



ENVIRONMENT IMPACT ASSESSMENT

ESTABLISHMENT OF JINNAH SPECIAL ECONOMIC ZONE AT DISTRICT THATTA (SINDH)



by

Green Infrastructure Development (Pvt) Ltd



Volume-I

Prepared for:

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EXECUTIVE SUMMARY

A Special Economic Zone (SEZ) under the SEZ Act, 2012¹ is being established at Thatta district. Developer (proponent) of the project is Green Infrastructure Development (Pvt) Ltd (GID), Islamabad, a 100% subsidiary of Frontier Works Organization (FWO). The company has been incorporated under the Companies Act, 2017 to develop the proposed SEZ to provide industrial infrastructure to host enterprises in different fields of economy to contribute to economic development focusing on green growth and sustainable development for rapid and planned industrialization.

This document contains the Environmental Impact Assessment (EIA) report for the proposed SEZ, which is the mandatory part of determining the feasibility of the project. Indeed, it is a legal requirement in Pakistan to conform to environmental laws while carrying out any developmental activity and get it approved from the concerned regulating agencies before embarking on the development activities. In addition, the aim of the EIA study is to ensure sustainable development in Pakistan and to establish a framework and related actions for evaluating and mitigating environmental and social impacts stemming from implementation of the Project.

Provincial environmental legislation also requires similar environmental approvals from relevant provincial authorities (provincial environment departments). In 2010, through the 18th Amendment in the Constitution of the Islamic Republic of Pakistan, 1973, environment became a provincial subject, empowering each province to make its own law and regulations.

This EIA report provides an assessment of anticipated positive and negative environmental and social impacts of the proposed project, along with the appropriate measures to further enhance the beneficial impacts and to mitigate any adverse impacts.

The Sindh Environmental Protection Agency (SEPA) is the lead agency for taking investment protection measures which was established in 1989 having its Head Quarters at Karachi. The Regional Offices at Hyderabad and Sukkur were established during 1998. Recently, three more Regional Offices at Karachi, Mirpur Khas and Larkana had been established. The major function of SEPA is to ensure protection, conservation, rehabilitation and improvement of the

¹ Amended in 2016

environment, the prevention and control of pollution, and the promotion of sustainable development through enforcement of Environmental Laws.

E-2. Environmental Legislative, Regulatory and Institutional Framework

National environmental laws, regulations, guidelines and policies applicable to proposed project have been provided below;

a) National Environmental Legislative, Regulatory and Institutional Framework

Pakistan Environmental Protection Act 1997 is the supreme environmental legislation in Pakistan. The Federal Environmental Protection Act, 2012 Section 12 requires the filing of an EIA for projects that are likely to cause adverse environmental effects. This EIA of the proposed project has been conducted in accordance with national and provincial environmental regulations and guidelines. Moreover, international commitments of Pakistan have also been kept in mind while preparing this report. National environmental laws, regulations, guidelines and policies applicable to proposed project are as under;

- Sindh Environmental Protection Act 2014;
- The Sindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2014;
- The Sindh Environmental Quality Standards (self Monitoring and Reporting by Industry) Rules, 2014;
- Sindh Environmental Industrial Waste Water, Effluent, Domestic, Sewerage, Industrial Air Emission and Ambient Air, Noise for Vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards, 2015;
- Sindh Environmental Protection Agency (Environmental Assessment) Regulation, 2021.

b) International Environmental Requirements

While preparing this study, Pakistan's international commitments towards environment protection have also been kept in view;

- Environmental Requirements of International Finance Corporation (IFC);
- Asian Development Bank (ADB) Environmental Assessment Guidelines;

- Environmental and Social safeguard of the World Bank.

E-3. Project Description

Creation of Special Economic Zones (SEZs) is linchpin of the policy of Government of Pakistan to become an active member of global international trading and investment system. The SEZ Act 2012² was promulgated for creation, development and efficient operations of SEZs through provisions of a legal and regulatory framework to encourage domestic and international investors for promotion and establishment of industrial infrastructure and for other matters connected or ancillary to.

FWO after thorough study and research of Pakistan's investment and trade regimes, international trends in industrial development and different models of SEZs around the world, has planned to establish a multi-activity and hi-tech SEZ promoting "Green Development" leading to sustainable development at a piece of land measuring 1114 acres in district Thatta (Sindh Province). The land (proposed project site) located in Deh Kohistan 7/1 Makan Kharion, Tapo Jhimpir, Taluka and Thatta District, was purchased by FWO in 2015 to facilitate its M-9 motorway construction operations.

Keeping in view the changing trends in business practices, the Developer has envisaged the Business Concept of the proposed SEZ based on "moving towards green development for sustainable development" which will make the proposed SEZ, the first green SEZ in Pakistan.

Establishment of Combined Effluent Treatment Plant and Solid Waste Management System, Fire Fighting System, Captive Solar Power Plant (100 MW), Palm Oil tree plantation, schools, training centers, hospital, workforce colony, and one-window facilitation services are part of project.

The conceptual Master Plan of the proposed SEZ (Jinnah SEZ) is given over leaf. (xviii-xxi)

2 Amended in 2016

E-4. Alternative Considerations

Alternatives are generally considered and analyzed to determine the most suitable way of achieving the project objectives. During the recent years, environmental and social concerns related to the developmental activities, are gaining significant momentum all over the world. Therefore, besides the technical and financial considerations, it is also required to recognize the environmental and social consequences of developmental projects, Alternatives considered in this EIA include following:

- **No project option**

A “No project option” simply indicates no harm to environment and society at all. Keeping in view the economic logic and conventional wisdom that that all types of development projects have some social and environmental benefits associated with it, two options were considered

- Housing Society; or
- Green SEZ providing industrial infrastructure.

In order to attain real benefits from regional cooperation dynamics and efforts having deeper market access of Pakistani products worldwide as per standards of international quality, establishment of an SEZ, fully equipped with industrial infrastructure was considered as the best option.

The rationale was that establishment of an SEZ will not only uplift standard of living of local people in Thatta district and in the province of Sindh but will also provide sustainable economic development at the national level. It is pertinent to mention that with rapid increase in population, the employment demand has also increased. With annual population growth rate of more than 2.1% in Pakistan, there is a strong need of developmental projects to move the wheel of economy and to overcome unemployment issues.

It is easily assessed that “No project option” will not be considered as it will be a barrier in national economic development. Therefore, establishment of an SEZ (Jinnah SEZ) at Thatta district near M-9 Motorway is highly recommended. However, the development project should be environmental friendly.

- **Alternate Site Selection**

The surrounding areas were surveyed to look for better alternatives if any available. But in the final analysis, the present site which is owned by FWO, and was purchased for facilitation of M-9, Motorway construction work turned out to be the best candidate for establishment of the SEZ; therefore, idea of alternate site selection was also dropped.

- **Design Alternatives**

The basic principles which should be adopted during the design phase were considered as under;

- **Design 1**

In design 1, the concept of same plot size for all types of identified industries was introduced. This concept was rejected based on the fact that different type of industries has different land demand for their efficient operation.

- **Design 2**

In design 2, the concept of traditional flexible zoning was considered. This concept was repealed because flexibility of zoning can cause unorganized and sporadic development wherein two different types of industries sharing neighborhood cannot be cost effective.

- **Design 3**

In third design, the proposed SEZ is designed under the concept of multi-activity and green development to accrue, and to ensure minimum harm to environment. The multi-activity model was chosen to host enterprises from different sectors of economy to gain benefits of economy of scales and reinforcing supply chain with environmental friendly technical innovations.

E-5. Physical Environment and Geography

Physical environment includes all features of the project site and its surroundings which may be directly affected due to the construction and operation the industrial undertakings. Physical environmental features discussed in this report include:

▪ **General Location of District Thatta**

District Thatta is situated at a distance of 98 kilometers in east of Karachi on National Highway. The district is surrounded on the north and northwest by Jamshoro district, on the east by Hyderabad, Tando Muhammad Khan, Sujawal districts and the Indus River while Indian Ocean is situated on the south of the district. The total area of the district is 8,570sq. Km. River Indus flows down-stream the Kotri Barrage through numerous creeks till its delta in the Arabian Sea near chachdehwal Mohammd at Ketu Bunder. The northern part of the district is paramount and known as "Kohistan" connected with a Kheerthar range of mountains.

▪ **General Topography of the Area**

Four talukas of district Thatta are on the right bank of Indus River and four lie on the left bank while one taluka is on both sides of the river. Due to the long coastal line of 107 kilometers as well as shortage of river Indus water, the southwestern part of the district is saline and sea-affected. The southern portion, adjoining the Run of Kachh, on the border of India, is desert like sandy area. The northern part of this district consists of small hills and torrents that are extended till Kheerthar range of mountains.

The topography of proposed project area is quite varied with elevations ranging from 77.3 to 237 m. The highest elevation point within project area is 124 to 145 m whereas, lowest is 110 m.

▪ **Climate of District Thatta**

According to the average results of 2014 to 2022 surveys, the climate of the district is moderate. The mean maximum and minimum temperature recorded about 39°C and 11°C respectively. The sea breeze blows for eight months of the year, from March to October, making the hot weather comparatively cool. As a result, there is an immediate fall in temperature. January is the coldest month. In Thatta, the summers are sweltering, muggy, arid, and windy; the winters are short, comfortable, and dry; and it is mostly clear year round. Over the course of the year, the temperature typically varies from 11°C to 39°C and is rarely below 8°C or above 42°C.

▪ **Geological Setting**

Geologically, Thatta is formed of volcanic and sedimentary rocks of quaternary and tertiary sediments and has the same composition as that of the Indus plain and the eastern desert zones of

Pakistan containing the deserts of Cholistan, Nara and Thar. The soils are silty clayey wet and saline. The natural vegetation found in the district can be divided into two categories mangroves in the coastal or delta zone, and tropical thorns in the rest of the district. According to the United States Geological Survey (USGS), the proposed project area is divided in the two categories Neogene Sedimentary Rocks and Quaternary Sediments i.e. sedimentary rocks and sediments.

- **Soil Setting**

The soils are silt, clayey wet and saline. The natural vegetation found in the district can be divided into two categories-mangroves in the coastal or delta zone, and tropical thorns in the rest of the district. The lands in the district can be divided into five major categories; lands not available or fit for agriculture, those under arable agriculture, forests, rough grazing lands and areas under human settlements.

The project site is mainly sedimentary rocky hills (mountains) and loose sediments predominantly deposits of older River.

- **Seismicity**

Seismic Zoning Map of Pakistan places district Thatta in Zone 2A and 2B where it represents peak horizontal ground acceleration from 1.6 to 0.8.

- **Temperature**

The hot season lasts for 3.0 months from April 3rd to July 5th, with an average daily high temperature above 97°F. The hottest month of the year in Thatta is June, with an average high of 99°F and low of 83°F. The cool season lasts for 2.0 months, from December 10th to February 10th with an average daily high temperature below 83°F. The coldest month of the year in Thatta is January, with an average low of 53°F and high of 79°F.

- **Precipitation**

The wetter season lasts 1.9 months, from July 8th to September 4th with a greater than 8% chance of a given day being a wet day. The month with the wettest days in Thatta is August, with an average of 3.7 days with at least 0.04 inches of precipitation.

▪ **Wind**

The average hourly wind speed in Thatta experiences extreme seasonal variation over the course of the year. The windier part of the year lasts for 5.0 months, from April 15th to September 15th with average wind speeds of more than 11.2 miles per hour. The windiest month of the year in Thatta is June, with an average hourly wind speed of 15.4 miles per hour.

▪ **Ambient Air Quality & Noise**

The air quality in the project area is generally good with very few sources of pollution like emissions from vehicles and dust due to blowing wind. The main pollutants emitted by vehicle exhaust pipes are particulate matter, carbon monoxide, sulfur dioxide and nitrogen oxides. These emissions generally may affect the air quality in the vicinity of the roads. It is reported that strong winds lead to high levels of air borne dust and occasionally give rise to short-duration dust storms. However, the effect is localized, seasonal and temporary.

The proposed project will not produce significant amount of pollutants (dust, emissions during construction) that can cause significant impact on the air quality of the project area.

▪ **Water Resources**

District having lot of creeks, freshwater lakes, estuary and river Indus thus the large variety of freshwater and estuarine fish exploited. In this district large freshwater lakes are present namely Keenjhar, Haleji, Hadero and Muradani. A number of creeks and estuarine depressions are interconnected with sea-water and river Indus which are source of fish and fisheries for the country. Well-known river Indus delta is spread over the area of about 0.61 million hectares in this district which supports mangrove vegetation.

The project area lacks any prominent surface water source in proximity, and people depend upon the rainfall for raising livestock and millet crops. Locals have to walk miles every day to access clean, safe water for drinking, cooking, washing or bathing. Meanwhile for high requirement they are dependent on water tanker.

There are two wells at the project site supplying water to FWO Camp Office.

- **District Hazard Profile**

District Thatta is vulnerable to various natural and human induced hazards including floods, cyclones, droughts, sea intrusions, deforestation of mangroves, water logging and salinities and earthquakes as natural hazards Wild fires, civil unrests, road accidents and health epidemics are prominent human induced hazards. Besides, poor communication infrastructure, lack of health facilities, low literacy ratio and poverty especially in the remote coastal villages makes the area very vulnerable to various hazards.

Flooding has been reported as the most frequent and damaging natural hazard in the district which occurs at regular intervals during the monsoon seasons.

- **Protected Areas**

There is neither protected area nearby nor any wildlife sanctuary near the project site.

E-6. Ecological Environment

Ecological resources are very important to create a balance in the ecological habitats. Therefore, the documentation of the state of present ecological conditions of the proposed project is highly significant to observe the impacts of the project on the indigenous environment.

- **Ecology of Project Area**

The project site is located in a highly arid environment with very little rainfall. Comprehension of this ecosystem is essential for the development of ecological profile of the area. The existing knowledge of the ecology is quite significant both at the construction and operational phases of the project.

- **Floral Attributes of the Project Area**

A total of 23 species of plants were observed within the vicinity of the proposed project site while the dominant plant species includes *Prosopis glandulosa*, *Suaeda fruticosa*, *Capparis decidua*, *Ziziphus nummularia*, *Acacia nilotica*, *Acacia Senegal*, *Prosopis juliflora*, *Aervajavanica*, *Parkinsonia aculeata* and *Calotropis procer*.

Most dominating plant found in the area is *prosopisglandulosa* and *Ziziphus nummularia* with very high number of counts.

▪ **Faunal attributes of the Project Area**

Sporadic flora of the area provides few opportunities for fauna to exist in small numbers. Proposed project site is located in highly arid environment. The faunal species observed during the survey were mainly of desert origin along with few migratory birds. Moreover, it is important to note that the proposed project site sustains few rare species of birds as well and list of identified avifauna, mammals and reptile species of the proposed project area are given in details in the relevant Chapter.

▪ **Mammals and Reptiles**

Direct count method was adopted to identify total number of identified species during the ecological/ baseline surveys. The proposed project area sustains few domesticated mammals such as: five striped Palm Squirrel, Dogs, Buffalo, Sheep, Goats, Jackals and Donkey are the common species of the area while small Indian mongoose is less common. Reptiles' species are quite dominant and their burrow pits are quite obvious near the project area.

None of the species recorded is protected, threatened or included in the International Union for Conservation of Nature (IUCN) appendices.

E-7. Socio-Economic and Cultural Environment

The purpose of the baseline socio-economic conditions of the project area description is to provide a basis for the evaluation of the positive and negative (e.g. employment and quality of living) socio-economic impacts of the proposed project.

Project Area comprises of approx. 1142.83 acres (on ground) and will be offering industrial plots, logistic & ware-housing facilities, trading opportunities, R&D services, power plant, and all other facilities and infrastructure for a modern and green industrial hub with health, safety and accommodation provisions. The project will create direct and indirect jobs along with human development opportunities. These initiatives will bring prosperity in the local communities.

E-8. Stakeholders Consultation leading to better and more acceptable decision-making

Stakeholders, for the purpose of this EIA study have been divided into two broad categories, local community and government departments. Relevant stakeholders including Agriculture, Communication and works, Trade & Industry, Investment, Education, Environment, Fisheries,

Forest, Health, Public Health Engineering, Revenue Board, Wildlife department were consulted. According to these offices, there is no existing or ongoing project of their departments at site area. District office environment is in full support of this SEZ. The business concept of the project focusing on sustainable development and minimizing industrial pollution was appreciated. Establishment of combined effluent treatment plans, waste management system, cultivation of Palm trees and installation a solar power plant was hailed by all stakeholders including the local communities.

E-9. Environmental and Social Impacts and Mitigation Measures

Potential impacts described in this EIA are primarily caused by changes to the existing socioeconomic and biophysical environment brought on by the proposed project and thus should be interpreted in conjunction with the sections of the report addressing these biophysical and socio-economic dimensions. Potential impacts along with their mitigation are detailed in **Table-E: 1**.

E-10. Environmental Management and Monitoring Plan

The purpose of Environmental Management and Monitoring Plan (EMMP) is to provide a framework for the implementation of the mitigation and monitoring measures which were identified in the EIA. This EMMP has been prepared on the basis of the details currently available and envisaged plans about the construction, operations and maintenance of the proposed project.

However, this EMMP should be considered as a live document which may need to be amended in order to incorporate changes in the design of the proposed project.

Specific roles and responsibilities for monitoring are provided in the following **Table-E: 2**

Aspect	Project Developer (GID)	EPC Contractor	Relevant Documentation
Contracting	Ensuring that monitoring and mitigation requirements are included in the contract between GID	Understanding the requirements and estimating the required resources	Contract between GID and the construction contractor/s.

	and the construction contractors		
Monitoring Plan	Confirming finalization of Monitoring Plan before commencement of project construction.	Prepare a Construction Management Plan.	Finalized Monitoring Plan and Construction Management Plan.
Resources	Ensuring availability of required resources for environmental monitoring.	Ensuring availability of required resources for environmental management and monitoring.	Project Budget
Environmental Staff	Nominating a qualified person in the field (an Environmental Manager) along with a Team for the proposed project.	Nominating an Environmental Manager for the proposed Project (may be combined with Health and Safety)	Job description and KPIs
Monitoring Surveys, oversight and Inspections	Carrying out regular inspections of contractor's environmental performance and carrying out further measurements when necessary.	Conducting regular inspections and collecting data on environmental performance, and carry out surveys.	Inspection and survey reports.
Environmental Audit	Conducting periodic audits of the construction site.	Conducting periodic internal audits.	Audit reports
Reporting	Ensuring that periodic environmental monitoring reports are received from the construction contractor/s. Reviewing those reports.	Generating environmental monitoring reports periodically and circulating those among the developer's management and appropriate staff members.	Environmental monitoring reports.
Corrective Actions	Confirming/ verifying that activities carried out comply with the EIA/EMMP and identifying corrective	Carrying out corrective actions as required	Corrective actions reports and record.

	actions if necessary		
Maintenance of Records	Maintaining the monitoring data and recording all incidents of environmental significance and related corrective measures.	Maintaining monitoring data and recording all incidents of environmental significance and related corrective measures	Environmental databases.

Table-E-2: Roles and Responsibilities for Environmental Monitoring

▪ **Monitoring Plan**

Environmental monitoring is important component of any EMMP. It is the mechanism through which the effectiveness of EMMP is measured. Monitoring will be performed to determine whether the project contractors, Developer and other stakeholders are carrying out the project in accordance with the EIA and EMMP.

E-11. Conclusion

The Project has been envisaged on the concept of green and sustainable development. It will ensure all environmental protection and safety requirements and will pro-actively promote the cause of environment. GID (Developer) will incorporate state-of-the-art solar power project, digital technologies, tree plantation, effluents and emissions treatment technologies to minimize the associated wastes and mitigate their adverse impacts on the physical, biological, socio-economic and cultural environment of the local area, and the region to the maximum possible levels. The enterprises in the zone will also be responsible to follow the environmental friendly processes and procedures.

This EIA has endeavored to document all major environmental concerns associated with the project. A series of mitigation and monitoring measures have been included to address these concerns. Assuming effective implementation of the mitigation measures and monitoring requirements as outlined EMMP, the adverse environmental and social impacts of the proposed project are likely to be within the acceptable limits.

GID is committed to contribute positively towards environmental safety, protection, promotion and sustainable development.

Table E-1: Environmental and Social Impacts of the Proposed Project

Subject Area	Potential Impacts During Construction	Potential Impacts During Operation	Mitigation
Physical Environment	Air Quality Dust from construction activities. Traffic-related air quality impacts.	Effects of stacks emissions on ambient air quality. Traffic-related air quality impacts. Green House Gas emissions	Watering of the material stockpiles, access roads and bare soils on an as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds). Stored materials such as gravel and sand should be covered and confined Vehicles with appropriate exhaust systems will be used. Maintenance of all vehicles on regular basis. Establish and implement vehicle speed limits to minimize dust generation Cover haul vehicles transporting dusty materials (cement, borrow and quarry) moving outside the construction site Use of specified haulage routes and reduce vehicle speed where required.
	Water Resources Control and management of site drainage. Wastewater discharge. Sewage disposal and foul drainage. Effects on groundwater quality.	Water requirements for power plant operation Discharge of process and wastewater. Operation of drainage systems on site. Discharge of storm water, sewage and drainage.	Stockpiles of potential water pollutants (i.e. oils, construction materials, fuel, etc.) shall be placed so as to minimize the potential of contaminants to enter local watercourses or storm-water drainage. Preparation of Emergency Spills Contingency Plan. Storm-water runoff from all fuel and oil storage areas, workshop, and vehicle parking areas is to be directed into an oil and water separator before being discharged to any watercourse.

Table E-1: Environmental and Social Impacts of the Proposed Project

Subject Area	Physical Environment		Potential Impacts During Construction	Potential Impacts During Operation	Mitigation
Soils, Geology and Topography			Effects on soils and topographic features. Soil contamination.	Soil Contamination during coal and ash handling.	Ensure the topography of the final surface of all raised lands are favorable to enhance natural draining of rainwater / flood water; Restore the natural landscape of the construction sites after completion of works
Land Use, Landscape and Visual Issues			Impacts on existing land use on site. Impacts on existing land use in the surrounding area. Effects of construction activities on landscape character. Visual impact of construction activities.	Impacts on existing land use on site. Impacts on existing land use in the surrounding area. Effects on landscape character. Visual impact of operating facilities.	Stop work and inform the site manager immediately if, during construction, an archaeological or burial site is discovered. It is an offence to restart work in the vicinity of the site until approval to continue is awarded by the plant management. Resolve landscape change issue in consultation with local leaders and supervision consultants.
Flora			Loss of natural vegetation and crops	Impacts on flora due to altered drainage and runoff patterns.	Removal of trees should be limited to the development footprint. Construction activities shall reduce the loss or disturbance of vegetation Use clear areas to avoid cutting of trees. A procedure shall be prepared to manage vegetation removal, clearance and reuse Inform the plant management before clearing trees

Table E-1: Environmental and Social Impacts of the Proposed Project

Subject Area	Potential Impacts During Construction	Potential Impacts During Operation	Mitigation
Fauna	Losses of habitat or species due to land take. Disturbance or damage to adjacent habitat of species.	Disturbance or damage to adjacent habitat. Effects on bird migration routes.	Project should ensure the safety of various animals at power plant in construction and operation camp area.
Economy Related Impacts	Impacts on local skilled and un-skilled labor and businesses.	Impacts on local labor and businesses	The increased government revenue could be used to meet objective by improving infrastructure and services in areas local to the project. Engage local youth and workforce according to their skill set Local businesses to be engaged by out-sourcing small assignments
Social Setting and Services Related Impacts	Demographic changes due to influx of people. Pressure on existing infrastructure, utilities and services.	Small scale demographic and cultural changes.	Safe and reliable water supply. Sufficient housing for all. Hygienic sanitary facilities and sewerage system. Treatment facilities for sewerage of toilet and domestic wastes In-house community entertainment facilities. Storm water drainage facilities.
Public Health Related Impacts	Traffic congestions and disruption to road users Health impacts due to construction related dust and air emissions and waste water/effluents release Traffic-related air quality.	Health impacts due to air emissions and power plant noise and effluents released. Traffic-related air quality impacts. Traffic-related noise impacts	Implement proper safety standards. Provide personal protection equipment (PPE) for staff, such as safety shoes, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE under a regular checking and replacement program. Provide safe and healthy work environment to workers, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas.

Physical Environment

Table E-1: Environmental and Social Impacts of the Proposed Project

Subject Area		Potential Impacts During Construction	Potential Impacts During Operation	Mitigation
Physical Environment	Occupational Health and Safety	Accidents. Effects on health of workforce. Safety at work.	Accidents. Effects on health of workforce. Safety at work.	A traffic management plan will be developed by the construction contractor to prevent incidents of accidents which may occur due to transportation of machinery and equipment to the project site. Undertake a full project community risk assessment followed by the development of a community emergency preparedness and response plan appropriate to its findings
	National and Regional Impacts	Human resource development. Economic development at regional and national level.	Industrial development in Sindh Pakistan National and regional power crises Impacts on regional and national air quality	The increased revenue could be used to meet development objective by improving infrastructure and services in areas local to the project.
	Global Impacts	Purchase of power plant equipment and machinery from global markets. Hiring the international contractors and consultants.	Green House Gas emissions and climate change. Impacts on global air quality and global warming.	Maintenance of all construction machinery on regular basis. Use of machinery with appropriate exhaust systems. In order to control the particle emissions in all stages filtering systems, duct collectors or humidification or other techniques (as applicable) to the concrete batching and mixing plant will be provided.



CONCEPTUAL MASTER PLAN



LEGENDS

INDUSTRIAL ZONE	
12 ACRE PLOT	
10 ACRE PLOT	
08 ACRE PLOT	
03 ACRE PLOT	
02 ACRE PLOT	
01 ACRE PLOT	
TRADE CITY	
08 ACRE PLOT	
07 ACRE PLOT	
02 ACRE PLOT	
01 ACRE PLOT	
ICT PARK	
02 ACRE PLOT	
01 ACRE PLOT	
0.5 ACRE PLOT	
COMMERCIAL	
5 MARLA PLOT	
7 MARLA PLOT	
WATER TANK	
SCHOOL	
COLLEGE	
HOSPITAL	
MOSQUE	
HIGH RISE FLATS	
TRAINING CENTER	
ADMIN BLOCK	
GREEN / PARK	
RO PLANT	
GRAVEYARD	
SOLID WASTE	
MANAGEMENT PLANT AREA	
SPORTS COMPLEX AREA	
SEWERAGE TREATMENT PLANT	
WATER TANK	
ROADS / STREETS / PARKING	

PROJECT LAND USE SUMMARY					
A. INDUSTRIAL ZONE AREA					
INDUSTRIAL PARK					
SR . NO	PLOT SIZE(ACRE)	DESCRIPTION	NO OF PLOTS	AREA (SFT)	AREA(ACRE)
1	12	BLOCK A	10	5294378.536	121.54
2	10	BLOCK B	10	4367215.846	100.26
3	6	BLOCK C	10	2618508.756	60.11
4	3	BLOCK D	26	3461193.893	79.46
5	2	BLOCK E	39	3465319.761	79.55
6	1	BLOCK F	35	1600568.371	36.74
TOTAL					477.67
TRADE CITY					
SR . NO	PLOT SIZE(ACRE)	DESCRIPTION	NO OF PLOTS	AREA (SFT)	AREA(ACRE)
1	8	BLOCK G	1	367296.042	8.43
2	7	BLOCK H	1	301976.250	6.93
3	2	BLOCK I	20	1733515.465	39.80
4	1	BLOCK J	5	226621.936	5.20
TOTAL					60.36
ICT PARK					
SR . NO	PLOT SIZE(ACRE)	DESCRIPTION	NO OF PLOTS	AREA (SFT)	AREA(ACRE)
1	2	BLOCK K	8	696915.3668	16.00
2	1	BLOCK L	20	871200.000	20.00
3	0.5	BLOCK M	20	471769.0932	10.83
TOTAL					46.83
CAPTIVE SOLAR POWER PLANT					
SR . NO	AREA (SFT)			AREA(ACRE)	
1	9379139.654			215.32	
TOTAL				215.32	
A. INDUSTRIAL ZONE AREA				800.17	

B. COMMERCIAL, LABOUR COLONY, AMENITIES AND ROADS AREA				
COMMERCIAL				
SR . NO	AREA SFT			AREA(ACRE)
1	753417.472			17.30
TOTAL				17.30
LABOUR COLONY				
SR . NO	AREA (SFT)			AREA(ACRE)
1	2923005.135			67.10
TOTAL				67.10
AMENITIES AREA				
SR . NO	NO	DESCRIPTION	AREA (SFT)	AREA(ACRE)
1	5	MOSQUE	123120.000	2.83
2	2	SCHOOL	157257.829	3.61
3	2	COLLEGE	316407.808	7.26
4	4	HOSPITAL	276388.942	6.35
5	1	TRAINING CENTER	34000.000	0.78
6	1	ADMIN BUILDING	34000.000	0.78
7	2	WASTE MANGEMNT PLANT	286005.352	6.57
8	1	SPORTS COMPLEX	204436.297	4.69
9	7	RO PLANT	4375.000	0.10
10	4	STP	432316.552	9.92
11	1	GRAVEYARD	986693.988	22.65
12	10	WATER STORAGE TANK	12566.371	0.29
13	N.A	GREEN AREA	1845564.047	42.37
TOTAL				108.20
ROAD AREA				
SR . NO	AREA (SFT)			AREA(ACRE)
1	6536884.366			150.07
TOTAL				150.07
B. COMMERCIAL, LABOUR COLONY, AMENITIES AND ROADS AREA				342.66
GRAND TOTAL = (A+B)				1142.8388

SCHEDULE III

(See Regulation 5)

List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation more than 50 MW
2. Thermal power generation more than 100 MW
3. Coal power projects more than 50 MW
4. Transmission lines above 132 KVA and distribution projects.
5. Nuclear power plants
6. Wind, Solar or renewable energy projects if falls under any environmental sensitive and protected area.

B. Oil and Gas projects

1. Oil Petroleum refineries.
2. LPG and LNG Terminals Projects
3. Coal Handling Terminals Projects

C. Manufacturing and processing

1. Cement plants
2. Chemical manufacturing industries
3. Fertilizer plants
4. Steel Mills
5. Sugar Mills and Distilleries
6. Establishment of Industrial estates & Export processing zones
7. Petrochemicals complex
8. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulping, plastic products, printing and publishing, paints and dyes.

D. Mining and mineral processing

1. Mining and processing of coal, gold, copper, sulphur and precious stones
2. Mining and processing of major non-ferrous metals, iron and steel rolling
3. Metal Smelting plant production capacity more than 20 tons/day

E. Transport

1. Airports
2. Construction of highway, motor ways, major roads (Intercity roads) more than one km and above

3. Ports and harbor development
4. Mass transit projects
5. Railway works
6. Construction of Flyover, underpass and bridges having total length more than one km.

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of 25 million cubic meters and above having surface area of 4 square kilometers and above
2. Irrigation and drainage projects serving more than 15,000 hectares and above

G. Water supply and filtration

Public water supply schemes and **filtration** plants.

H. Waste Disposal and treatment

1. Facilities for handling, storage or disposal of hazardous or toxic wastes or radioactive waste (including landfill sites, incineration units, etc.)
2. Solid waste municipal landfill sites.
3. Combine Effluent Treatment Plant
4. Domestic wastewater treatment plant more than 100mgd

I. Urban development and tourism

1. Housing schemes above 50 acres
2. Residential, Commercial High rise buildings subject to compliance of building bylaws of relevant organizations more than 500,000 sq. feet
3. All Projects located in High Density Zones notified by Government and relevant land controlling organization, irrespective of their size.
4. Commercialization of major corridors/roads in urban centers
5. Large Scale public facilities
6. Large-scale tourism development projects

J. Environmentally Sensitive Areas

SCHEDULE V
[See Regulation 9(2)(a)]
Application Form

1.	Name and address of Proponent	Phone: 051- Email: AHMAD JAMAL greeninfra@pl@gmail.com	
2.	CNIC No. of proponent	42301-6061658-1	
3.	Brief description of project	Establishment of SEZ under SEZ Act and focus on green & sustainable development	
4.	Location of project	7/1 Doh Kolistan Topo Jhangir Thatta	
5.	Cost of the Project	PKR: 13, 057, 030, 000/-	
6.	Objectives of project	To build Industrial Infrastructure to attract FDI & local investment	
7.	IEE/EIA attached?	IEE/EIA: ☒ Yes ☐ No	
8.	Have alternative sites/options been considered/ reported in IEE/EIA?	☒ Yes ☐ No	
9.	Title document of the project	Environment Impact Assessment for establishment of Jinnah SEZ at Thatta district	
10.	Existing land use	FWO, Camp office	Land requirement 1142-83 acres, land is possession of proponent
11.	Is basic site data available, or has it been measured?	(only tick yes if the data is reported in the IEE/EIA)	
		Meteorology (including rainfall)	☒ Available ☐ Measured
		Ambient air quality	☒ Yes/No ☐ Yes/No
12.	Have estimates of the following been reported, especially Quantitative Analysis?	Water balance	☒ Yes/No ☐ Yes/No
		Solid waste disposal	☒ Yes/No ☐ Yes/No
		Liquid waste	☒ Yes/No ☐ Yes/No
13.	Source of power	Captive Solar Power plant	Power requirement 250MW
14.	Labour force (number)	Construction: Operation:	
15.	Environmental Consulting Firm	EMC Pakistan, Private limited AR Consultants, Private limited	

Verification, I do solemnly affirm and declare that the information given above and contained in the attached EC/IEE/EIA is true and correct to the best of my knowledge and belief.

Date



Signature, name of proponent (with official stamp/seal)

GM (Business Development)
HQ FWO (CBD Dte)
(Ahmad Jamal)

CHECK LIST

Under Schedule III of the Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021, the proposed Project Jinnah SEZ Thatta, falls in the list of projects requiring an EIA as per section C: Manufacturing and processing, sub-section 6 “establishment of industrial estates and export processing zones”.

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ACRONYM

Sr.#	Term	Abbreviation
	Asian Development Bank	ADB
	Built-own-Lease-Transfer	BOLT
	Common Effluent Treatment Plant	CETP
	Carbon Dioxide	CO ₂
	Chinese State owned Enterprises	SOEs
	Convention on Combating Desertification	CBD
	Corporate Social Responsibility	CSR
	Construction Management Plan	CMP
	Domestic Investment	DI
	Engineering, Procurement and Contracting	EPC
	Emergency Response Team	ERT
	Environmental Quality Standards	EQS
	Environmental Impact Analysis	EIA
	Environment and Social Governance	ESG
	Environmental Management and Monitoring Plan	EMMP
	Food and Agriculture Organization	FAO
	Foreign Direct Investment	FDI
	Frontier Works Organization	FWO
	Global Value Chain	GVC
	Global Alliance of Special Economic Zones	GASEZ
	Green Infrastructure Development (Pvt) Ltd	GID
	Green House Gases	GHG
	Grievance Redress Mechanism	GRM
	Grievance Focal Points	GFPs
	Health, Safety & Emergency	HSE
	Information Communication Technology	ICT
	International Finance Corporation	IFC
	Initial Environmental Examination	IEE
	Islamabad Capital Territory	ICT
	International Union of Conservation of Nature	IUCN
	Karakoram Highway	KKH
	Land use and Land cover	LULC
	Medical Safety Data Sheet	MSDS
	National Conservation Strategy	NCS
	Non-Governmental Organizations	NGOs
	Pakistan Environmental Protection Agency	Pak-EPA
	Pakistan Environmental Protection Act	PEPA
	National Environment Conservation Strategy	NECS
	National Environmental Quality Standards	NEQS
	Pakistan Environmental Protection Council	PEPC
	Research & Development	R & D

Sr.#	Term	Abbreviation
	Right of Way	ROW
	Security Exchange Commission of Pakistan	SECP
	Sindh Environmental Protection Agency	SEPA
	Sindh Coastal Development Agency	SCDA
	Sindh Environmental Quality Standards	SEQS
	Sindh Environmental Protection Council	SEPC
	Sindh Industrial Trading Estate	SITE
	Sanitary Sewer Overflows	SSOs
	Social Impact Assessment	SIA
	Socially Responsible Investment	SRI
	Sindh Special Economic Zone Authority	SEZA Sindh
	Special Economic Zone	SEZ
	Special Purpose Vehicle	SPV
	Sustainable Development Goals	SDGs
	Sewer System Management Plan	SSMP
	United Nations	UN
	United Nations Education, Scientific and Cultural Organization	UNESCO
	United States Geological Survey	USGS
	United Nations Framework Convention on Climate Change	UNFCCC
	United Nations Conference on Trade and Development	UNCTAD
	World Wide Fund for Nature	WWF
	World Bank	WB

CHAPTER-1

OVERVIEW

1.1. Introduction

Green Infrastructure Development (Pvt) Ltd (GID) has been incorporated under the Companies Act 2017 FWO for development of a Special Economic Zone (SEZ) under the Special Economic Zone Act, 2012³. GID as a Special Purpose Vehicle (SPV) is the Developer the SEZ called Jinnah SEZ (the proposed zone) to be established on a piece of compact land measuring 1142.8388 acres located at Thatta district, the province of Sindh. The Zone Developer (GID) is committed to contribute significantly towards sustainable development in Pakistan in line with the environmental laws, rules and regulation, and the provisions of the SEZ Act.

The document in hand is Environmental Impact Assessment (EIA) for the proposed project which is mandatory part of determining technical feasibility of the project. Undoubtedly, it is a legitimate necessity in Pakistan to fit in with environmental laws while doing any industrial developmental initiative. EIA needs to get endorsed from concerned regulating agencies before setting out on developmental activities. After the 18th amendment in Constitution of the Islamic Republic of Pakistan, Provincial environmental legislation likewise requires comparable environmental endorsements from provincial authorities (provincial environment departments). This EIA has been conducted in accordance with provincial environmental regulations and guidelines (SEPA Environmental Protection Act, 2014 and other regulations there under). However, where provincial laws are yet not framed national laws will be applied.

In addition, other relevant international environmental laws and regulations such as World Bank (WB), International Finance Corporation (IFC) and Asian Development Bank (ADB), have also been considered/consulted. Detailed discussion on relevant environmental legislation is provided in Chapter 2 of this Study Report.

This EIA report provides an assessment of anticipated positive as well as negative environmental impacts of the proposed Project. Social impacts have also been discussed on the sidelines to make the Study more comprehensive. To further enhance the beneficial impacts and to mitigate

³ Amended in 2016

any adverse impacts appropriate measures are provided which will be followed during the construction and operational phases of the proposed project.

1.2. Project Introduction

The proposed project is establishment of an SEZ at Thatta district near M-9 Motorway (Karachi-Hyderabad Motorway) in the Sindh Province. The territory of this bequest is roughly 1142.8388 acres which is owned and also in possession of FWO, the parent company. The project is part of FWO's remarkable contributions over the years towards Pakistan's infrastructure development needs all over the country.

Keeping in view the changing trends in business practices, the Developer has envisaged the Business Concept of the proposed SEZ Based on "moving towards green development for sustainable development" which will make the proposed SEZ, the first green SEZ in Pakistan. The Business Concept has following building blocks/ focus;

- A delimited area⁴ where Developer is committed to provide infrastructure, transportation links and utilities such as electricity and water inside the zone;
- Provision of captive power project based on solar to supply uninterrupted, low cost and green energy to zone enterprises;
- Waste treatment plant and recycling plant to avoid damage of waste dumping;
- Palm Oil Plantation all along boundary wall and inside the Zone to boost healthy environment and support Sindh Coastal Development Agency (SCDA) in its endeavors of Palm Oil Tree Plantation;
- Commitment to Corporate Social Responsibility (CSR) obligations and good governance;
- Gender-equality bench marks;
- Minimum emissions and waste;
- High labor, health and safety standards;
- Creation of backward and forward market linkages;
- Spillover of best practices;
- Initial Project cost to be met by own resources.

⁴ section 3(n) of the SEZ Act

1.3. Project Need and Justification

The principle motivation behind the foundation of the proposed SEZ is to provide industrial infrastructure to promote much needed socially responsible investment (SRI) in the country to bring in capital, technology, job opportunities, provide import substitution with export-focused investment and related socio-economic development in the country to enhance quality of life of people. The development initiatives by private sector in Thatta city is being done in an unplanned way. This has brought about foundation of scattered industrial units inside the city's urban territory and can be regarded as major cause of nuisance and pollution by city dwellers and environments.

In Pakistan, the environmental degradation and climate change are adversely affecting the economy, livelihood especially the poor and sustainable development. A joint study titled “Climate Risk Country Profile” for Pakistan released by the two international lending agencies (Asian Development Bank and World Bank Group) has put Pakistan among the top risk-prone countries in terms of increase in average temperatures and resultant economic and social losses. The study has estimated that Pakistan is facing up to \$3.8 billion in annual economic loss due to climate change⁶. The study noted that Pakistan faces increases in average temperatures significantly above the global average with a potential rise of 1.3°C-4.9°C by the 2090s over the 1986-2005 baseline, one of the highest disaster risk levels in the world, and ranked 18 out of 191 countries by the “2020 Inform Risk Index”. The global average by 2080-99 is estimated at about 3.7°C under the highest emission estimates.

Growing population, unplanned urban expansion, depletion of natural resources, deforestation and mismanagement (mishandling) of solid waste have triggered the environmental issues. Carbon dioxide (CO₂) and other Green House Gases (GHG) mostly from fossil fuel emissions and increased industrial activities have further aggravated the adversities of climate change.

International pressure to combine environmental and economic performance, are placing SEZ activities under increasing scrutiny. International environmental commitments, such as the Paris Agreement on Climate Change, require national governments to reduce emissions. Meanwhile, international producers also face mounting consumer pressure to ensure sustainable supply

⁶ The Business Recorder, 19 May 2021

chains. For example, Unilever has set targets to source 100% of energy across all of its operations from renewable sources by 2030, partly in response to consumer concerns.

SEZs can be instrumental to combine the environmental and economic targets under one roof. Green growth & development is a mean to stay competitive in global markets. This is a vital concept that recognizes the fact that to be competitive in global markets, industries must meet the principles of a green economy and contribute to sustainable development. In other words, industries and firms must ensure that their business practices contribute towards human, social, economic and environmental causes.

In Pakistan, SEZs can become the backbone of rapid economic development, the epicenter of reforms, and the testing ground for the introduction of new business concepts, models and activities for long-term learning and value ladder up-gradation.

The Business Concept of the Jinnah SEZ is not only will provide “windows” to promote economic, trade and investment exchange between Pakistan and the rest of the world but will add to economic, social, and sustainable development reform agenda. At one hand, it will promote concept of green development and on the other, it will contribute towards reduction of import bill on coal and other fuel to generate electricity, and providing low cost energy from solar resources.

1.3.1. Objectives of the Project

The Zone Developer (GID) aims to provide opportunities to meet the emerging challenges posed by new industrial revolution created by digital economy, changing pattern of international production, and sustainable development imperatives;

- implementing greener production processes and encouraging energy efficiency improvements for existing industries;
- testing innovative green policies and setting low-carbon targets and testing experimental policies aimed at reducing environmental impact of growth;
- developing green product supply chains by attracting investment that support the green transition such as solar energy panel production;
- developing a sustainable industrial sector in line with the targets of SDG-9;
- focus on people, social development, economic growth and environmental protection;

- creation of regional and international linkage for investment and trade flows;
- fostering domestic forward and backward market linkages;
- achieve international environmental commitments such as nationally determined contributions under the Paris Agreement-while pursuing national agenda of industrial development.

In the short term, the Green Business Concept will leverage the existing investments and logistics infrastructure to produce industrial goods more efficiently with a reduced environmental impact. In the medium term, it will support economic diversification and focus efforts and policies to produce low-carbon products (environmentally friendly products), and innovations both goods and services.

And over a strategic time period, green industrial clusters provide support for other zone types and organize regional resources to deliver green products for the global supply chain. By considering green pathways to industrialization, GID's well-designed SEZ at Thatta will play a crucial role in delivering desired objectives which seek to balance the economic, environmental, and social dimensions of growth and development.

1.4. Project Proponent and Developer

As mentioned earlier, proposed Project is being developed by Green Infrastructure Development (Pvt) Ltd (GID), a subsidiary of FWO.

1.4.1. Profile of FWO and Contact Information

FWO, Pakistan's most versatile and vibrant construction firm, was established on 31st October 1966 to carve out an all-weather land link across crags and crevices of the highest mountain ranges of the world, the Karakoram Highway (KKH) which is recognized as Eighth Wonder of the World. Over the years, FWO has played a leading role for the development of diversified communication infrastructure including roads, railway-lines, airfields, building of dams, canals and barrages, thermal and hydel-power projects, tunneling and mining, construction of residential and industrial units and proved its unmatched qualitative and quantitative potential. FWO has established Pakistan's first Service Sector SEZ (Oil Village SEZ) in Rawalpindi providing a strategic storage place for 50,000/ MT of oil. Beyond the national frontiers, it has

successfully undertaken projects in Kuwait, Afghanistan, Liberia and UAE. The quality work for ‘Joint Ventures’ with multinationals on projects both inland and abroad is assured through the qualified staff and over all monitoring through Operations Directorate.

Having its Head Office is at Rawalpindi; FWO believes in “Strive for Excellence” and is constantly moving towards new peaks of engineering competence to execute national and international projects with a focus on generating economic and social value for all stakeholders. Keeping the vision and mission to serve the country, FWO has incorporated a new subsidiary GID to develop and manage the proposed SEZ (Jinnah SEZ) at Thatta district.

1.4.1.2. GID-the Developer

GID is mandated to perform all responsibilities as zone developer given in the Section 20 of the SEZ Act;

- GID will develop and operate the proposed SEZ within a specified time period as will be scheduled in zone development plan;
- GID will approve zone enterprises and allot land to enterprises in accordance with the applicable zone admission criteria, zone regulations and the terms of the development agreement;
- monitor and ensure the compliance of zone enterprises with all applicable zone regulations;
- all other responsibilities and obligations for smooth operations of the proposed SEZ;
- will make sure that business concept of GID is implemented and achieved in letter and spirit by all stakeholders.

- **Vision Statement**

Moving towards Green and Sustainable Development;

- **Mission Statement**

Provision of state-of-the-art industrial infrastructure to businesses with uninterrupted low cost green energy to reduce the cost of doing business and to contribute towards national agenda to

have 30% of energy mix by renewable, ultimate aim is to promote green and sustainable development and environmental friendly industrial growth to enhance national competitiveness.

▪ **GID's Goals**

- build and maintain a Special Economic Zone under the SEZ Act to attract foreign investment and transfer of technology to bridge the resource and technological gaps in the country;
- create job opportunities;
- help import substitution;
- narrow the trade deficit;
- create ease of doing business;
- reduce cost of doing business;
- provide one-window facilities to enterprises inside the zone;
- promote sustainable development while introducing environmental friendly ecosystem for industrial activities.

Globally, the industrial activities are under scrutiny, and environmental preservation is on agenda to safe guard the future of planet. Pakistan is a signatory of Paris Agreement and GID is making an endeavor to introduce green solar energy to cut the fuel bill, coal omissions and introduce green growth. This will also help the businesses to reduce the cost of products and will make the products competitive in the international market.

1.4.2. Contact Information

Frontier Works Organization

509, Kashmir Road

R.A. Bazar, Rawalpindi, Pakistan

Phone: (9251) 9271301, Fax: (9251) 9271330

1.5. Project SEZ Consultants

The Feasibility Study for the proposed project has been prepared by a consortium of consultants comprising the following;

- a) AR Consultants (Pvt.) Ltd, Islamabad
- b) EMC Consulting (Pvt.) Ltd, Karachi
- c) HH Fidelity Investment Group, China

The spectrum of services offered by a team of Consultant, well qualified with exposure and experience;

- Engineering fields and EIA monitoring done by EMC Consulting (Pvt.) Ltd (Karachi);
- Civil work designing, Compilation, tree plantation, and Economic & Social analysis done by the AR Consultants (Pvt.) Ltd (Islamabad);
- Master plan and financial modeling and power project dimensions done by HH Fidelity (China).

1.5.1. Study Team

The EIA study team for the proposed Project comprises of experts who are able to cover multidisciplinary areas including environment, ecology and economic & social profiles of key team members and their respective roles and contribution are provided at **Annexure-10**.

1.6. Introduction to Environmental Impact Assessment

This section provides the description of various steps and methods adopted to carry out EIA for the proposed Project. Following diagram depicts the method/ steps being taken to carry out the EIA study.

1.6.1. Environmental Screening of Project / Categorizing the Project

Environmental screening is the process used to evaluate the environmental category of a project. The results of environmental screening provide an understanding of potential impact significance and hence decide the environmental category of the project, and level and extent of environmental assessment required. In this section, the environmental category of the proposed project is discussed in the light of provincial environmental laws and regulations.

1.6.1.2. Categorization of the Project

The Sindh Environmental Protection Agency (Environmental Regulations) 2021 categorizes the projects on the basis of their nature and scope. The section-3-Project requiring Environmental Checklist (EC) provides that a proponent of a project falling in any category listed in Schedule-1 shall file environmental checklist with the Agency and the provisions of section 17 shall apply to the project. The provisions of section 4-Projects requiring an Initial Environmental Examination (IEE) provide that a proponent of a project falling in any category listed in Schedule-II shall file an IEE with the Agency, and the provisions of section 17 shall apply to such projects. Whereas the provisions of section 5-Projects requiring an Environmental Impact Assessment (EIA) dictate that a proponent of a project falling in any category listed in Schedule-III shall file an EIA with the Agency, and the provisions of section 17 shall apply to such projects.

Keeping in view that above mentioned schedule, the categorization of the proposed project has been done. The project falls under Schedule III (section 5) and requires filing of an EIA with SEPA. For further clarity following is mentioned;

Schedule III (C)-Manufacturing and processing: sub-section 6 wherein Establishment of Industrial estates & Export Processing Zones requires EIA.

1.7. Purpose of the EIA Study

The main purpose behind this EIA is to assess the environmental and social effects of the proposed project. It also supports an application for environmental endorsement from the important provincial organizations (and, if required, from international agencies). A wide range of provincial and international environmental laws and regulations require that advancement ought to be led in a way that minimum destruction happens to biophysical, socio-economic and cultural assets of the project area, region or country. Thought of worldwide environmental implications of developmental exercises is additionally required by global environmental agreements for which Pakistan is the signatory. This EIA report provides an assessment of anticipated positive as well as negative environmental and social impacts of the proposed project. Along with this, appropriate measures further enhancing the beneficial impacts and to mitigate any adverse impacts are also included.

The specific objectives of this EIA include:

- An assessment of the existing environmental and socioeconomic conditions at and around the proposed project site, particularly identifying environmental and social sensitivities if any;
- Identification of any foreseeable positive and negative impacts (including cumulative impacts) of the proposed project on the natural and socioeconomic environment, followed by prediction and evaluation quantitatively (wherever possible) and determination of their significance in the light of technical and regulatory concerns, as well as those related to public perceptions;
 - Propose appropriate mitigation and monitoring measures that can be incorporated into the planning of proposed project activities to further enhance the beneficial impacts and to mitigate any adverse impacts identified by the assessment;
 - Develop an Environmental Management and Monitoring Plan (EMMP) for the proposed project, EMMP will provide details of mitigation, management and monitoring measures for the proposed project during the design, construction, operation and maintenance phases;
 - Define monitoring responsibilities of the Developer and Contractors;
 - Prepare an EIA report for submission to the Sindh Environmental Protection Agency and if required to international agencies.

1.8. Climate Change Overview

Earth's average temperature has risen by 1.5°F over the past century, and is projected to rise another 0.5 to 8.6°F over the next hundred years. Small changes in the average temperature of the planet can translate to large and potentially dangerous shifts in climate and weather. Summer monsoons are moderate and reach here in July and August. Winter precipitation is in January and February and it is erratic. The average annual rainfall of the area is about 127 mm. There are also periods of drought. Rising global temperatures have been accompanied by changes in weather and climate. Many places have seen changes in rainfall, resulting in more floods, droughts, or intense rain, as well as more frequent and severe heat waves. The planet's oceans and glaciers have also experienced some big changes - oceans are warming and becoming more acidic, ice

caps are melting, and sea levels are rising. As these and other changes become more pronounced in the coming decades, they will likely present challenges to our society and our environment.

Over the past century, human activities have released large amounts of CO₂ and other greenhouse gases into the atmosphere. The majority of greenhouse gases come from burning fossil fuels to produce energy, although deforestation, industrial processes, and some agricultural practices also emit gases into the atmosphere. The build-up of GHGs can change Earth's climate and result in dangerous effects to human health and welfare and to ecosystems. Human societies have adapted to the relatively stable climate we have enjoyed since the last ice age which ended several thousand years ago.

A warming climate will bring changes that can affect water supplies, agriculture, power and transportation systems, the natural environment, and even human health and safety. Carbon dioxide (CO₂) can stay in the atmosphere for nearly a century, so Earth will continue to be warmer in the coming decades. The warmer it gets, the greater the risk of more severe changes to the climate and Earth's system. Although it's difficult to predict the exact impacts of climate change, but it is clear that the climate we are accustomed to, is no longer a reliable guide for what to expect in the future. According to World Bank data, Pakistan is producing 0.9 metric tons of CO₂ which is much less than the developed countries or the developing countries like US (17.0) and China (6.7) metric tons.

Pakistan contributes very little to the overall GHG emissions, but remains severely impacted by the negative effects of climate change by the following ways:

Glacier melting in the Himalayas is projected to increase flooding will affect water resources within the next two to three decades. This will be followed by decreased river flows over time as glaciers recede.

Freshwater availability is also projected to decrease which will lead to biodiversity loss and reduce availability of freshwater for the population. Coastal areas bordering the Arabian Sea in the south of Pakistan will be at greatest risk due to increased flooding from the sea and in some cases, the rivers.

Being a predominantly agriculture economy, climate change is estimated to decrease crop yields in Pakistan which in turn will affect livelihoods and food production. Combining the decreased yields with the current rapid population growth and urbanization in the country, the risk of hunger and food security will remain high. Endemic morbidity and mortality due to diseases primarily associated with floods and droughts are expected to rise. Increases in coastal water temperatures would exacerbate the abundance of cholera.

The impact of climate change will also aggravate the existing social inequalities of resource use and intensify social factors leading to instability, conflicts, displacement of people and changes in migration patterns.

1.9. Project Area for EIA Study

Project area for this study has no single dimension. It is because of the different temporal and spatial dimensions of environmental and social impacts. Moreover, a single environmental impact may have influence up to different geographical extents in different areas. For ground water resources, the project area includes main proposed project site and its adjacent areas which may be subject to ground water contamination. Similarly, for socio-economic impacts, the project area includes the proposed Project site and its surrounding area, from where work force can be hired during construction and operation.

It is to note that this EIA study mainly focuses on proposed project site and its nearby surroundings areas, which will be called hereafter as “project area” or “study area” or “area of influence”. The study areas for different environmental components have been provided in respective Chapters of this EIA.

1.10. Approach and Methodology

This EIA covers the assessment of environmental (and on the sidelines social) impacts of the proposed project. Environmental impacts include the impacts on physical (land, air and water) and biological (flora and fauna) environments of the project area whereas the social impacts include the impacts on socioeconomic and cultural features of the proposed area.

1.10.1. Technical Approach

Specific assessment of environmental impacts has been made by adopting the following technical approach:

- Significant environmental issues related to the proposed project have been identified through a scoping exercise;
- A team of experts and representatives of the Proponent jointly visited the project site;
- Key activities of the proposed project during its various phases have been identified;
- Environmental baseline of the project area has been developed;
- Stakeholder consultation has been conducted including local communities and relevant government departments and NGOs;
- Changes in existing environmental baseline conditions have been anticipated which might occur due to the proposed project activities. This is done by keeping in view the baseline environmental conditions in the absence of proposed project and comparing it with the scenario when the proposed project is installed;
- The impact on surrounding due to existing industrial activities were also observed;
- Based on the potential (would be) environmental impact, identification of mitigation and monitoring measures (Environmental Management and Monitoring Plan);
- Debriefing session with the team and reporting to top management of the Proponent was also done side by side to make sure that everybody was on the same page regarding proposed project and the measures to be initiated, monitored and implemented during all phases of the project;
- A comprehensive and holistic Environmental Management and Monitoring Plan had been prepared to face the challenges and minimize the pressure if any on the environments.

Technical Approach of EIA

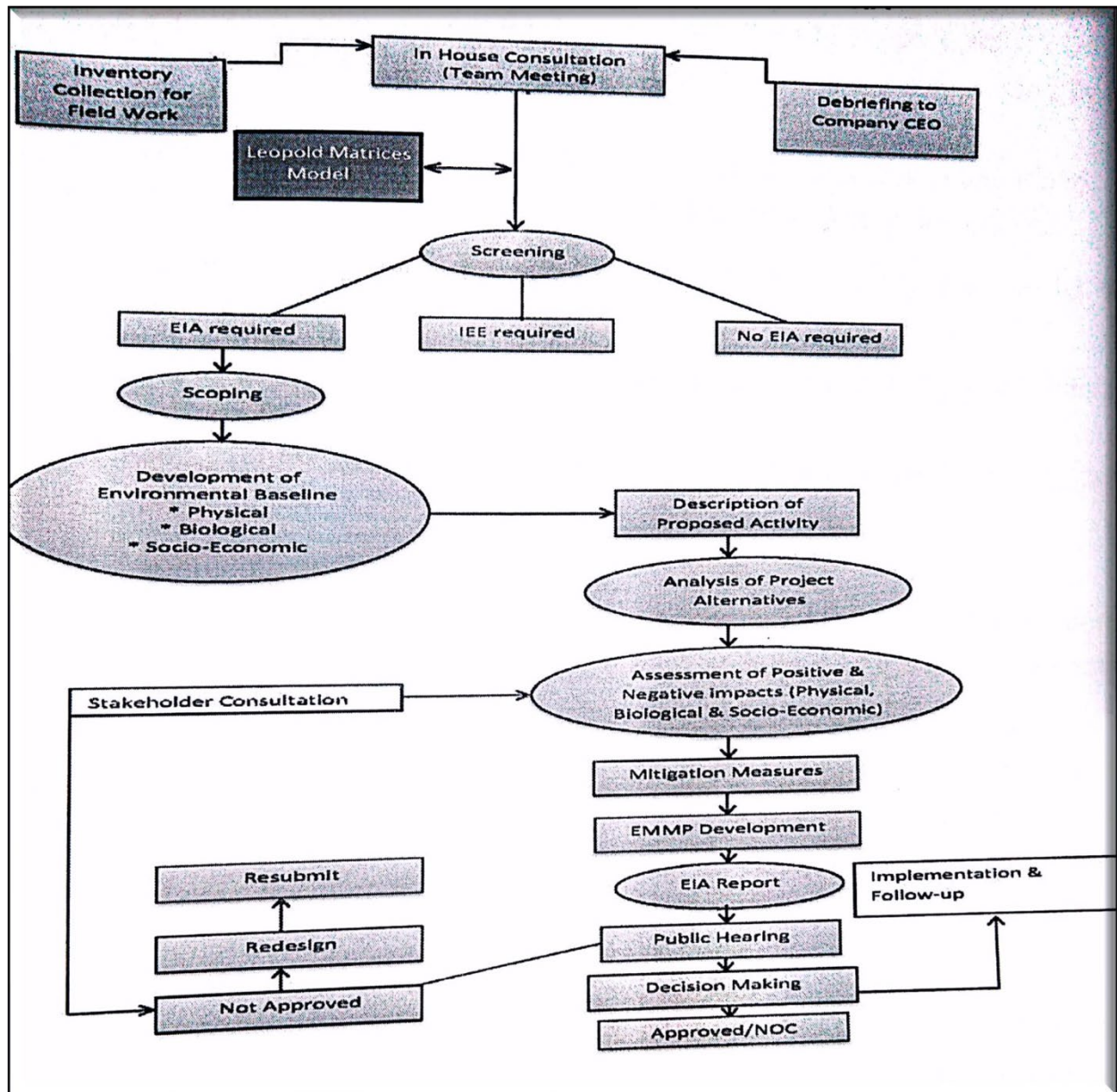


Figure-1: Technical Approach to EIA

Beyond the project area, this EIA also provides the discussion on environmental impacts at regional, national and global levels. Wherever relevant, cumulative environmental and social impacts have also been identified in conjunction with other existing and planned activities in the area. The following sections provide further information on the steps described above in the technical approach.

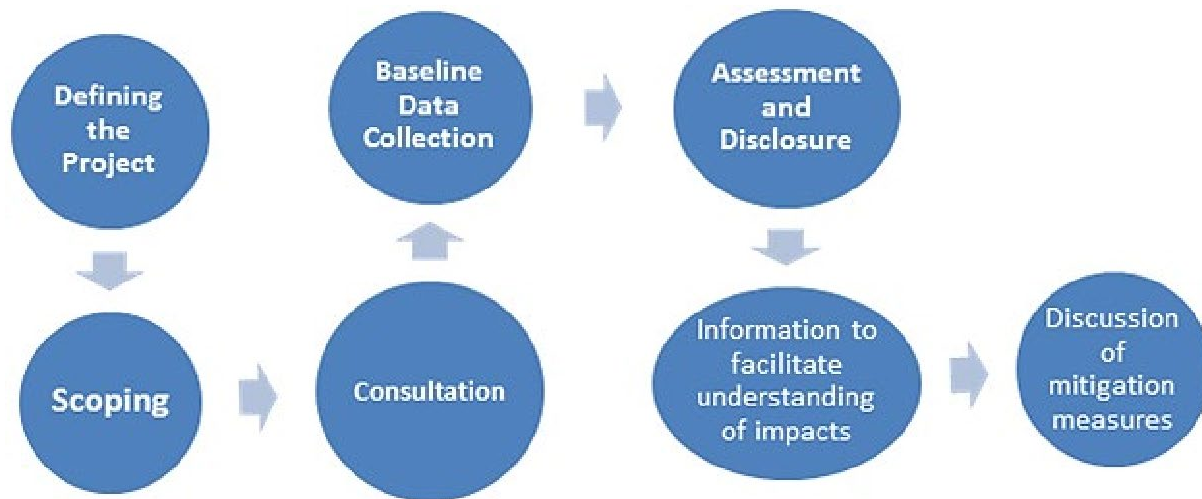


Figure-2: Steps involved in EIA

1.10.2. Scoping

Scoping is a critical, early step in the preparation of an EIA. The scoping process identifies the issues which are likely to be of most importance, and eliminates those which are of little concern. In this way, scoping ensures that the EIA is focused on significant effects and time and money are not wasted on unnecessary investigations.

The key objectives of scoping are to:

- Inform the public about the project;
- Identify the main stakeholders and their concerns and values;
- Define the reasonable and practical alternatives to the proposal;
- Focus the important issues and significant impacts to be addressed by the EIA;
- Define the boundaries for EIA in time, space and subject matter; and,
- Set requirements for the collection of baseline and other information.

The following activities have been performed during the scoping exercise for the proposed Project:

- A scoping visit of the project area and visual observations by environmental and social experts;

- Consultation with persons and local communities could be affected by the proposed Project;
- Consultation with relevant government departments.

Based on above-mentioned activities during scoping phase, the key environmental and social issues of the proposed project have been identified, which will be addressed by the EIA. It should be noted that in Pakistan, scoping is not performed as a separate step during the EIA process. In addition, a separate scoping document is also not required under the Pakistan environmental regulations. Therefore, during EIA, scoping has been conducted in conjunction with baseline studies.



Picture-1: Scoping Team

1.10.3. Baseline Studies

Baselines for EIA include the environmental and socioeconomic baselines. Both primary and secondary data sources have been utilized to develop the environmental and socioeconomic baselines of the project area. Primary Data for baseline studies was collected through field visits and surveys (economic and ecological surveys) in the project area. Existing water, air and soil qualities in the project area have been studied through sampling and subsequent analysis.

Ambient noise quality was studied by on-site noise monitoring at various locations in the proposed project area.



Picture-2: Existing Ambiance of the Site Area

Secondary sources for baseline studies includes of official statistics of the area obtained from various government departments. It also includes research publications related to environmental and socioeconomic features of the project area and electronically available data related to the area. Detailed account of methodology adopted for baseline studies has been provided in Chapters 5, 6 and 7.

1.10.4. Stakeholders Consultation

Consultation was held with local communities and concerned government departments as well as NGOs. Its purpose is to note down the apprehensions, recommendations (appreciations if any) of stakeholders. In view of the stakeholder's discussion, key environmental and social issues have been identified and are addressed in EIA. During Stakeholders meeting social impact assessment (SIA) was also done to further strengthen the EIA. The local culture, economy, project policy vis-a-vis project business policy, risks and benefits were assessed. The potential risks/ hazards were identified and thereby, addressed in the mitigation plan.



Figure-3: Social Impact Assessment Parameters

1.11. Impact Assessment and Mitigation Measures

Potential positive and negative effects of the proposed project have been identified during design, construction, operation & maintenance, and commissioning phases. Wherever, relevant cumulative impacts have also been identified in conjunction with other existing and planned activities in the area. The impact assessment is focused on following key areas:

- Physical Environment;
 - Land resources (geology, soils, landscape and topography);
 - Air and noise quality;
 - Water resources (surface and ground water); and,
 - Climate and weather conditions.
- Biological Environment;
 - Impacts on biodiversity; and
 - Impacts on flora and fauna in project area.
- Socioeconomic and Cultural Features;
 - Resettlement and livelihood;
 - Public Health;
 - Economy;
 - Education;
 - Demography; and,

➤ Cultural features

Appropriate measures have been identified to further enhance the beneficial impacts and to mitigate any adverse impacts. Chapter 9 provides the detailed account of environmental and social impacts and methods and procedures adopted for impact assessment.

1.12. Environmental Management and Monitoring Plan

Environmental Management and Monitoring Plan (EMMP) provides the details of mitigation, management and monitoring measures for the proposed project during the design, construction, operation & maintenance, and decommissioning phases. It also defines the monitoring responsibilities of the developers and contractors.

1.13. Documentation

This EIA has been conducted and prepared in accordance with national and provincial environmental regulations and guidelines (Pak-EPA and Sindh-EPA). In addition, other relevant international environmental laws and regulations (WB, IFC and ADB) have also been considered/ consulted. At the current time, only the national and provincial environmental regulations are applicable to proposed project. However, other relevant international environmental laws and regulations have been considered as they may be required for the installation of captive solar power plant of 250 mw by the Chinese state-owned-enterprises (SOEs) as Zone Enterprise in the SEZ for securing funds from financial institutions and insurance coverage.

1.13.1. Document Structure

The EIA Report is organized as follows:

Chapter 1: Overview

Chapter 2: Legal and Regulatory Framework

Chapter 3: Project Description

Chapter 4: Analysis of Alternatives

Chapter 5: Environmental Baseline-Physical and Ecological Environment

Chapter 6: Environmental Baseline-Socio-economic and Cultural Environment

Chapter 7: Stakeholder Consultation and Information Disclosure

Chapter 8: Environmental and Social Impacts and Mitigations

Chapter 9: Environmental Management and Monitoring Plan

Chapter 10: Conclusion

Volume II: Annexure of EIA report are in the Volume II of the Study

The Chapters and Annexure are essential part of the EIA study and are mutually reinforcing.

CHAPTER: 2

ENVIRONMENTAL LEGISLATIVE REGULATORY AND INSTITUTIONAL FRAMEWORK

2.1. Introduction

This chapter is based on legislations, regulations and guidelines relevant to the proposed project. As project has been established in the Sindh province of Pakistan, the environmental laws of Sindh Province will be applicable to the project. Keeping in view vision and mission of the proposed project relating to the international dynamics and Foreign Direct Investment (FDI), wherever laws and regulations of the Sindh Province are silent, national or universal level laws will come into play. In any case and other applicable universal environmental laws and regulations, (for example, those of the WB, IFC and ADB) will also be considered.

2.2. Legislative/Regulatory Framework

Along the timeline development has been perceived towards legislative/regulatory reforms at national as well as provincial level. The project has been assessed in compliance with existing legal framework on the environment in Pakistan as described henceforth.

2.2.1. National Conservation Strategy

In 1992, Pakistan decided the National Conservation Strategy (NCS) which gives a wide framework to address environmental concerns of the country. In 1993 National Environmental Quality Standards (NEQS) were formulated. In December 1997, the Pakistan Environmental Protection Act (PEPA) was established, repealing the Environmental Protection Ordinance of Pakistan, 1983. NCS covers 14 areas and environment is likewise included. The policy, laws, regulations and standards pertinent to the industrial activities and special economic zones projecting the context of environmental protection are depicted in the following segments.

2.3. National Environmental Institutions in Pakistan

A brief account of environmental institutions in Pakistan is provided in this section.

2.3.1. Federal Ministry of Climate Change

The Federal Ministry of Climate Change is the apex level institution in Pakistan dealing with matters of environment and climate change. The Ministry comprises five wings / sections: Administration Wing;

- Development Wing
- Forestry Wing;
- International Cooperation Wing; and
- Environment Wing.

The Environment Wing deals with national and international environmental matters. The Pak-EPA is closely linked with the Federal Ministry of Climate Change.

2.3.2. Pakistan Environmental Protection Council

The Pakistan Environmental Protection Council (PEPC) was constituted in 1984 under Section 3 of the Environmental Protection Ordinance of Pakistan, 1983. PEPC is headed by the Prime Minister of Pakistan and contains representatives from:

- trade and industry;
- leading NGOs;
- educational intuitions;
- expert journalists; and,
- concerned ministries.

The key function of PEPC is to co-ordinate and supervises the enforcement of PEPA. Other functions include:

Approval of national environmental policies, and ensuring their implementation;

- Approval of the National Environmental Quality Standards (NEQS);
- Provision of guidelines for the protection and conservation of species, habitats and biodiversity in general, and for the conservation of renewable and non-renewable resources; and,

- Co-ordination of the integration of the principles and concerns of sustainable development into national development plans and policies.

2.3.2. Pakistan Environmental Protection Agency

Pakistan Environmental Protection Agency (Pak-EPA) was established under Section (5) of PEPA. The basic function of Pak-EPA is the implementation of the PEPA and development of associated regulations and guidelines.

Other functions of Pak-EPA are as follows:

- Review of IEE and EIA reports of relevant projects and environmental approvals granted;
- Issue of certificates for establishment of environment labs in the Islamabad Capital Territory;
- Preparation (or revision) and establishment of provincial Environmental Quality Standard (EQS) with approval of PEPC;
- Promotion of research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development; and
- Identification of the needs for, and initiation of, legislation in various sectors of the environment.

2.4. 18th Amendment to the Constitution of the Islamic Republic of Pakistan

In 2010, through the 18th Amendment to the Constitution of the Islamic Republic of Pakistan, 1973, environment became a provincial subject, empowering each province to make its own law (except for the Islamabad Capital Territory (ICT) or areas in the federation not included in any province).

2.4.1. Status of PEPA after 18th Amendment

In the light of provisions of the 18th Amendment:

- PEPA can be repealed or amended to make it applicable to a particular province, through a Provincial Act enacted by the Provincial Assembly concerned; and,

- PEPA shall continue to remain in force until repealed or amended by the competent authority, which is now the Provincial Assembly in respect of each Province and Parliament in respect of the ICT / areas in the federation not included in any province.

At present, under the provisions of 18th Amendment, almost all provinces of Pakistan have enacted their own Provincial Environmental Protection Act by making appropriate amendments to PEPA.

2.4.2. Status of Pak-EPA Rules and Regulations after 18th Amendment

According to the 18th Amendment, powers to make rules and regulations have been delegated to the provinces and review of IEE and EIA Regulations, 2000 Powers relating to review of IEE and EIAs have been delegated to the Provinces except for the:

- Military projects;
- Projects with trans-country impacts; and,
- Projects with trans-province impacts.

Under the 18th Amendment, the power to prepare, establish and revise the Environmental Quality Standards (EQS), have been delegated to provincial EPAs. Now provincial EPAs can prepare, establish and implement the EQS with approval from Provincial Environmental Protection Council. As mentioned earlier, Sindh EPA is the responsible authority for proposed Project.

2.5. Provincial Environmental Setup in Sindh Province

Following is the setup in the province of Sindh for environmental safeguard:

2.5.1. The Sindh Environmental Protection Agency

The Sindh Environmental Protection Agency (SEPA) was established in 1989 having its Head Quarters at Karachi. Regional Offices at Hyderabad and Sukkur were established during 1998. Recently three more Regional Offices at Karachi, Mirpur Khas and Larkana have been established. The major functions are;

- Protection, Conservation, Rehabilitation and Improvement of the Environment, the prevention and control of pollution; and
- Promotion of sustainable development through enforcement of Environmental Laws.

2.5.2. Sindh Environmental Protection Act 2014

The Sindh Environmental Protection Act 2014 is the elementary legislative tool. It is valid for a wide-ranging range of issues of air, water, soil, marine and noise pollution, as well as the import and handling of hazardous waste.

The Sindh Environmental Protection Bill, 2014 was passed by the Provincial Assembly of Sindh on 24th February, 2014 and assented to by the Governor of Sindh on 19th March, 2014, thereafter, published as an Act of the Legislature of Sindh. The Act provides for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development, and for matters connected therewith and incidental thereto

Following sections and sub-sections of the Act deal with the IEE and EIA for the proposed projects;

Section:17. Initial environmental examination and environmental impact assessment.- (1) No proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment, and has obtained from the Agency approval in respect thereof.

Section 17(2)(b) provides the requirement for environmental assessment as under;

(b) review the environmental impact assessment and accord its approval subject to such terms and conditions as it may deem fit to impose or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or decline approval of the environmental impact assessment as being contrary to environmental objectives.

2.5.3. The Sindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2021

In exercise of the powers conferred by section 37 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency, with the approval of Government has made the Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021.

These regulations state the provisions for preparation, submission, review and approval of the IEE and the EIA and post monitoring of environmental endorsements by Pak-EPA. These regulations likewise give the classification of projects requiring IEE and EIA.

2.5.4. The Sindh Environmental Quality Standards (Self-Monitoring and Reporting by Industry) Rules, 2014

Sindh Environmental Quality Standards (SEQS) are significant to the proposed project especially the Standards for municipal, liquid industrial effluents, gaseous emissions, motor vehicle exhaust and noise, ambient air quality, ambient noise, and drinking water.

2.5.5. Promotion of Sustainable Development

In exercise of the powers conferred by section 36 of the Sindh Environmental Protection Act, 2014, the Environmental Protection Agency with the approval of the Government of Sindh is pleased to make the rules for establishment of Sindh Sustainable Development Fund (Procedure and Utilization) Rules, 2014.

2.5.6. Sindh Environmental Protection Council

The Sindh Environmental Protection Council (SEPC) consisting of the following has been established having following constitution;

- Chief Minister: **Chairperson**
- Minister-in-charge of the Environment Protection Department: **Vice Chairperson**
- Director General, Sindh Environment Protection Agency: **Member/ Secretary**

Other members include;

- Additional Chief Secretary, Planning and Development Department;
- Secretaries of the Environment, Finance, Public Health Engineering, Irrigation, Health, Agriculture, Local Government, Industries, Live Stock and Fisheries, Forest and

Wildlife, Energy, Education, Departments of Government of Sindh and the divisional commissioners of Sindh;

- Other persons not exceeding twenty-five as Government may appoint from representatives of the Chambers of Commerce & Industry & industrial associations, representatives of the Chambers of Agriculture, medical & legal professions, trade unions, NGOs concerned with environment and sustainable development, scientists, technical experts and educationists;
- Two Members of the Provincial Assembly of Sindh amongst the eleven Members of the Standing Committee on Environment nominated by the Speaker.

The Council has following mandate;

- co-ordinate and supervise the enforcement of the provisions of this Act and other laws relating to the environment in the Province; Functions and Powers of the Council;
- approve comprehensive provincial environmental and sustainable development policies and ensure their implementation within the framework of a conservation strategy and sustainable development plan as may be approved by Government from time to time;
- approve the Sindh Environmental Quality Standards;
- provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources;
- coordinate integration of the principles and concerns of sustainable development into socio-economic and development policies, plans and programs at the provincial, district and local levels;
- consider the annual Sindh Environment report and give appropriate directions thereon and cause it to be laid before the Provincial Assembly;
- deal with inter-provincial and federal-provincial issues, and liaise and coordinate with other Provinces through appropriate inter-provincial forums regarding formulation and implementation of standards and policies relating to environmental matters with an inter-provincial impact;
- provide guidelines for bio-safety and for the use of genetically modified organisms; and
- assist the Federal and Provincial Governments.

2.6. Sindh Coastal Development Authority

Sindh Coastal Development Authority (SCDA) works for overall development, improvement, and beautification of the Coastal Areas of Sindh Province comprising Districts (Karachi South, Malir, Keamari, Korangi, Thatta, Sujawal and Badin). Environment, Climate Change & Coastal Development Department was established on 17th May 2016 by the Government of Sindh. SCDA is responsible to ensure proper identification & selection of development schemes/ activities based on the needs of the community. These schemes fall in the following categories;

- Drinking Water Facilities;
- Communication and utility Systems/ Services (Electricity,; Drainage; Education);
- Development of Fisheries, Livestock;
- Horticulture, Forest, Agriculture and Marketing Facilities;
- Construction of Jetties and Harbors;
- Up-Gradation and Improvement of the Socio-Economic Condition of the Inhabitants, and Tourism.

It acts as coordinating agency of the Federal and Provincial Governments, and any local authority or autonomous body to: collaborate in development activities, provide technical guidance, undertake execution of schemes entrusted by the Federal or Provincial Government, undertake research in developmental planning of various activities related to the coastal areas, compile relevant literature on planning and development, and conduct training programs/ seminars on planning and development in the related areas. Presently, it has following on-going projects in the vicinity of the project area;

Scheme Title	Work Location	Cost (PKR.M)	Implementation period
Improvement of major Fishermen's Settlement & Rehabilitation of Flood Affected in Coastal Areas of Thatta, Sujawal and Badin	Thatta, Sujawal and Badin	979.575	June 2022
Communication Access & Allied Facilities in the Coastal Areas of Karachi & Thatta	Karachi & Thatta	659.957	June 2024
Communication Access & Allied Facilities in the Coastal Areas of Sujawal & Badin	Coastal Areas of Sujawal & Badin	496.051	June 2024

2.7. Other National and Provincial Legislation Applicable to the Proposed Project

Besides the environmental laws and regulations of Pakistan and Sindh province, proposed Project also has certain obligations under various national and provincial laws and regulations. These are discussed in this section.

2.7.1. The Sindh Factories Act, 2016

The Sindh Factories Bill, 2015 having been passed by the Provincial Assembly of Sindh on 21st March, 2016 and assented to by the Governor of Sindh on 25th April, 2016 is hereby published as an Act of the Legislature of Sindh. The Act aims to consolidate and amend the law regulating labor in factories, and whereas it is expedient to consolidate and amend the law regulating labour in factories. Act provides detailed information about duty hours, health and safety, restrictions on working hours of adults, special provisions for adolescents and children's and penalties and procedure.

2.7.2. Sindh Wildlife Protection Act, 2020

This Act aims to protect the province's wildlife resources directly and other natural resources indirectly. It classifies wildlife by degree of protection (i.e. animals that may be hunted on a permit or special license, and species that are protected and cannot be hunted under any circumstances). The Act specifies restrictions on hunting and trade in animals, trophies, or meat. The Act also defines various categories of wildlife protected areas (i.e. national parks, wildlife sanctuaries and game reserves).

Provisions in this Act will be applicable throughout the design, construction, operation and maintenance, and decommissioning phases of the proposed Project.

2.7.3. Sindh Forest Act, 2012

The Sindh Government has enacted the Sindh Forest Act, 2012 by making amendments to the Forest Act 1927. The Forest Act deals with the matters related with protection and conservation of natural vegetation / habitats. The Act empowers the concerned agency to declare protected and reserved forest areas and maintain these forests. In spite of the fact that Act recognizes the right of people for access to the natural resources for their household use, it prohibits unlawful

cutting of trees and other vegetation. According to the provisions of Sindh Forest Act, cutting of any trees during the construction of proposed Project will require prior permission from the Sindh Forest Department. The new legal instrument amply addressed the provision and requirements of United Nations Framework Convention on Climate Change (UNFCCC), and Convention on Combating Desertification (CBD). Legal aspects of carbon sequestration and carbon credit marketing should also be kept in view.

The proposed project is installing a 100 MW Solar Captive Power plant (Jinnah solar Park) with in the SEZ and carbon credits will be sold, moreover, Palm Oil Tree plantation has also be made part of the Master Planning to ensure environmental friendly industrial activities.

2.7.4. Antiquities Act, 1975

The Antiquities Act of 1975 ensures the protection of historical and archaeological resources in Pakistan. The Act is designed to protect ‘antiquities’ from destruction, theft, negligence, unlawful excavation, trade and export. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest and national monuments etc. The Act prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area that may contain articles of archaeological significance. Under this Act, the project proponents are obligated to:

- Ensure that no activity is undertaken in the proximity of a protected antiquity; and,
- If, during the course of the project, an archaeological discovery is made, it should be protected and reported to the department of archaeology, Government of Pakistan, for further action.

Sindh is the one of the Oldest Civilizations of the World. The history of Sindh is intertwined with the history of the broader South Asia and surrounding regions. Sindh was at the center of the Indus Valley Civilization, one of the cradles of civilization. The Sindh Government established the Department of Antiquities in the year 2008, under the Antiquities Act 1975.

2.7.5. Explosives Act 1884

The Explosives Act 1884 regulation for the manufacture, possession, use, sale, transport, import and export of explosives. Under this Act, project developers (and contractors) are bound on safe taking care of, transportation and utilizing explosives amid development of proposed project.

2.7.6. The Sindh Prohibition of Employment of Children Act, 2017

The Sindh Prohibition of Employment of Children Bill, 2017 having been passed by the Provincial Assembly of Sindh on 25th January, 2017 and assented to by the Governor of Sindh on 15th March, 2017 was published as an Act of the Legislature of Sindh. The main objective of the law is to prohibit the employment of children and to regulate employment of adolescents in certain occupations and work and to provide for matters connected therewith. Under the Act, the Government is to notify in the official Gazette a Committee to be called the Sindh Coordination Committee on Child Labor, to advise Government for appropriate legislative, administrative and other measures for eradication of child labor as per international instruments and to set the minimum age, for the purpose of employment in the Province. The Committee consists of a Chairperson and not less than nine other members representing government, employers, workers, civil society and two Members of the Provincial Assembly of Sindh nominated by the Speaker, Provincial Assembly of Sindh. The Act expresses that no youngster should be utilized or allowed to work in any of the occupation put forward in the Act, or in any workshop wherein any of the procedures characterized in the Act are attempted. Under this Act, project developers (and contractors are not allowed to permit any child work amid the development and operation of proposed project

2.7.7. Pakistan Penal Code 1860

Pakistan Penal Code 1860 manages the offenses where open or private property or human lives are influenced because of purposeful or unintentional behavior of an individual or association. The Code likewise addresses control of clamor, harmful emanations and transfer of effluent.

2.7.8. The Sindh Local Government Act 2013 and Amendment 2021

Having been passed by the Provincial Assembly of Sindh and assented to by the Governor of Sindh was published as an Act of the Legislature of Sindh. The Government may if so deemed necessary in public interest pass an order after recording reasons, exclude any area or areas from the operation of such provision or provisions of this Act and may make alternate provisions for such area by rules as may be deemed appropriate.

2.8. International Environmental Requirements

This section discusses other relevant international environmental laws, regulations and guidelines (such as those of the WB, IFC and ADB). As mentioned earlier, international environmental laws and regulations have been considered as they may be required in the event due to international emphasis on the environmental aspects of industrialization. International financial institutions and investors are reluctant to invest in the countries / projects where environmental standards are not complied with international standards.

2.8.1. Environmental and Social Requirements of the World Bank

Environmental Assessment is one of the 10th environmental, social, and legal safeguard policies of the World Bank. Environmental assessment is used in the World Bank to identify, avoid, and mitigate the potential negative environmental impacts associated with bank lending operations. In World Bank operations, the purpose of environmental assessment is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been properly consulted.

The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP) / Bank Procedure (BP) 4.01: environmental assessment. This policy is considered to be the umbrella policy for the Bank's environmental 'safeguard policies.

2.8.2. Environmental and Social Requirements of IFC

IFC Sustainability Framework is aimed to ensure the IFC commitment to sustainable development and reflects the corporation's approach to risk management. The sustainability

framework comprises IFC's policy and performance standards on environmental and social sustainability, and IFC's access to Information Policy. The policy on environmental and social sustainability describes IFC's commitments, roles, and responsibilities related to it.

2.8.2.1. IFC Performance Standards on Environmental and Social Sustainability

IFC's Performance Standards on Environmental and Social Sustainability define the responsibilities of IFC clients for managing their environmental and social risks. The Performance Standards are:

- Assessment and management of environmental and social risks and impacts;
- Labour and working conditions;
- Resource efficiency and pollution prevention;
- Community health, safety, and security;
- Land acquisition and involuntary resettlement;
- Biodiversity conservation and sustainable management of living natural resources;
- Indigenous peoples;
- Cultural heritage.

Assessment and management of environmental and social risks and impacts applies to all projects that have environmental and social risks and impacts.

2.8.2.2. IFC Environment, Health and Safety (EHS) Guidelines

The IFC EHS Guideline are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP), as defined in IFC's Performance Standard 3 on Pollution Prevention and Abatement. These Guidelines are used as a technical source of information during project appraisal activities.

2.8.2.3. IFC Environmental and Social Review Procedures

IFC investment timing in relation to a client's business activities and project implementation varies from project to project. IFC does not control the timing of its entry into a project, however

IFC's engagement, more often than not, occurs after the project is conceived, with the site selected and development started.

Therefore, IFC's approach is, whenever possible, to take full advantage of assessment work undertaken by the client before IFC's entry into the transaction and where necessary strengthening environmental assessment (EA) analysis without replicating processing requirements. Of particular importance is the adequacy of the client's Environmental and Social Management System.

Whenever IFC makes an investment in a project, following environmental and social review procedures are adopted:

- Conduct due diligence of the proposed investment activity;
- Assist the client in developing measures to avoid, minimize, mitigate, or compensate for environmental and social impacts;
- Categorize the project to specify IFC's institutional requirements;
- Identify opportunities to improve environmental and social outcomes;
- Monitor and document the client's environmental and social performance throughout the life of IFC's investment; and,
- Disclose information about its institutional and investment activities in accordance with the Policy on Disclosure of Information.

All environmental and social studies, EA documentation, records and associated information are stored in iDesk which is an electronic workspace that provides secure access to several corporate applications and serves as a one-stop-shop for project processing in IFC.

2.9. Environmental and Social Requirements of ADB

ADB Environmental Assessment Guidelines describe how to fulfill the requirements outlined in ADB's Environment Policy and Operations Manual on Environmental Considerations in ADB Operations. Information on ADB's policies and procedures for conducting and reporting on the environmental assessment is also provided for all types of projects.

Strategic tools such as country environmental analysis and strategic environmental assessment are also included in guidelines.

2.10. International Treaties

Important international environmental treaties that have been signed by Pakistan and may have relevance to the proposed Project are listed **Table-1**.

Table-1: INTERNATIONAL ENVIRONMENTAL TREATIES ENDORSED BY PAKISTAN

Topic	Convention	Date of Treaty	Entry into Force in Pakistan
Climate Change and the Ozone Layer	United Nations Framework Convention on Climate Change- the primary objective is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.	1992	1994
	Kyoto Protocol to the United Nations Framework Convention on Climate Change-enabled by the above Convention on Climate Change. It has more powerful and legally binding measures. It sets binding targets for 37 industrialized countries and the European Community for reducing greenhouse gas emissions.	1997	2005
	Vienna Convention for the Protection of the Ozone Layer- acts as a framework for the International efforts to protect the ozone layer with a primary objective to protect human health and the environment against adverse effects resulting from human activities that modify or are likely to modify the ozone layer.	1985	1993
	The Montreal Protocol on Substances that Deplete Ozone Layer and Associated amendments – enabled by the Vienna Convention, it is designed to protect the Ozone layer by phasing out the production and consumption of a number of substances believed to be responsible for ozone depletion.	1987	1993
Waste and Pollution	Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal –regulates the trans-boundary movement of hazardous waste and other waste with a stated purpose to protect human health and the environment against the adverse effects from generation and management of hazardous waste. The Convention provides for three sets of measures with binding obligation. These are: strict control of trans-boundary movement of hazardous waste; Environmentally sound management of hazardous waste; and Enforcement and implementation of the provisions of the convention at international and national levels.	1989	1994
	International Convention on Oil Pollution Preparedness,	1990	1995

	Response and CO-operation		
	Stockholm Convention on Persistent Organic Pollution –seeks to protect human health and the environment from Persistent Organic Pollutants, which are chemicals that remain intact in the environment for long periods, become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife.	2001	2008
	International Convention for the Prevention of Pollution from Ships (MARPOL)- is the main international convention that's covers prevention of pollution of the marine environment by ships from operational or accidental causes. The Convention includes regulations aimed at preventing and minimizing pollution from ships, both accidental pollution and that from routine operations, and currently includes six technical Annexes.	1983	
Desertification	International Convention to Combat Desertification- with and objective to combat desertification and mitigate the effects of drought. It is supported by international cooperation and partnership arrangements, with the aim of achieving sustainable use of land and water resources and sustainable development in affected areas.	1994	1997
Biodiversity and the Protection of Plants and Animals	Convention on Biologically diversity- covering ecosystems, species, and genetic resources and also the field of biotechnology. The objectives are: conserve of biological diversity; sustainable use of its components; and fair and equitable sharing of benefits arising from genetic resources.	1992	1994
	Cartagena Protocol on Biosafety to the Convention on Biological Diversity- Addresses potential risks posed by living modified organisms resulting from modern biotechnology.	2000	2009
	Bonn Convention on the Conservation of Migratory Species of Wild Animals- Aims to conserve terrestrial, marine and avian migratory species throughout their range. It is concerned with the conservation of wildlife and habitats on a global scale.	1979	1987
	Memorandum of Understanding concerning Conservation Measures for the Siberian Crane-Parties undertakes to provide strict protection to Siberian Cranes, and identify and conserve wetland habitats essential for their survival.	1998	1999

	Convention on International Trade in Endangered Species of Wild Fauna and Flora- to ensure that international Trade in specimens of wild animals and plants does not threaten their survival.	1973	1976
	International Plant Protection Convention (1997 Revised Text)- to prevent the international spread of pests and plant diseases. It requires maintenance of lists of plant pests, tracking of pest outbreaks, and coordination of technical assistance between member nations.	1951/52	1954
	Agreements for the Establishment of the Near East Plant Protection Organization to establish the Near East Plant Protection Organization (NEPPO), which promotes international co-operation with a view to implementing International Plant Protection Convention.	1993	2009
	Plant Protection Agreement for the Asia and Pacific Region and amendments –establishes the Asia and Pacific Plant Protection Commission to review and promote the region's progress in the implementation of the Agreement. Trade in plants and plant products are regulated by certification, prohibition, inspection, disinfection, quarantine, destruction, etc, as necessary.	1955 (amendments 1967)	1976 (amendments 1994)
	Convention on Wetlands of international Importance especially as Waterfowl Habitat and associated protocols and amendments to promote conservation and sustainable use of wetlands. The Ramsar List of Wetlands of International Importance now includes almost 1,800 sites (known as Ramsar Sites). There are currently 19 Ramsar sites in Pakistan.	1971 (amendments 1987)	1976 (amendments 1994)
Cultural Heritage	Convention concerning the Protection of the World Cultural and Natural Heritage requires parties to adopt a general policy on the protection of the natural and cultural heritage, to set up services for such protection, to develop scientific and technical studies, to take appropriate legal, technical, scientific and administrative measures and to foster training and education for such protection.	1972	1976

CHAPTER: 3

PROJECT DESCRIPTIONS

3.1. Introduction

The Islamic Republic of Pakistan, situated at a strategic location in South Asia is the fifth most populous country in the world. With a population of 242 million, it is the 33rd largest country by area. Pakistan is the site of several ancient cultures including one of the oldest in the world and dating back 5,000 years, the Indus Valley civilization of Bronze Age.

Pakistan is a developing country and is one of the largest producers of natural commodities and its labor market is the 10th largest in the world. Following are the basic pillars of Pakistan's diverse economy;

- Agriculture: 22.68 percent
- Manufacturing: 19.11 percent
- Services: 58.20 percent

Despite Covid-19 pandemic which resulted in lockdowns and closure of business activities worldwide, Pakistan's economy performed well⁷.

3.1.2. Investment and Trade Regime of Pakistan

Pakistan has a liberal and forward looking Investment Policy. The policy focus is to attract, promote, facilitate and protect FDI and Domestic Investment (DI). All economic sectors are open for investment except a few specified/ strategic sectors.

Pakistan has a narrow export base, and historically, its 60 percent export earning comes from cotton-textile and apparel sector. Export destinations are also limited where USA is the largest export market and China stands at number two position. Pakistan's import structure reveals that import bill is heavy due to import of petroleum & petroleum products, edible oil (soya bean and palm oil) and machinery. China stands on the top as import source; other sources are Kingdom of Saudi Arabia, UAE, Indonesia and USA. Under the Strategic Trade Policy Framework (STPF)

⁷ Pakistan Economic Survey, 2021-22

2020-25 export is a National Priority, primary driver of inclusive & sustainable economic growth and main viable source of foreign exchange earnings.

3.2. Creation of Special Economic Zones as Economic Development Tool

The SEZ Act 2012⁸ was promulgated for creation, development and efficient operations of SEZs through provisions of a legal and regulatory framework to encourage domestic and international investors for promotion and establishment of industrial infrastructure and for other matters connected or ancillary to.

There are around twenty one (21) approved/ notified SEZs in all four provinces. SEZs are linchpin of the Investment and Industrial policy to become an active member of global international trade and investment system. The international production regime is changing and markets and production pattern in different countries are becoming increasingly interdependent and challenging due to dynamic of international trade of goods and services and free cross border flows of capital and technology. Creation of SEZs to attract investment, import substitution, employment generation and enhance exports is becoming increasingly important to become a part of global value chain (GVC).

3.2.1. The Proposed SEZ (Jinnah SEZ) at District Thatta (Sindh Province)

FWO after thorough study and research of Pakistan's investment and trade regimes, international trends in industrial development and different models of SEZs around the world has planned to establish a multi-activity and hi-tech SEZ promoting "Green Development" leading to sustainable development at a piece of land measuring 1142.8388 acres in district Thatta (Sindh Province). The land (proposed project site) was purchased by FWO in 2015 to facilitate its M-9 motorway construction operations. Then this piece of land was used for temporary accommodation for the workforce and parking of the construction machinery and other goods. A Camp Office was established there.

⁸ Amended in 2016

3.2.2 The Project-Jinnah SEZ, Thatta

Project Name: Jinnah SEZ

Location: Thatta District Sindh

Land Area: 1142.8388 acres

Land Status: FWO purchased and in possession land

Zone Developer: GID (subsidiary of FWO)

Project Cost: PKR: 13,857,838,800/-

Financier: FWO/ GID

IRR: 14.67%

NPV (over 30 years): US\$ 48,259,512/-

Type of SEZ: Multi-activity Zone with focus on hi-tech companies and sustainable development

Solar Captive power plant: a 100 mw solar plant called Jinnah solar park to be established in the Zone under clause 27(2) of the SEZ Act

3.3. Latest Trends in SEZs around the Globe

The Global Alliance of Special Economic Zones (GASEZ) representing seven global, regional and national associations seeks to drive the modernization of zones across the world and maximize their contribution to the United Nations (UN) Sustainable Development Goals⁹ (SDGs). United Nations Conference on Trade and Development (UNCTAD) has also joined hands with them. UNCTAD Secretary-General Rebeca Grynspan¹⁰ said: “The United Nations 2030 Agenda for Sustainable Development provides an opportunity for special economic zones to attract investment by putting SDGs at the forefront of their value proposition.” He further added that “a new model of sustainable special economic zones is therefore, rapidly taking shape and they are contributing to more inclusive, resilient and sustainable economies in the countries where they operate.”

SEZs are faced with new challenges and opportunities that require them to adapt and innovate. Some challenges are related to the COVID-19 pandemic, with new lockdown measures in some parts of the

⁹ 17-Sustainable Development Goals (SDGs), are an urgent call for action by all countries (developed and developing) in a global partnership that ending poverty and other deprivations must go hand-in-hand with strategies that improve health, education, reduce inequality, and spur economic growth while tackling climate change and working to preserve oceans and forests.

¹⁰ 7th World Investment Forum, May 2022

world or disruptions due to the war in Ukraine. Other challenges and opportunities are longer term, stemming from changing global value chains, increased digitalization and investments in digital assets, and adversities of Climate Change.

The zones are critical for economic development but need to adapt to keep pace with a changing climate, digital transformation and other factors influencing their viability and performance.

3.3.1. Industrial Activities and Climate Change

The realization among global community that increased industrialization is causing unprecedented climate change, global warming, environmental pollution which is a challenge for sustainable development. The realization to harness the adverse effects of industrialization is on the International Agenda. Pakistan is also a signatory of agreement on Climate Change¹¹, and SDGs. Over the years, Pakistan has lost US\$ 10 billion due to havoc¹² created by climate change. The recent flood (2022) in Pakistan is unprecedented in magnitude, and washed away rural, urban communities, infrastructure causing huge human and financial loss.

Due to adversities created by climate change, omission of GHG and CO₂ by industrial activities, SEZs are also under security. The vision of “Green Growth” and “Sustainable Development” is gaining momentum world over to save the future of the planet.

3.4. Response of Proponent/ Developer Jinnah SEZ to Emerging Challenges

Following is the overview of GID’s response to emerging challenges and trends while developing Jinnah SEZ;

Policy Standards	New Industrial Revolution and the Digital Economy	Changing Patterns of International Production	Sustainable Development Imperatives
Strategic Reorientation	- Modernize SEZ service provisions by integrating digital technologies - Promote investment in business activities of digital firms	- Focus specialize services and manufacturing activities in line with global industrial restructuring - Link SEZ development to	- Integrate sustainable development indicators in SEZ program - Focus on incubating business activities that promote

¹¹ Paris Agreements

¹² Recent flood (2022) and its destruction is unprecedented

	Partner with global platform to enhance SEZ competitiveness	regional integration including through new international models	- sustainable development - Health care and essential medical services
Regulatory Reforms	Interaction between the policy framework of SEZ and national regulatory regime for the digital economy	- Focus on regional integration efforts - Anticipate international rules and trade preferences - New form of investment mode like BOLT for captive power	- Establish, monitor and enforce environment & social, governance (ESG) performance indicators - Promote global standards in SEZ - Renewable energy and climate change mitigation
Repackaging of the Value Proposition	Provision of adequate digital infrastructure within SEZ	- Facilitate to diversify & promote exports - Strengthening the entrepreneurship culture - Provision of manufacturing design and testing services	- Provision of supporting services and training programs in ESG factors - Programs towards sustainable development contribution

Table-2: Responses to Emerging Challenges

3.4.1. Business Concept of the Proposed SEZ: Moving towards Green Development for Sustainable Development

Keeping in view the changing trends in business practices, the Developer has envisaged the Business Concept of the proposed SEZ Based on “moving towards green development for sustainable development” which will make the proposed SEZ, the first green SEZ in Pakistan. The Business Concept has following building blocks/ focus;

- A delimited area under the SEZ Act where Developer is committed to provide infrastructure, transportation links and utilities such as electricity and water inside the zone;
- Initial Project cost to be met by own resources;

- Provision of captive power project based on solar to supply uninterrupted, low cost and green energy to zone enterprises;
- Waste treatment plant and recycling plant to avoid damage of waste dumping;
- Palm Oil Plantation all along boundary wall and inside the Zone to boost healthy environment and support Sindh Coastal Development Agency (SCDA) in its endeavors of Palm Oil Tree Plantation;
- Commitment to Corporate Social Responsibility (CSR) obligations and good governance;
- Gender-equality bench marks;
- Minimum emissions and waste.
- High labor, health and safety standards;
- Creation of backward and forward market linkages;
- Spillover of best practices.

The focus of Business Concept is that the proposed Jinnah SEZ should act as a change agent for sustainable economic development by serving as a “role model” of the green economy providing inspiration and guidance to other economic agents of the country. The citizens of the world need a true green consciousness to ensure sustainable production and consumption for the present as well as future generations. “Green Economic Principles” are now guiding the global development agenda. The Developer (GID) recognizes the importance of applying Green Growth Concepts in the development of the proposed SEZ at Thatta and has incorporated the green industry concept in over all development planning of the industrial infrastructure.

The project is in line with the sustainable development vision of SEPA.

3.4.2. Business Model- Concept into Action

GID’s business model is prudent and backed by the resources both financial and skilled-manpower to establish the SEZ industrial infrastructure. Moreover, GID is neither asking for any financial resources from the government nor asking for any land acquisition. Being owner of the capital goods, machinery & equipment for the Zone development, GID will save the government funds on account of non-utilization of Section 36 (a) of SEZ Act.

Salient features of the business model are as under

- Project sponsored by own resources;
- Private land acquired by own resources/ ownership land;
- Land and Industrial Infrastructure development as per SEZ Act;
- Admission of Zone Enterprises as per SEZ Act;
- Land on lease basis to zone enterprises;
- Installation of Captive Solar Power of 100 MW for green energy along with grid and internal networking to provide energy inside the zone with investment from state-owned Chinese Companies;
- Focus on digital technologies and product innovations;
- Promotion of FDI, Employment Generation, Export orientation, Import Substitution and Technology Transfer;
- Skill development facilities and training for the local work force;
- Environmental friendly;
- Revenue Generation for Developer (GID) augmenting the sustainable development for the country and the local community.



Figure-4: Business Model

3.5. Master Planning

The Master Plan of the Jinnah SEZ (Thatta) has been carved out keeping in view the legal provisions of the SEZ Act, international best practices and national and local requirements. Before Master Planning, strategic analysis and cost-benefits assessment of developing an SEZ was carried out.

3.5.1. Master Planning and Strategic Analysis

The land measuring (1142.8388) in Deh Kohistan 7/1 Makan Kharion, Topo Jhimpir, Taluka and District Thatta (near M-9 Motorway) was purchased by FWO in 2015 during construction of M-9 Motorway. The basic purpose at that time was to have a temporary Camp Office to monitor the construction operations of M-9, and to park machinery, equipment and to provide temporary residing place to workforce. A Camp Office was built on the land with basic facilities to support operations of M-9 Motorway.



Picture-3: FWO Camp Office at the said Property

After completion of M-9, the land lost its utility. Following two options were considered to utilize the land gainfully;

- Option-1: Building a Housing Colony
- Option-2: Establishment of an SEZ

After deliberations, establishment of a world-class SEZ offering globally and nationally integrated logistics, industrial and manufacturing facilities, was being opted for. The decision to convert the land into an SEZ in Deh Kohistan 7/1 Makan Kharion, Topo Jhimpir, Taluka and District Thatta was firmed up. Scope, strengths, weaknesses, opportunities, and threats in presence of competitor industrial establishments in the vicinity and province were analyzed to determine the competitive edge of the envisaged project.

3.5.2. SWOT Analysis

Strengths ▪ FWO the largest investor with financial & technical credibility ▪ Location & connectivity being adjacent to motorway (M-9) ▪ Suitability of the area for sophisticated and hi-tech manufacturing sector ▪ Can be a favourable destination for international brands ▪ Strong linkages with major logistical routes (N-5) ▪ Easy access to high concentration of skill centers (Karachi, Hyderabad) ▪ Railway station near Jhimpir Wind farm	Weaknesses ▪ Needs considerable energy consumption from National grid ▪ Presence of competitor SEZs limited scope ▪ Periphery model offering the same facilities ▪ Nooriabad Industrial Estate with established industrial units ▪ Dependence on road rather than rail
Opportunities ▪ Leveraging comparative advantages in key industries ▪ Redefining the core-periphery model to hybrid Model ▪ One-window facilities to enterprises from visa to custom clearance to all other business-related processes ▪ Huge labour pool and potential for employment ▪ World-class logistics facilities ▪ Solar Captive Power Plant can be installed ▪ Carbon credits on CO₂ ▪ Environmental Friendly with tree plantation	Threats ▪ Shifting & unpredictable global manufacturing landscape ▪ Increasingly unreliable energy supply from National Grid ▪ Growth of unemployment and inward migration of job-seekers (demographic shift) ▪ Increased competition, both domestic and abroad ▪ Procedural and approvals delays

Table-3: SWOT Analysis

3.5.3. Existing SEZs in Sindh Province

Presently, there are following approved SEZs in the Province of Sindh. Their working model, strength-weaknesses, success stories, land prices, facilities being offered, current colonization, and marketing strategies were studied.

Sr.#	SEZ	Location	Mode	Land
1	Bin Qasim	Karachi	Public	930
2	Korangi Creek	Karachi	Public	220
3	Khairpur	Khairpur	Public	140
4	Naushero Feroz	Sukkar Division	Public	80
5	Service Long March Tyer	Jamshoro	Private-sole enterprise	50
6	Dhabejee (pSEZ	Thatta	Public-Private Partnership	1530

Table-4: Existing SEZ in Sindh

3.5.4. Nooriabad Industrial Estate, Jamshoro

In the vicinity of the proposed SEZ, Norriabad Industrial Estate is located in Jamshoro which is 94 kilometers away from Karachi on the N-5 National Highway. The Industrial area is managed by Sindh Industrial Trading Estate (S.I.T.E.) and hosts a large number of industrial units, to name a few as under;

Sr.#	Name	Sr.#	Name
1	Liberty Mills	2	Latif Textile
3	Yunus Textile Mills	4	Khas Textile
5	Luck Cement	6	Zehra Textile
7	Power Cement	8	Noori Textile
9	National Foods	10	Faisal Textile
11	Al Rehman Textile	12	Terry World Textile
13	Lucky Textile	14	Metco Textile
15	Popular Textile	16	Nadeem Textile
17	Soorti Textile	18	Best Board Industries

Table-5: Industries in Nooriabad Industrial Estate, Jamshoro

Discussions and meetings were held with industrialists to share their experiences, issues, problems and way forward to resolution.

3.5.5. Wind Corridor /Farm in Jhimpir

Jhimpir is a village in Thatta district and is situated 114 km away from Karachi. Being privileged as the “wind corridor”, it is the site for Pakistan’s first wind power project. It has a railway station and the train service is available for Karachi and upcountry. Wind power projects are

expensive; a 50 MW farm costs around US\$ 135 million. Meetings were held with Wind Farm as well to understand the business dynamics. The land prices and sub-lease rates have also gone up due to Wind Farm.

3.5.6. Meetings with local Community

Meetings were held with local community to have their views about the proposed project though FWO is a familiar name amongst the local community in the vicinity due to

- M-9 Motorway construction;
- Existing Camp Office of FWO;
- Jobs given to local community;
- School being built by FWO in the area;
- Relief operations of FWO in every national calamity.

Local community largely hailed the project and gave valuable suggestions for the planning of the project.

3.5.7. Redefining the Existing SEZ Model

Synthesis of the discussions, research, local dynamics and keeping in view the emerging trend in SEZ model, the Developer (GID) envisioned redefining the SEZ model. Solar power plant, planned tree plantation and a comprehensive Waste Management System and Chemically Enhanced Primary Treatment (CEPT) was planned on the piece of land for the proposed project measuring 1142.83 acres. The Master Plan is prepared keeping in view;

- Power outages and Load shedding and how to bridge the gap;
- Green and sustainable development focus;
- Consumers awareness and choices for environmentally friendly products;
- Climate change and global warming;
- Pakistan's international commitment under Sustainable Development Agenda, 2030 and Paris Agreement;
- Suitability of Local area to accommodate the project;

- Digital revolution and technology enablers in business processes; and
- Strategic analysis of regional, international challenges and opportunities and shifting production global trends.

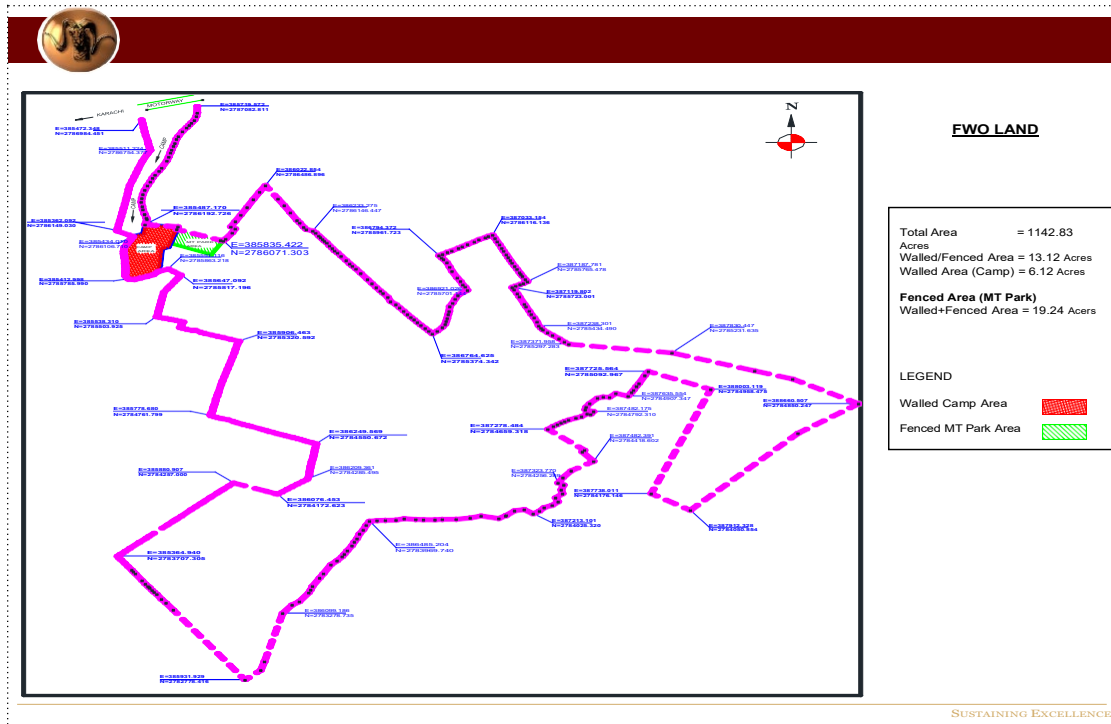
Following Table reflects what new and more investor friendly is being envisioned in the Master Plan of Jinnah SEZ as compare to the business as usual;

Project Aspects	Business as Usual	Green Growth Interventions	Benefits to Business
Power Supply/ power Generation	Power from National Grid	Captive Solar Power project of 100MW	▪ Uninterrupted low cost power supply ▪ Product acceptability SEZ image as a Green Zone ▪ Reduced CO2 omissions, less air pollution
Hazardous Waste and Water Treatment Plant	No Hazardous Waste Treatment Plant (HWTP)	HWTP in the SEZ	▪ Save trucking & shipping costs ▪ Reduce associated GHG emissions ▪ Generate a useful byproduct (incinerator bottom ash for construction materials) ▪ Avoid environmental damage of waste dumping
Admission & facilitation of Industry	Traditional manufacturing industries	Hi-tech, value added manufacturing and services industries, Logistics & merchandizing	▪ More revenue generation ▪ Global Consumer acceptability ▪ One-window facility
Tree Plantation especially Palm Oil Tree	Randomly done Traditional Trees and ornamental shrubs	Organized and Planned plantation in and around the SEZ	▪ Possibility of achieving a small premium on the sale of produce ▪ Replacement of plants and shrubs ▪ Increase economic value of ecosystem services, preservation of biodiversity around

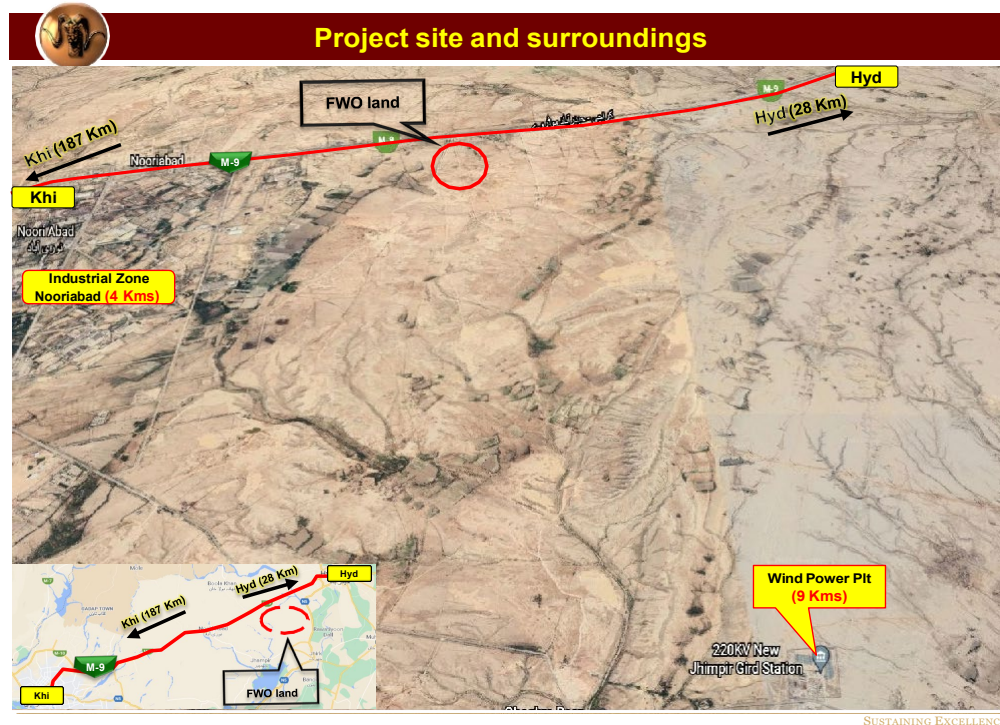
Table-6: Redefined Model of the Proposed SEZ

3.6. Land Location

Following maps shows the location of the land for appreciation of the Master Planning;



Map-1 &2: FWO Land Location



Map-3: Project site and surroundings

3.7. Master Plan

The SEZ Act provides that not more than thirty percent of the entire area of an SEZ shall be used for amenities (including commercial area), infrastructure and residential labour colonies. The size of site for the proposed SEZ is 1142.8388 acres at Thatta district. The Master Plan has been developed (conceptually) with the land use mapping as per the criteria 70:30 given in the SEZ Act;

- 70 % industrial use (saleable) = 800.17 acres
- 30% infrastructure and amenities and commercial = 342.66 acres
 - 25 % for infrastructure and amenities (non-saleable) 325.36 acres
 - 5% out of 30% for the commercial sale (saleable) 17.30 acres

3.7.1. Industrial /Economic Activity area = 800.17 acres

- Industrial Park = 477.67 acres
 - Trade City = 60.36 acres
 - ICT Park = 46.36 acres
 - Jinnah Solar Park = 215.32 acres
- } the area to be divided into 4 zones

3.7.2. Land distribution of Industrial Park area

- Large scale manufacturing projects = 281.91 acres, plots 30
- Small & medium sized projects=195.75 acres, plots 100

a) Large scale land use (281.91 acres)

Sr.#	Block name	Size of plot	No of plots	Land area
1	Block -A	12	10	121.54
2	Block-B	10	10	100.26
3	Block-C	6	10	60.11
TOTAL			30	281.91

Table-7: Large scale land use (281.91 acres)

b) Small and medium sized land use (195.75 acres)

Sr.#	Block name	Size of Plot	No of plots	Land area
1	Block-D	3	26	79.46
2	Block-E	2	39	79.55
3	Block-F	1	35	36.74
TOTAL			100	195.75

Table-8: Small and medium sized land use (195.75)

c) Trade City to be allocated 60.36 acres

Trade city will be consisting of merchandize zone, Services zone, Exhibition centers, Offices structures (Block G &H), Warehousing & Logistics zone will be in Block-I &J;

Sr.#	Block name	Size of Plot	No of plots	Land area
1	Block-G	8	1	8.43
2	Block-H	7	1	7.1
3	Block-I	2	20	39.80
4	Block-J	1	5	41.7
TOTAL			27	60.36

Table-9: Trade City to be allocated 60.36 acres

d) ICT Park to be allocated 46.83 acres

- Hi-tech companies, soft ware, computers, equipment, R&D Park, Education City

Sr.#	Block name	Size of plot	No of plots	Land area
1	Block-K	2	8	16.00
2	Block-L	1	20	20.00
3	Block-M	0.5	20	10.83
TOTAL			46	46.83

Table-10: ICT Park to be allocated 46.83 acres

Solar Captive Power Project (Jinnah Solar Park) to be allocated 215.32 acres and will consist of project components and ancillary matters;

3.8. Basic infrastructure & Commercial needs to be allocated 342.66 acres

The Jinnah SEZ will be a gated area with a boundary wall (all around) to secure delimitation and security, and all basic infrastructure and facilities will be provided inside the Zone.

3.8.1. Non-saleable area = 325.36 acres, and following is the distribution;

a) Amenities Area

Amenities Area				
Sr.#	No.	Description	Area (SFT)	Area (acre)
1	5	Mosque	123120.000	2.83
2	2	School	157257.829	3.61
3	2	College	316407.808	7.26
4	4	Hospital	276388.942	6.35
5	1	Training Center	34000.000	0.78
6	1	Admin Building	34000.000	0.78
7	1	Waste Management Plant	286005.352	6.57
8	1	Sports Complex	204436.297	4.69
9	7	R.O. Plant	4375.0	0.10
10	2	STP	432316.552	9.92
11	1	Graveyard	986693.988	22.65
12	10	Water Storage Tanks	12566.371	0.29
13	N.A	Green Area	1812069.4	41.6
TOTAL				108.20

Table-11 Amenities Area

b) Road Area

Roads (Main Road, Tertiary Roads, Service Roads)		
Sr.#	Area (SFT)	Area (Acre)
1	6536884.336	150.07
	TOTAL	150.07

Table-12 Roads Area

c) Labor Colony

Labor Colony		
Sr.No.	Area (SFT)	Area (Acre)
1	2923005.135	67.10
	TOTAL	67.10

Table-13 Labor Colony

3.8.2. Saleable Area= 17.30 acres (753417.472 SFT)

Saleable area for commercial activities to be allocated 17.30 acres or 753417.472 SFT (will be sold in SFT or marlas). This area will be having Shopping Malls, Cinemas & entertaining centers, Restaurants, 3-5 star hotels, Tourism offices and other basic requirements of a modern city life;

Saleable Commercial Area		
Sr.#	Area (SFT)	Area (Acre)
1	753417.472	17.30
	TOTAL	17.30

Table-14: Saleable Area

3.8.3. Total Land Area Distribution of Jinnah SEZ

Total Land Area				
Sr.No.	Description	Area (Acre)		Percentage
1	Saleable Economic Activity Area	800.17		70%
2	Saleable Commercial Activity Area	17.30	342.66	30%
3	Non-saleable Amenities and Road Area	325.36		
TOTAL		1142.8388		100%

Table-15-Total Land Area distribution in summary

3.9. Land Area distribution in Excel Sheet and the Master Plan (Spatial Lay out) on the pages # 80, 81, 82 and 83.

3.10. Principles for Industry Selection

Industry selection is based on research, pragmatic approaches, knowledge of local, regional and international markets & demands, consumer's preferences and the facilities within 15 km radius of the proposed site.



Map-4: Land marks within 15 km radius

Following were considered to support Pakistan's trade and investment regimes in real time while making the selection of industry for the proposed zone;

Compatible with Local Environments: Industries no matter with self-advantage or introducing new technology must assimilate into the local environment. On the basis of giving full play to the advantages of local resources, the industrial chain shall be extended to be stronger and stronger. Otherwise, it is impossible to gather synergy for internal work and external force.

Value Chain Supplement: In terms of industry selection, we tend to choose the key areas available for development and with this as an axis, gather investment attraction and preferential measures on the whole industry chain to form industrial support or synergy, as well as industrial coupling, forming the cycle of energy and materials between industries;

Diversified Industry: Cultivate leading industries to develop into featured industries with regional advantages, guide the development of various industries, promote industrial competition and enhance the industry's ability to mitigate risks;

Green Industry: GID makes rational use of advantageous resources to form a long-term perspective, take circular economy as a consideration, give priority to green industry, enhance industrial continuity and ensure sustainable development of the industry;

Approaches to Match and Support the Local Area: Situational analysis of Thatta region pointed out existence of significant potential for industrial clusters development and inter-organizational interfaces for by-product and local resources;

Pakistan's Regional and International Trade & Investment Arrangements: Free Trade Agreements (FTAs) and other cooperation agreements (Multi-lateral Trade & Investment Arrangements with Regional Blocks) have been analyzed to provide import substitution and export promotion.

Close proximity to Port Qasim & Karachi Port: Jinnah SEZ is close to Port Qasim & Karachi port and ideal location for industries with imported raw material and targeting export markets, (except Afghanistan and India).

Size of Karachi Market: The size of Karachi market for any product is from 20 – 30% of the whole Pakistan market.

3.10.1. Parameters for Assessment and Analysis of Industry

Basic and applied research was conducted to analyze the industry selection for the proposed SEZ from the perspective of Pakistan, and its needs for FDI, export growth and potential for imports substitution to reduce the import bill;

- Deeply study the industrial structure of Pakistan to assess the areas which need to be upgraded and have potential to improve;
- Situational analysis of the industrial structure of Pakistan to fill the gap;
- Research official websites of government of Pakistan / Board of Investment/ Investment Promotion Agencies to look for the priority, demand sector being identified and supported for investment;
- Rely on the comparative advantages in natural resources of Pakistan and others to choose the industry with larger space for development;
- Industries that can make use of relatively low labor cost in Pakistan to develop low-cost labor intensive related industries;
- Potential industry with special advantages, guided by the industrial structure characteristics of the FDI distribution in Pakistan and to develop import substitution industry for the Pakistan market;
- Follow the laws of Pakistan's industrial evolution and develop the leading industries that match the process of industrialization in Pakistan and willing to adapt the process of long-term heavy industrialization in Pakistan and actively guide the related industries;
- Has the ability to utilize the support policy of “Go Global”;
- Analyze the core products of different FTAs, Pakistan has executed for import substitution and to establish linkages with local markets;
- Study the industrial structure of the Pakistan’s importing partners and distribution of foreign direct investment to lead the relevant key industries;
- Actively guide the key industries that can radiate Europe, America and other markets
- Make full use of regional advantages and trading products;
- Develop export-oriented industries with the direction of radiation in the Middle East, and the European and American markets;
- New Industrial Revolution and changing patterns of production overtimes.

A transition of the industries into eco-industrial network has emerged as a dynamic approach to preserve the natural resources of the region. Forging strong linkages between industry and related services can accelerate this transition to a diversified, high income economy while providing safer environment.

3.11. Nature and Type of Target Industries

Project site is a peaceful place located in a scenic location in Thatta district. Keeping in view the industrial undertakings in view and other dynamics of the area, SEZ is designed under the concept of “moving towards green development and it represents “Multi-activity” targeting different sectors of economy. The zoning is based to keep the things open and flexible on the one side and on the other side this flexibility will allow to maintain material chain of any particular industry in its close proximity to create synergy and economy of scales.

The industrial profile of nearby Nooriabad Industrial Estate where local industry especially the textile industry is thriving, Jinnah SEZ is planned to target only foreign investors. The site area of the proposed SEZ is divided into four portions and a purpose built dual road from entrance to the end passes through the center of the site. Jinnah SEZ will cater Large and Medium industry, Small and Medium scale industries. Transport & logistics, merchandized trading and R&D industries, all these industries are well suited for the local area. The selection of type of industries for the Jinnah SEZ has been done by giving due consideration to existing industries operating in the area, local skill set, availability of workforce, and the commercial activities planned on both sides of the M-9 Motorway (Right of way of M-9 is with FWO). Apart from the local industrial trends, Pakistan’s international commitments, regional dynamics and World Trade Organization (WTO) regulations had been studied while formulating the list of targeted industries. The type of multi-activity for Jinnah SEZ will be comprised the following though not limited, as list can be up-dated being “dynamic” in nature;

e-commerce	Trading	Logistics	Warehousing	Textile & made-up
R&D	Packaging & Printing	Pharmaceuticals	Financial services	Surgical instruments
Technology	Leather value added	Engineering goods	Automobiles and e-vehicles	Sports goods
Electronics	Food Processing	Chemicals	Furniture	Edible oil

				processing
Computer and Soft ware	Solar panels	High value steel products	Construction	Toys
Mobile Phones	Education	Electrical goods	Recycling	Consumer items
Tourism	Footwear	Telecom parts & goods	Vendor industry	Plastic ware

Table-16: Nature and Type of Target Industries

3.12. Entrance Point

The entrance of the Jinnah SEZ has been designed at approximately center of the project site. The entrance gate is grandeur state of architecture. This gateway will cover the entrances both from main artery of the SEZ and will lead to M-9. The gateway will have admin buildings at its base. Apart from the admin offices, the entrance will feature security offices to conduct the security checks on the incoming and outgoing traffic. The entry point of the proposed JinnahSEZ will feature following elements:

Administration office

Security Offices

Car Parking Area

Other Management Offices

There will be a wall around the area ensuring security check-posts, CCTV cameras, Light-poles and Palm trees plantation at recommended distance all around inside the wall area.

3.12.1. Proposed Amenities

Provision of services and utilities has been ensured in designing the Zone. Three large scale community cores have been designed. Following is part of the Planning;

- Main road and other roads;
- Mosques;
- Schools;
- College and training center;
- Labor Colony;
- Waste Management Treatment Plant;
- R.O. Plants;

- Sewerage and Drainage system;
- Community Centers;
- Parks and green area;
- Graveyard;
- Commercial area.

3.12.2. Utilities

The proposed SEZ will provide following utilities inside the Zone to the Zone Enterprises and for all other activities;

- Low cost, uninterrupted green (solar) energy;
- Power Generation station and internal distribution system;
- Water Works and supply networks;
- Sewage Treatment Plants;
- Solid Waste Collection system;
- Gas Distribution Centre;
- Telephone Exchange;
- Utility lines for electric, water, sewerage, gas and phone to be provided in services corridor underground.

3.12.3. Commercial Buildings

To meet the daily requirement of the project and to provide comfort of the modern life, commercial and public buildings have also been proposed which may include;

- Post office;
- Clinics and Hospitals
- Banks;
- Shopping Malls;
- Hotels and restaurants;
- Recreational Centers;
- Recreational activities, clubs and Gymnasium.

3.12.4. Fire Fighting System

The Fire Fight System of international standards is an essential part of the proposed SEZ. A well-equipped and pressurized water distribution system will comprise of pipes, hydrants, gate valves etc. will be provided. The system shall be operated automatically in case the pressure is dropped in the system by operating any fire hydrant.

3.13. Emergency Response Plan

The purpose of Emergency Response Plan (ERP) is to develop a system, provide instructions, and assign responsibilities whenever dealing with emergencies and provide guide lines how to deal with emergency such as

- First and foremost, try to remain calm;
- Secondly, be familiar with emergency procedures so you know what to do when there is no time to refer to a manual or ask for advice;
- Thirdly, memorize important telephone numbers HSE, Doctor and Plant Manager;
- Finally, do not transport ill or injured people to the hospital. If the ill or injured person is conscious and the injury is not life-threatening, give them a choice of having a family member or an ambulance take them to the hospital.

Specific ERPs shall be developed and maintained for all operating sites and/or premises of GID. These plans shall provide instructions to manage an emergency, and establish roles and accountabilities for emergency response tasks. While every situation is different and one may have to make decisions under pressure, these guidelines are intended to help you make decisions that maximize the safety of others as well as one's own self. If injuries or illnesses occur in job-related activities, a first report of injury must be filed within 24 hours in the Plant Manager office. GID may face explained below emergency situations. Scope Plans and procedures should be in place to respond to foreseeable emergencies in order to minimize any adverse impact on the health or safety of people or the environment. Emergency response priorities are considered in the following order,

- Health and safety of people;
- Protection of the environment;

- Preservation of reputation and operability of GID;
- Financial risk;

3.13.1. Type of Emergencies and Remedies

The ERP provides guidance in case of following emergencies;

- Bomb Threat;
- Chemical;
- Electrical;
- Earthquake;
- Death;
- Fire.

Bomb Threat

If receive a bomb threat, remain calm and:

- Obtain as much information as possible;
- Write down the number from where the call is coming;
- Write down the exact time of the call;
- Write down as accurately as possible the statements made;
- Listen to the voice to determine the sex, age, accents, lisps, tone, etc. (Note any distinguishing feature);
- Listen for background noises;
- Try to signal for someone else to also listen to the telephone line, if possible;
- Do not hang up and stay on the line as long as possible; wait for the caller to hang up;
- Keep the bomb threat caller talking, and ask as many questions of the caller like;
 - When will the bomb go off?
 - How much time remains?
 - Where is the bomb located?
 - What does it look like?
 - What kind of bomb is it?
 - How do you know about this bomb?
 - Why was it placed here?
 - Who are you?

- What is your name?
- If there is an immediate threat of a bomb explosion, pull the fire alarm, evacuate the camp and contact Health, Safety & Emergency (HSE) office, which will ultimately contact Police;
- Share information with the company HSE who will in return share the same with the police;
- Return to the camp / work area only after being given the “all-clear” sign by the police.

Death

- Call Emergency Response Team (ERT);
- Clear the area of spectators;
- Secure the scene and do not touch or move anything;
- Assist in directing emergency personnel to the scene;
- Do not give out any information to the media;
- Contact the HSE Officer / Doctor;
- HSE Officer will contact the Management as needed for a post-crisis meeting for any other employees affected by the situation.

Earthquake

In the event of an earthquake:

- If inside a room, take cover under a desk or table or under a doorway and hold on;
- If none of these is available: move against an interior wall and cover head with arms;
- Remain under cover until the movement subsides;
- If outdoors, stay in an open area, away from buildings, windows, power lines, streetlights or anything that could fall;
- When shaking stops, survey immediate area for trapped or injured persons, evacuate the building;
- If damage has occurred in the area, inform Security immediately;
- Assemble at the muster point;
- Follow the instructions of emergency officials when present;

- Proceed with any necessary cleanup and recovery of items if it is safe to do so and allowed by the officer in-charge.

After an Earthquake

- Put on enclosed shoes to protect against broken glass;
- Be alert for safety hazards such as fire, electrical wires, gas leaks, etc;
- Check on others and if there are injuries or other urgent problems, report to Security;
- Give or seek first aid and assist any disabled persons in finding a safe place;
- Evacuate if the building seems unsafe or if instructed to do so;
- Unplug small electrical appliances;
- Be mentally and physically prepared for aftershocks;
- Cooperate with emergency personnel, keep them informed, and remain calm.

Fire

- When a fire alarm has been activated without any warning, staff must initiate all evacuation procedures as described in fire drill procedures. Following are the basic steps when discovering a fire;
- Knock on doors; yell “Fire!” and notify staff members in immediate area;
- Confine the fire by closing door;
- Go to the nearest pull station and activate fire alarm;
- Inform the administrator of the extent of the fire by means of communication plan;
- Extinguish fire and if the fire appears controllable, try to extinguish it by using proper fire extinguisher but attempt this for no longer than 30 seconds;
- If the fire appears difficult to control, evacuate immediately; and always remember
- The first five minutes of a fire are the most important;
- Be familiar with the use of a fire extinguisher before a fire occurs;
- If have to leave the room, close the door behind;
- Always fight a fire from a position near the door, i.e. make sure there is an exit in case fire gets out of control;
- If using an extinguisher, aim at the base of the fire; and use a Fire Extinguisher only if
- Have been trained and back to an unobstructed exit;

- When fire is contained, report;
- Make sure everyone has left the area and there are little smoke or flames.

Never fight a fire if:

- Lack a safe way to escape, should the efforts fail
- It has left its source of origin;
- Unsure of the type of extinguisher need or have;
- If can't control the fire within 30 seconds, abandon efforts, close the door(s) and evacuate immediately.

Building Evacuation

- Be familiar with the evacuation routes as per an evacuation order;
- If necessary to evacuate the building due to an emergency, fully cooperate with Safety and Security/emergency personnel and:
- Take only Cell Phone, keys, wallets and essential belongings along;
- If possible wear weather appropriate clothing;
- Do not investigate the source of the emergency;
- Walk, don't run, to the nearest exit;
- Assist people with special needs;
- If there is no immediate danger, persons with disability/mobility limitations should shelter in place and call Safety and Security to report location and number of people needing assistance;
- If unable to evacuate, call Safety and Security and report the location;
- Follow instructions of the Department of Safety and Security or other identified emergency personnel;
- Wait for instructions before returning to building after an evacuation.

Enforce the Rules

- Smoking should only be permitted in designated areas;
- Keep trash cans covered to guard against careless smokers;
- Empty trash cans regularly and never leave them overnight.

- Staff in other units, departments must be available to assist in fire area if necessary;
- Always be on alert for signs of fire and the smell of smoke;
- Electrical system should always be in proper working condition as improper use of electrical system is cause of fire and this can include overloading electrical outlets, delayed electrical repairs/ignoring plugs which heat up, neglecting wires and delayed repair etc.

Chemical Burns

If a corrosive or other chemical gets in the eyes;

- Flush the eye with water for at least 15 minutes, lifting the eyelid occasionally;
- Follow any other directions in the Medical Safety Data Sheet (MSDS);
- If necessary, get medical attention;
- Inform supervisor, and file a first report of injury form as soon as possible in the HSE office.

If the corrosive or other chemical splashes in the skin;

- Quickly remove contaminated clothing;
- Rinse the skin with water for at least 15 minutes and follow any other instructions in the MSDS.

If skin is burned;

- Apply a clean compress;
- Call medical attention;
- Inform supervisor, and file a first report of injury form as soon as possible in the HSE office.

If a chemical is breathed in;

- Get away from the chemical and into fresh air;
- Follow any other directions in the MSDS;
- Get medical attention if necessary;
- Inform supervisor; file a first report of injury form as soon as possible in the HSE office.

If a chemical is eaten or swallowed;

- Call the company medical help / doctor for immediate help;
- Don't eat or drink anything unless directed by medical personnel;
- Read MSDS for specific instructions;
- Get medical attention if necessary;
- Report the injury to supervisor.

Electrical Burns

If a person is burned by an electrical source:

- Assess the area around the person for potential unsafe conditions such as broken wires, pools of liquid;
- Don't touch a person who is in contact with a live electrical source;
- Pull the main switch or fuse to turn off the electricity;
- Stand on something dry and use a dry stick or board-nothing metallic, wet or damp-to push the person away from the wire;
- If needed call a first aider and get someone to call the company HSE Officer / Doctor as soon as possible;
- Report the injury to supervisor and file a first report of injury as soon as possible.

Keeping in view the Geotechnical Report and its finding that Active faults are present in the vicinity of the area which is Jhimpir fault, Surfer fault, Runn of Katch fault and Allah Bund fault generating earthquake of greater than 6.0 magnitude, all building structures in the Jinnah SEZ will be built for minimum or zero damage in the case of an earthquake.

3.14. Solid Waste Management System and Combined Effluent Treatment Plant

Solid waste, sewer system management plan (SSMP) and waste water treatment are important initiatives, and should be taken seriously for the betterment of society and our future. Wastewater treatment is a process, wherein the contaminants are removed from wastewater as well as household sewage, to produce waste stream or solid waste suitable for discharge or reuse. Wastewater treatment methods are categorized into three sub-divisions, physical, chemical and biological. The treatment of effluents is essential to prevent pollution of the

receiving water. The effluent water treatment plants are installed to reduce the possibility of pollution; biodegradable organics if left unsolved, the levels of contamination in the process of purification could damage bacterial treatment beds and lead to pollution of controlled waters. It is estimated that every year 1.8 million people die (worldwide especially in the developing countries) due to suffering from waterborne diseases. A large part of these deaths can be indirectly attributed to improper sanitation.

Jinnah SEZ is a multi-activity zone hosting Industrial Mix, Trade & Merchandize, Transport & Logistics, Warehouses, IT and Services sectors. Under the commercial activities, it will have hospital, schools, training center, shopping malls, entertainment centers and labor colonies. All these economic, industrial, commercial activities and human habitat will generate solid waste and industrial waste. Collectively, the solid waste generated in Jinnah SEZ will be in a very huge volume. Therefore, to handle this waste, a comprehensive Solid Waste Management Plan (SWMP) is being developed as the part of GID's SEZ Plan and Green Development vision.

Being an integral part of the Development Plan 6.57 acres of land have been allocated for waste handling, management, disposal and Combined Effluent Treatment Plant (CEPT), and 9.92 acres have been allocated for Sewage Treatment Plant (STP). The most significant characteristics of solid waste are density, moisture, combustible and compostable contents and thermal values and each of these characteristics varies widely. The characteristics are mainly affected by seasonally and locally variable type of collection system, standard of living, extent and type of commerce and industry involved, prevailing climate and other considerations. The density of solid waste is an important criterion in the context of planning for collection system. Its range (reported in the USA) is 89 kg per cubic meter to 267 kg per cubic meter with an average of 128 kg per cubic meter. Average figure for Europe is about 30 kg per cubic meter. No such estimates are available for the local conditions. The density is likely to decrease with increase in the standard of living.

Some of the important types of waste management and wastewater treatment process are as follows:

- Effluent Treatment Plants (ETP)
- Sewage Treatment Plants (STP)
- Common and Combined Effluent Treatment Plants (CETP)

ETPs are used by leading companies in the pharmaceutical and chemical industry to purify water and remove any toxic and non toxic materials or chemicals from it. STPs are the process of removing contaminants from wastewater and household sewage, both runoff (effluents) and domestic. It includes physical, chemical, and biological processes to remove physical, chemical and biological contaminants.

Its objective is to produce a waste stream (or treated effluent) and a solid waste or sludge suitable for discharge or reuse back into the environment. Many of the Small Scale Industries (SSI) are unable to put up the treatment systems individually, the concept of CETP is envisaged to benefit such industries in treating its effluent before disposal whether it is in stream, land, sewerage system or in rivers and seas.

CETPs are set up in the industrial estates where there are clusters of small scale industrial units and where many polluting industries are located. The major objective of the CETP is therefore, to reduce the treatment cost to be borne by an individual member unit to a maximum while protecting the water environment to a maximum in order to make a cooperative movement of pollution control especially to treat the effluent, emanating from the clusters of compatible Small-Scale Industries.

In Jinnah SEZ, hazardous, harmful industrial waste in general are required to be managed by enterprises, and guidance and regulations will be provided to administer and manage the waste and design a more environmental favorable manufacturing method.

A waste handling manual shall be prepared to be shared with the zone enterprises and other entities so that environmental friendly industrial efficiency can be ensured in the early stages of development.

Estimation of the industrial waste depends upon the different kind of the industries and the way they conduct the disposal of waste. Jinnah SEZ is designed under the concept of green development and offers multi-activity model while benchmarking the industrial trends, demands, Pakistan's global trading partners and investment flows.

The following type of industries (manufacturing, services & Trading) will be (but not limited to) hosted in the Jinnah SEZ;

Industrial Park			Trade City	ICT Park
Textiles & made up	Leather, value added	Automobiles	Merchandize	Hi-Tech
Furniture & wood work	Plastic & related products	Steel & related products	Services	R & D
Packaging & Printing	Engineering	Electrical and Electronics	e-commerce	Tourism
Pharmaceuticals	Food Processing & Sea Food	Consumer goods	Transport & logistics	Front and Back Offices
Chemicals	Construction Materials	Value- addition	Warehousing	Education
Mineral Beneficiation	Solar panels	Palm Oil production	Marketing	IT Industry

Table-17: Type of Industries in Jinnah SEZ

Following type of Industrial Waste (to mention a few items) may be produced by industrial activities;

Acids & Bases Spent Solvents Reactive Waste Waste water	Heavy Metal Solutions Waste Inks Solvents	Fibers and Yarns Cloth scraps Selvage	Pieces of leather scrap, dyes, glues, waxes	Oil filters, Paints Used rags and absorbents
Sawdust & Leftover wooden pieces etc	Leaves & Peels Pomace Pulp Spoiled items Bones, Wasted dairy items	Slaughterhouse waste, Blood Manure, Hair, Fat, Feathers,	Pieces of glass, plastic, Oil wastes	Aerosol cans Anti-freeze, Brake fluids, Brake pads/shoes Motor
Discarded Electronic appliances &	Pieces of iron, nails, circuits	Ink Sledges Heavy metals Organic Constituents	Dye & Chemical container, Oily rags Wasted sludge	IT related waste Lighting equipment related waste etc

Table-18: Type of Industrial waste to be produced

Design Basis, for Waste Management System will as per National Reference Manual (NRM) and international best practices. Industrial wastes will be treated prior to disposal, and processing is intended to reduce its volume and weight and to ensure hygienic safety by reducing Biological Oxygen Demand (BOD), toxicity and poisonous quality of the effluents/emissions to the required standard.

The NRM Standards which are categorized as generation rate, density, storage bin and pick up are given below;

Sr.#	Description	Standards	
1	Generation rate	0.5 – 0.7 – 1 kg capita per day	
2	Density	200 – 250 – 300 kg/cu. m	
3	Storage Bin	25 – 30 – 40 kg	
4	Pick-up	Business Centers	Daily except on Fridays
		Residential	Twice a week

Table-19: the NRM Standards

In Jinnah SEZ, two types of solid waste will be generated;

- Industrial waste
- Municipal waste

The collection of both types of the wastes will be done via centralized collection system. However, in case of industrial waste collection, collection task will be assigned to a contractor after legitimate licensing process. Both contractor and GID will be responsible for the proper collection of the industrial waste. In case of municipal waste, door to door collection will be carried out. Both types of collected wastes will be further categorized depending upon their nature. The recyclable wastes will be recycled and rest of the collected waste will be taken to proper disposal site of Waste management system present within the vicinity.

As per NRM, the refuse (solid waste) is temporarily stored on the premises and this requires adequate number of suitable containers to store the refuse accumulations between collections. The weight and size of this container is to be kept within the limits that can be easily and functionally handled by the collection crew. Weight should preferably not exceed 30 kgs. Where mechanical lifting and dumping is involved, this weight can be increased manifold. Light weight plastic containers are fast growing in the developed countries and be adopted under the local circumstances. Such type of container should receive attention because it is low cost, coupled with its good appearance, cleanliness, noiselessness and reasonable resistance to chemicals and fires. As per NRM, the frequency of collections will depend on the quantity of refuse, time of the year and other factors. In business areas, refuse should be collected daily except on Fridays. Collection by tied body open trucks with a convenience or metal cover is to be gradually replaced by automatic load truck with packer to compact refuse dumped in the truck during collection compaction type bodies have twice the capacity of open trucks. Low level

closed body trailers to eliminate the strain of lifting cans are also available now. Such type of collection trucks has capacities of about 20-25 cubic meters although high in capital cost have much lower maintenance and amortization cost.

There will be four systems of solid waste collection namely:

- Block collection;
- Communal collection;
- Door to door collection;
- Yard collection.

The most effective way to handle solid waste is at source reduction. Enterprises will be responsible to reduce the production of waste with the use of technology. 2nd, option can be to re-use it. 3rd option can be re-cycling. Multi-bin-system can be introduced for segregation at source and guidelines will be issued accordingly.

Collection carts and transportation vehicles will also be designed or/and scheduled to handle waste of different bins separately. Importance of street sweeping cannot be ignored as it measures of last resort to handle the waste trembled out the collection system. After segregation of the solid waste, the categorized solid waste will be taken to the transfer station allocated in the proposed industrial city. Transfer stations is located conveniently close to all the communities it serves, but not too close to people's homes or factories, schools, hospitals, etc. so that it may cause a nuisance. It also has access to major roads leading to the treatment or disposal sites. Disposal Systems According to NRM, Refuse disposal methods include open dumping, incineration, grinding and discharge in to natural stream, sanitary fill, dumping at sea, reduction and fermentation or biological digestion. Among these methods of treatments, three generally accepted method of treatment and disposal of solid wastes are Sanitary Land Fill, Composting and Incineration.

Pollution Prevention will be encouraged which emphasizes a life-cycle approach to assessing a facility's physical plant, production processes, and products to identify the best opportunities to minimize environmental impacts across all media. This approach also ensures that actions taken in one area will not increase environmental problems in another area, such as reducing waste water discharges but increasing airborne emissions of volatile organic compounds.

Pollution prevention requires creative problem solving by a broad cross section of employees to help achieve environmental goals. Main component of Pollution Prevention includes;

- **Source Reduction** or any practice which reduces the amount of any substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment, prior to recycling, treatment, or disposal; and reduces the risks to public health and the environment associated with the release of such substances, pollutants, or contaminants
- **Recycling/Reuse** includes an examination of waste streams and production processes to identify opportunities for recycling and can be beneficial to reduce disposal costs, while using or reusing recycled materials as substitutes for feedstock's can reduce raw materials costs. Materials exchange programs can assist in finding uses for recycled materials and in identifying effective substitutes for raw materials.
- **Treatment** can reduce the volume and toxicity of a waste. Reducing a waste's volume and toxicity prior to final disposal can result in long-term cost savings. There are a considerable number of levels and types of treatment from which to choose.

GID is committed to provide green solutions to waste management to promote green development initiatives and will be selecting the right treatment option/ solution to simplify disposal options and limit future liability with maximum desired result.

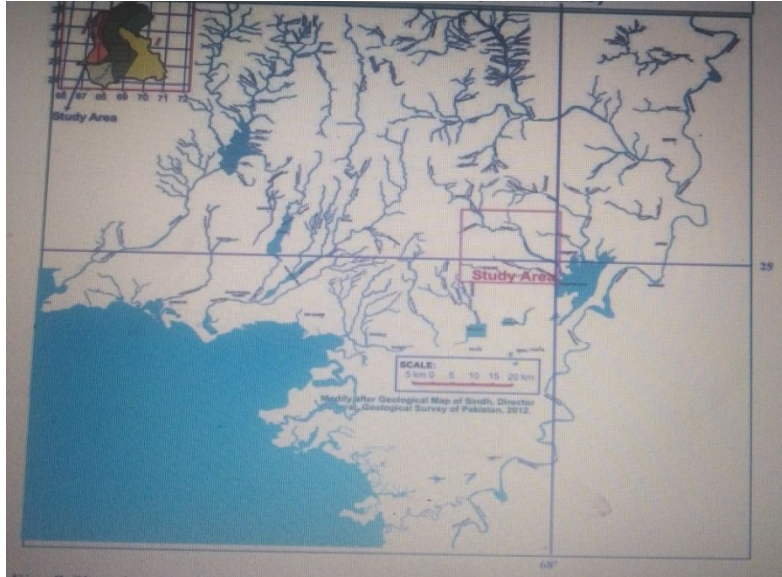
3.15. Sewerage Management & Waste Water Treatment Plan (STP)

Sewer System Management Plan (SSMP) is an essential component of the Development Plan. An SSMP is a document that describes the activities the agency uses to manage wastewater collection system effectively. Effective management of a wastewater collection system includes:

- Maintaining or improving the condition of the collection system infrastructure in order to provide reliable service into the future;
- Cost-effectively minimizing infiltration/inflow (I/I) and providing adequate sewer capacity to accommodate design storm flows; and
- Minimizing the number and impact of sanitary sewer overflows (SSOs) that occur.

The volume of sanitary sewerage from an area depends upon the population, the characteristics of the area, water usage and underground water conditions and material of joints etc. per capita

sewerage flow at 80% of water supply from residential area has been taken into account. The drainage system will be covered by the seepage drain and will flow across the project site and ultimately ends at the main drain nearby Nala.



Map-19: Drainage pattern of the Study Area (Jinnah SEZ)

Keeping in view the flow pattern of effluent and slope of the site, the Combined Effluent Treatment Plant will be placed at the location which is converging point for effluent flowing across the site area. The Nala is located at around 500 meters away from the project site as per the slope and contours of project area, the plant is planned. Manholes (sewer holes) have been designed on the road-sides to collect the sewerage. In addition to this, rain water harvesting tanks will be constructed in every plot to preserve rain water. Though designed capacity will be sufficient to conserve 100% rain water nevertheless harvesting tanks will ensure 80% water conservation. The rain water of streets will be evacuated by surface runoff towards main road where it will be taken to seepage drain through a standard sized drain channel (5X5-WidthxHeight) with 6" wall thickness and 12" base thickness. Four types of drain segments with varying slab thickness are designed. Jinnah SEZ will feature a comprehensive SSMP. Both drainage and CETP are part of SSMP. The collected sewage will firstly go through Local Treatment. The local treatment will limit the extent of contamination of generated sewage. After local treatment, the sewage will be directed towards CETPs for intensive treatment. Following are the characteristic and flow chart of CETP;

Characteristics for CETP	Sr.no	Particulars	Value
	1	Biochemical oxygen demand	770 mg/l
	2	Total suspended solid (TSS)	1.080 mg/l
	3	Chemical oxygen demand	1,380 m/l
	4	Total nitrogen	50 mg/l
	5	Ammonium N	30 mg/l
	6	Total phosphorus	12 mg/l
	7	Alkalinity	50 mg/l
	8	Minimum water temperature	10 c
	9	Maximum water temperature	35 c
	10	pH	7-8

Table-20: Characteristics of CETP

Construction of CETP shall ensure environmental compliance for Jinnah SEZ to offer its clients an environmental compliant facility that shall meet the environmental regulations. As a result, all individual industries shall operate as an environmentally sustainable enterprise. Following is Flow chart of a common CETP treatment process.

3.16. Tree Plantation Plan

Tree Plantation Plan is the essential part of the project's Green and Sustainable Development business concept of the proposed Jinnah SEZ. Acres 42.37 of land had been earmarked for tree plantation, green areas and parks inside the proposed zone. Adequate and qualified workforce will be hired to look after the trees, other horticulture and floriculture arrangements.

Zone Enterprises will also be bound to have planned and organized tree plantation in their premises. The governing factors of organized plantation for the area in and around the project are as follows;

3.16.1. Governing Factors of the Plan

The governing factors of the Plan are designed keeping in view the mitigation measures required to minimize negative impacts of the industrial initiatives on the floral resources of the area. At present, the area earmarked for the Zone is barren and full of bushes and long grass with hardly any mature trees.

However, the Forest Department of the Government of Sindh shall be entrusted with the responsibility for tree cutting (if so required), transplanting of suitable young plants, plantation of young saplings of indigenous tree species and care of planted tree saplings till they are mature.

- Old trees around the project area are good habitat and shelter places for birds. Every effort should be made to conserve these trees for the protection of generations of birds;
- Relocation of young trees should be preferred to other suitable locations;
- Trees having less than four inches trunk diameter is ideal for transplantation, as their survival rate is higher;
- A record should be maintained for tree cuttings, transplantation of trees to new locations or plantation of new trees;
- Plantation Plan must be properly followed and only recommended indigenous species should be preferred;
- Implementation of Plantation Plan must be started by first plantation season and must be completed as soon as possible;
- Along with permanent trees, decorative plants, bushes and seasonal flowers will be cultivated to enhance the optic aspects of the industrial site;
- Indigenous fruit trees and bushes will also be planted;
- SCDA will be consulted for plantation of Palm Oil trees and only the recommended species will be planted;
- Sindh Agriculture Department will also be consulted;
- Plantation of trees should be done according to the local conditions to avoid damage or harm to the trees due to pests, insects, tree-diseases and other negative elements.

3.16.2. Conservation Committee to be Constituted

A Conservation Committee should be formed under Divisional Forest Officer, Thatta or his representative to take care of all issues related to tree cutting and re-plantation of trees. The other members will include the representatives of:

- Wildlife Department, Sindh;
- Sindh Environmental Protection Agency;
- International Union for Conservation of Nature;
- World Wide Fund for Nature-Pakistan.

The Conservation Committee should ensure effective implementation of the tree cutting in accordance with Plantation Plan of the Project as follows;

- Marking of trees which are to be cut for the Project;
- Relocation of all the young trees (having less than 4 inches trunk diameter) at suitable locations;
- Organization of the cutting of trees as per recognized procedure;
- Plantation of new tree saplings and monitoring of planted trees;
- Upkeep of newly planted tree saplings;
- Ensuring that the tree cutting and implementation of Plantation Plan be carried out within the committed timeframe;
- Conservation Committee should record progress or any non-compliance and take remedial action.

3.16.3. Plantation of Palm Oil Tree

Palm Oil Tree Plantation is part of business concept of the proposed project. The purpose is to join hands with Sindh Coastal Development Agency in its efforts of promotion of Palm Oil Trees in the Sindh Province. Around 60000- Palm Oil trees will be planted inside the boundary wall of the Zone in consultation with the Sindh Coastal Development Agency.

Palm Oil Trees will also be planted alongside the main road and in formations inside the zone.

3.16.4. Other Tree Species Recommended for Planting in/around the Jinnah SEZ

Local and indigenous trees will be planted especially the following;

Sr #	Scientific Name	English Name/Common Name	IUCN Conservation Status
1.	<i>Eucalyptus recurva</i>	Eucalyptus	CE
2.	<i>Conocarpus erectus</i>	Button wood	LC
3.	<i>Prosopis cineraria</i>	Khejri Tree/ Jand/kandi	LC
4.	<i>Prosopis glandulosa</i>	honey mesquite/ Vilyati Kikar	LC
5.	<i>Suaeda fruticosa</i>	shrubby seabligh	LC
6.	<i>Lycium edgeworthii</i>	Indian Box Thorn	LC
7.	<i>Senna holosericea</i>	Senna	LC
8.	<i>Capparis decidua</i>	Ker	EN
9.	<i>Calotropis procera</i>	Apple of sodom	LC
10.	<i>Ziziphus nummularia</i>	Karken Ber, Koken Ber	LC
11.	<i>Azadirachta indica</i>	Neem	LC
12.	<i>Acacia senegal</i>	Gum Acacia	LC
13.	<i>Acacia nilotica</i>	Kikar, Babul	LC
14.	<i>Aerva javanica</i>	Kapok Bush/ dessert cotton	LC
15.	<i>Prosopis cineraria</i>	Devi	LC
16.	<i>Cordia myxa</i>	Assyrian plum/ Lasura	NE
17.	<i>Phoenix dactylifera</i>	Date Palm	LC
18.	<i>Salvadora persica</i>	Toothbrush tree/ Khabbar	EN
19.	<i>Parkinsonia aculeata</i>	Jerusalem thorn	LC
20.	<i>Salsola</i>	-----	LC
21.	<i>Heliotropium subulatum</i>	Heliotropes	LC
22.	<i>Grewia tenax</i>	White cross-berry	LC
23.	<i>Rhazya stricta</i>	Eshvarak	LC

Table-21: Tree Species Recommended for Planting in/around the Jinnah SEZ

3.16.4.1.Types of Tree to be planted

Apart from Palm trees, six types of trees will be planted in the proposed Jinnah SEZ. These will include;

1. Shady Trees;
2. Fruity Trees;
3. Ornamental Plant/Tree;
4. Environment Cleaning Plants/Trees;
5. Medicinal plants;
6. Shrubs/herbs and grasses.

3.16.5.Objective of Tree Plantation

Main objectives of planting these trees are;

- provide shade, aesthetic and environmental friendly environment in the proposed scheme.
- arrest soil erosion and conserve the soil, particularly in the watershed area of the Project;
- hold the soil firmly against any earthquake jolts and aftershocks;
- produce firewood, timber and fodder to meet the local requirements;
- ensure sustained supply of raw wood material to the wood based industry;
- create job opportunities for the people living in the area;
- provide benefits of strategic cover for defense purposes;
- improve the environment (climate, soil, air etc.);
- create awareness among the locals regarding the management of their existing natural resources on sustained yield basis;
- enhance the scenic beauty of the area;
- protect and promote the wildlife in the area.

3.16.6. Total Number of Trees Required as per Scientific Research

A human breathes about 9.5 tones of air in a year, but oxygen only makes up about 23 percent of that air, by mass, and we only extract a little over a third of the oxygen from each breath. That works out to a total of about 740kg of oxygen per year which is very and roughly seven trees are required for a single human. The proposed SEZ will function around 50,000 labor working

simultaneously in different areas designated for multi-activity. This means that for a single shift, there is need to be 335,000 trees / plants in the project area. The total area of proposed zone is 1142.83 acres.

Out of this, 70% is saleable as per SEZ laws and 30% will be under GID (Developer)'s control. Therefore, Developer will be responsible for vegetation of 30% area which comes out to be 100,500 trees. The rest of the trees recommended in EIA will be planted by the Developer and individual industrial units in consultation with the Developer during colonization.

Further to it number of trees to be planted against the pollutants to be released from an industry should be calculated at the time of EIA of that particular industry. These trees should be planted by the concerned proponent either within the premises or out of the premises wherever the land is available to compensate the environmental impacts of industrial process/activity. This vegetation will be carried out in different manner which are explained below.

3.16.7. Plantation Patterns

The three patterns of plantation in and around the project will be done which will include;

- Plantation in Block Form
- Plantation in Linear Form
- Plantation in Buffer Form

Plantation in Block Form: Block Plantation will be carried out in the all the parks and central round-about. The industrial city has been divided in to two main blocks on the basis of type of industry i.e. Small & Medium Industry and Medium & Large Industry. These are further divided in to sub-blocks up to G. The green spaces are distributed equally among these blocks. In block plantation, main emphasis will be on aesthetics and shades. Along with this other vegetation like grass, flowers etc. will also be grown as part of plantation.

Linear Plantation Form: Trees will also be planted along the all the roads of the proposed industrial city. The industrial city features roads of different widths. There is 280.7 acres being allocated for the roads including the main road and all secondary roads. Plantation will be carried out on both sides of the roads, and its central median along property line. Distance between the trees will be kept according to requirement of the species to be planted. Apart from this, the

industrial Park features walkways for pedestrians and walking pavements along the boundary of the industrial Park. The walkways and roads will be planted with such trees which will provide shade without any visual hindrance.

Buffer Plantation Form: Along the boundary and different zones of the SEZ will feature buffer plantation along the entire boundary. For this purpose, space has been left. The buffer plantation will feature trees which completely obstruct the vision from outside the boundary.

3.17. Corporate Social Responsibility

Corporate Social Responsibility (CSR) and business ethics are the essential part of GID's SEZ Plan and involve implementing appropriate and fair practices regarding issues such as corporate governance, insider trading, bribery, discrimination, corporate social responsibility, and fiduciary responsibilities. Laws and regulations shall be set to have standard/ bench mark the business ethics to follow by all stakeholders and to build on in order to earn trust and loyalty from consumers and market participants. GID believes in corporate citizenship and strongly feels obligated towards CSR to maximize the positive impact on stakeholders and to minimize the negative impact in the society. GID views Social Responsibility as a contract with society. Social Responsibility is GID's important corporate concern and has following pillars;

- **Pillar-1:** Rigorous Compliance with Rules and Regulations and abiding by all the laws and government regulations;
- **Pillar-2:** Strong and Sustained Economic Performance and maximizing stakeholders wealth and value;
- **Pillar-3:** Being ethical and following standards of acceptable behavior as judged by stakeholders;
- **Pillar-4:** Philanthropic: "giving back" to society.

GID will perform all its duties, obligations and responsibilities as Developer of the Zone being authorized by the SEZ Act, SEZ Rules, 2013, corporate ethics and any other Provincial rules and regulations. FWO is already running school near the project area to express its integration with local community.



Picture-4: FWO School near project site

3.18. Captive Solar Power Plant

Captive Solar Power Plant (100 MW-Jinnah Solar Park) is the capstone of Jinnah SEZ Green development initiatives. The Power plant will supply green, low cost and un-interrupted electricity to economic and commercial activities inside the zone. This will make Jinnah SEZ, the first SEZ in Pakistan with a captive power plant. Production of electricity by solar sources will contribute to Pakistan's energy policy to have 30 percent of the total power generation from renewable. Hot desert climate of Thatta suits the project viability. Causing low CO₂ omissions, it will uphold the country's international commitments for environmentally friendly sustainable development.

3.18.1. Business and Cooperation Mode

Reputable Chinese State-owned-Enterprises (SoEs) will form a consortium to invest in captive solar power project. GID and Consortium will establish a Project Company / Special Purpose Vehicle (SPV) with majority share holding (90%) and minority shares of GID (10%) against the land as equity in the project. The principal object of SPV shall be to plan, develop, operate, maintain, manage, lease and transfer the Solar Power Project, under cooperation mode Built- Own-Lease-Transfer (BOLT). Commercial agreements shall be signed and executed for project implementation.

Under the BOLT mode;

- **Built:** Chinese Consortium to invest 100% in the project;
- **Own:** Project Company will own the captive power plant till cost recovery of investment / concessionary period (10-years);

- **Lease:** Project Company will lease out the power plant to zone developer and collect lease amounts from the zone developer to recover the investment;
- **Transfer:** Upon ending of the concessionary period, Project Company will hand over the power project and its assets in optimal condition at zero cost to GID.

3.18.2. Salient Features of the Project

Based on the unique financial mode (BOLT), the Project has the following features;

- All financial and technical risks are borne by the investor;
- Government entities have no financial burden as 100% investment will come from China’
- Availability of backup & storage facilities (an option);
- Internal net working for distribution of power will be built;
- Energy cost per unit to be worked out to recover the investment in 10-years lease period (can be further discussed while increasing the payback period);
- GID can sell the power at a rate having its own margin;
- Once project cost is recovered, the project/ assets in working condition will be handed over to GID at zero cost;
- GID to generate power for next 15-20 years on standalone basis (100% profit generation for GID);
- After recovery of investment, there will be minimal operating cost & routine maintenance & workforce cost for GID;
- Selling of carbon credits in the international market will generate revenues for GID;
- Local workforce will be employed during construction period and thereafter creating direct & indirect jobs for local people.



INDUSTRIAL ZONE

- 12 ACRE PLOT
- 10 ACRE PLOT
- 06 ACRE PLOT
- 02 ACRE PLOT
- 02 ACRE PLOT
- 01 ACRE PLOT

TRADE CITY

- 06 ACRE PLOT
- 02 ACRE PLOT
- 02 ACRE PLOT
- 01 ACRE PLOT

ICT PARK

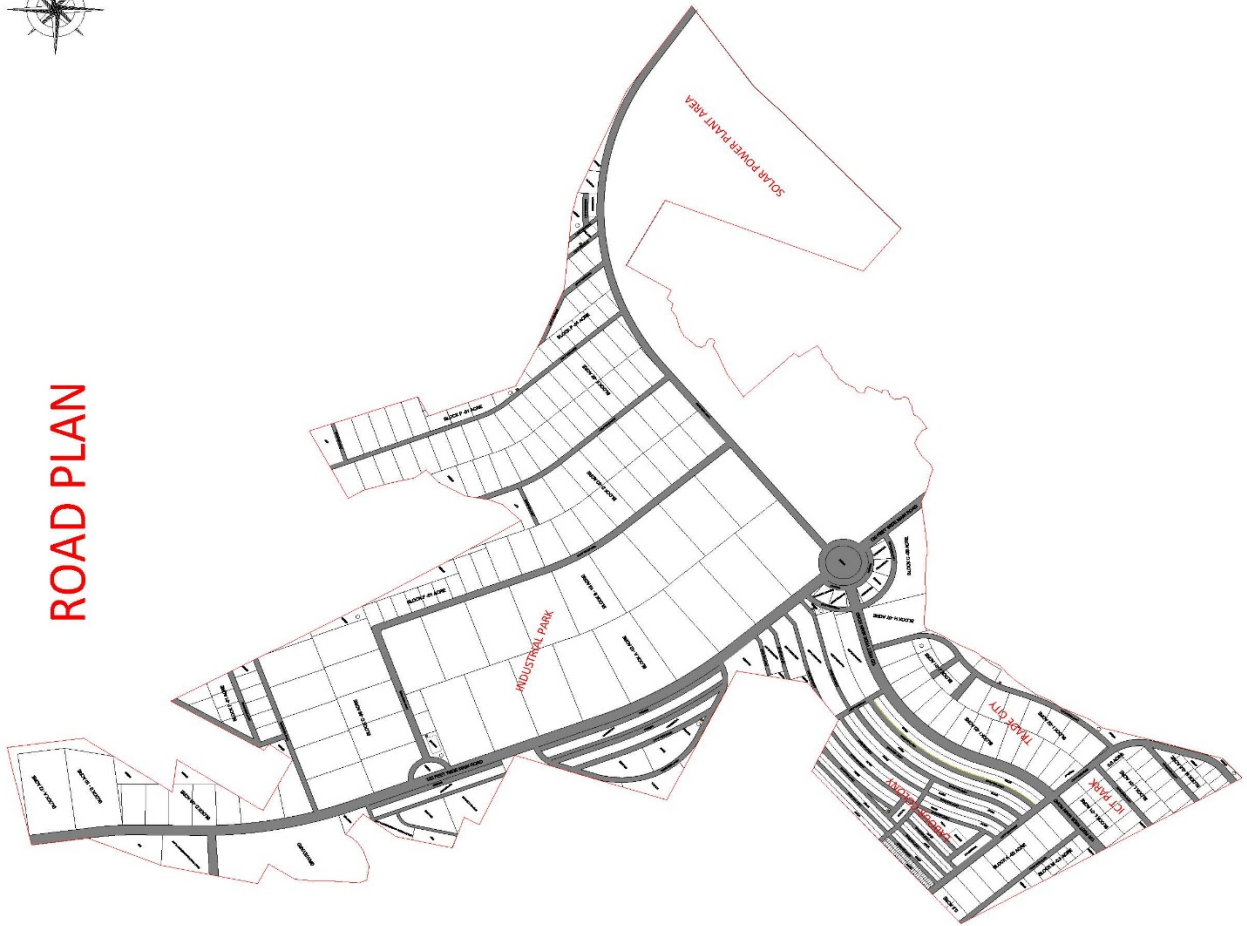
- 02 ACRE PLOT
- 01 ACRE PLOT
- 03 ACRE PLOT

COMMERCIAL

- 5 MARLA PLOT
- 7 MARLA PLOT
- WATER TANK
- SCHOOL
- COLLEGE
- HOSPITAL
- MOSQUE
- HIGH RISE FLATS
- TRAINING CENTER
- ADMIN BLOCK
- GREEN / PARK
- RO FLANT
- GRAVEYARD
- SOLID WASTE
- MANAGEMENT PLANT AREA
- SPORTS COMPLEX AREA
- SEWAGEWATER TREATMENT PLANT
- WATER TANK
- ROADS /STREETS /PARKING



ROAD PLAN



PROJECT LAND USE SUMMARY					
A. INDUSTRIAL ZONE AREA					
INDUSTRIAL PARK					
SR . NO	PLOT SIZE(ACRE)	DESCRIPTION	NO OF PLOTS	AREA (SFT)	AREA(ACRE)
1	12	BLOCK A	10	5294378.536	121.54
2	10	BLOCK B	10	4367215.846	100.26
3	6	BLOCK C	10	2618508.756	60.11
4	3	BLOCK D	26	3461193.893	79.46
5	2	BLOCK E	39	3465319.761	79.55
6	1	BLOCK F	35	1600568.371	36.74
TOTAL					477.67
TRADE CITY					
SR . NO	PLOT SIZE(ACRE)	DESCRIPTION	NO OF PLOTS	AREA (SFT)	AREA(ACRE)
1	8	BLOCK G	1	367296.042	8.43
2	7	BLOCK H	1	301976.250	6.93
3	2	BLOCK I	20	1733515.465	39.80
4	1	BLOCK J	5	226621.936	5.20
TOTAL					60.36
ICT PARK					
SR . NO	PLOT SIZE(ACRE)	DESCRIPTION	NO OF PLOTS	AREA (SFT)	AREA(ACRE)
1	2	BLOCK K	8	696915.3668	16.00
2	1	BLOCK L	20	871200.000	20.00
3	0.5	BLOCK M	20	471769.0932	10.83
TOTAL					46.83
CAPTIVE SOLAR POWER PLANT					
SR . NO	AREA (SFT)			AREA(ACRE)	
1	9379139.654			215.32	
TOTAL				215.32	
A. INDUSTRIAL ZONE AREA				800.17	

B. COMMERCIAL, LABOUR COLONY, AMENITIES AND ROADS AREA				
COMMERCIAL				
SR . NO	AREA SFT			AREA(ACRE)
1	753417.472			17.30
TOTAL				17.30
LABOUR COLONY				
SR . NO	AREA (SFT)			AREA(ACRE)
1	2923005.135			67.10
TOTAL				67.10
AMENITIES AREA				
SR . NO	NO	DESCRIPTION	AREA (SFT)	AREA(ACRE)
1	5	MOSQUE	123120.000	2.83
2	2	SCHOOL	157257.829	3.61
3	2	COLLEGE	316407.808	7.26
4	4	HOSPITAL	276388.942	6.35
5	1	TRAINING CENTER	34000.000	0.78
6	1	ADMIN BUILDING	34000.000	0.78
7	2	WASTE MANGEMNT PLANT	286005.352	6.57
8	1	SPORTS COMPLEX	204436.297	4.69
9	7	RO PLANT	4375.000	0.10
10	4	STP	432316.552	9.92
11	1	GRAVEYARD	986693.988	22.65
12	10	WATER STORAGE TANK	12566.371	0.29
13	N.A	GREEN AREA	1845564.047	42.37
TOTAL				108.20
ROAD AREA				
SR . NO	AREA (SFT)			AREA(ACRE)
1	6536884.366			150.07
TOTAL				150.07
B. COMMERCIAL, LABOUR COLONY, AMENITIES AND ROADS AREA				342.66
GRAND TOTAL = (A+B)				1142.8388

CHAPTER: 4

ANALYSIS OF ALTERNATIVES

4.1. Introduction

Alternatives are usually identified and analyzed to determine the most viable method of accomplishing the project objectives. During the recent years, environmental and social concerns are gaining significant attention all over the world. Therefore; besides the financial and technical considerations, it is also required to identify the environmental and social consequences of developmental activities. The analysis has been carried out critically so as to justify the needs to the project. Various alternatives considered during the course of the study are as under

- No Project Option;
- Alternative Site Selection;
- Design Alternatives.

4.2. No Project Option

A “No project option” (or “no development”) simply indicates no harm to environment and society at all. This important to appreciate that virtually all types of development and industrial projects have some social and environmental advantages and harms associated with it. The prime objective of this EIA is to look forward to the options (measures) which can be adopted to enhance the positive effects and lessen the hostile effects of the proposed Project on environment and society. It is pertinent to mention that with rapid increase in population, the employment demand has increased. With Annual population growth rate of more than 2.1% in Pakistan, there is ultimate need of developmental project to overcome the demands of employment. The aftermath of Covid-19, inflation, international economic recession, low commodities prices, and related economic slowdown has affected the socio-economic landscape of developing countries like Pakistan.

The proposed project will create a lot of direct and indirect job opportunities for local community and to other areas in the province of Sindh. It will create demand for various industrial inputs that will generate economic activities. Pakistan has comparative advantage in different sectors of economy with abundant raw material for various industries like chemical, pharma, food processing, engineering etc., cement and textile industries etc. this comparative advantage can be transformed in competitive advantage with inflow of FDI and transfer of

technology to produce value added finished products to get real benefits from regional cooperation, GPS plus, CPEC industrial cooperation and other international trade opportunities.

Establishment of a state-of-art SEZ with focus on sustainable development is need of hour. It will not only uplift standard of living of local people of Thatta but will also impact positively the development at the national level. Population of Pakistan consists 60 percent of youth, the project will enhance the productive capacities of youth and give them gainful employment.

It is easily assessed in the light of above discussion that “No project option” will not be considered as it will be a “barrier” to national development. Therefore, establishment of an SEZ near M-9 Motorway at Thatta district is a highly recommended option.

4.3. Alternate Site Selection

FWO purchased the proposed site during the construction operations of M-9 Motorway to park machinery, equipment, material and built a Camp office. After completion of M-9, the land lost its utility. Following two options were also considered to utilize the land gainfully;

- Option-1: Building a Housing Colony
- Option-2: Establishment of an SEZ

After thorough deliberations, establishment of a world class SEZ offering globally and nationally integrated logistics, industrial and manufacturing facilities, was being opted for. In the presence of competitor SEZs (especially upcoming Priority SEZ (pSEZ) Dhabejee in Thatta district) in the vicinity and in province, some other alternative sites were also considered during the project planning stage. After thorough deliberations on strengths, potential, prospects, opportunities, threats and challenges to determine the competitive edge and to be ahead of competitors, establishment of a world class SEZ with Unique-Selling-Point (USP) offering globally and nationally integrated logistics, industrial and manufacturing facilities, was opted for on the piece of land in hand.

4.4. Design alternatives

Different alternative were considered during the project conceptualizing and designing phase

Design 1

In design 1, the concept of traditional SEZs already approved and notified in Pakistan was looked into. The land to be allocated to all types of identified industries, and utilities especially power at the zero point to be provide by the concerned provincial government. This concept was rejected based on the fact that many approved SEZs are not successful to attract investment and enterprise due to shortage of electricity and lack of financial resources.

Design 2

In design 2, the concept of Industrial mix was considered and zoning to be avoided to keep the things open and flexible on the one side. On the other side, allow the flexibility to create and maintain material chain of any particular industry in its close proximity. However, in the end it was turned down.

Design 3

In Design 3, contemporary global changes in production patterns, scrutiny of industrial activities for monitoring their environment friendliness, digital revolution and emphasis on sustainable development were thoroughly discussed. Moreover, the definition of SEZ given in the SEZ Act was deliberated upon.

The town planning concept was finalized keeping the above in view and the spatial lay out to be divided in to four Zones accommodating “multi-activity” encompassing all sectors of economy with a captive power plant based on renewable energy.

The USP of this model is sustainable development with one-window facilities to contribute to ease of doing environmental-friendly business.

4.5. Conclusion

In the final analysis, it was decided that land in hand will be used to establish a multi-activity zone with focus on green and sustainable development. In summary following final selection of project site and project design was based on the following criteria:

- Availability of land;
- Minimum damage to existing environment;
- Site connectivity, accessibility and suitability;
- Close proximity to other industrial undertakings;

- Safe distance from urban settlements;
- Water resources availability;
- Acceptability and suitability of local culture;
- Minimum resettlement of population;
- Safe distance from sensitive habitat;
- M-9 having connectivity with CPEC routes.

CHAPTER-5

ENVIRONMENTAL BASELINE: PHYSICAL ENVIRONMENT

5.1. Introduction-Delimitation of the Study Area

The proposed project will be established in the district Thatta of Sindh Province, this baseline study focus on the environmental baseline of district Thatta.

The physical, biological and socioeconomic environment of the project is described with respect to watershed, air-shed, geology, soil characteristics and seismicity. The air-shed describes the climatic conditions and quality of the air; the water shed describes the water quality of surface. The terrestrial environment is described by its geology, geomorphology, wild life habitat, vegetation and soil characteristics in terms of stability and seismicity. Description of the environmental condition includes details of the area's hazards and water supply and sewage system, agriculture, transport and communications facilities.

5.2. Why to Establish Baseline Environment?

The baseline status of environmental quality in the vicinity of project site serves as the basis for identification, prediction and evaluation of impacts. The baseline environmental quality is assessed through field studies within the impact zone for various components of the environment, viz. air and water quality, noise, vibration, land and eco-biodiversity and socio-economic. Knowledge of baseline environmental status of the study area is useful for Impact Assessment Process. Significant impacts depict direct adverse changes caused by the action and its effect on flora, fauna, human being, socio-economic conditions, current use of land and resources, physical and cultural heritage properties and biophysical surroundings. Baseline data generation of the biological, physical and socio-economic attributes is essential in EIA studies. Environmental baseline establishment deals with two types of data i.e. determinate and indeterminate. In the study under consideration, we majorly dealt with the determinate data and establishment of 'Impact Zone' deciding whether an existing and proposed action is likely to cause significant adverse environmental effects or not. This is central to the concept and practice of EIA. Before proceeding for baseline data collection, it is important to know the boundary limits and framework, so the data collected can be effectively utilized for impact assessment. In this context, delineation of impact zone plays an important role.

5.3. Aim of Baseline Study

This section provides a comprehensive profile of the micro and macro environment of the proposed project in District Thatta (near Nooriabad Industrial Estate Jamshoro) Sindh. The micro environment of the project location is the sedimentary rock hills and sediments. The Macro environment is the district and province. The study will cover the physical, biological and socio-economic situation of the micro and macro environment prior to the beginning of its various project activities.

5.3.1. Baseline Methodology

The extensive environmental monitoring was carried out by team environmentalist and laboratory analyst through field visits along with environmental monitoring instruments for surface water analysis, ambient air quality test and noise level monitoring. The surface water monitoring was carried for thirty-two (32) parameters on three (03) locations near project area, and ambient air along with noise monitoring was carried out for eight (08) parameters on five (05) locations near project area. Some information for baseline study was collected from different sources primary data and, maps prepared by the satellite images. And remaining data was used from secondary sources such as including electronic, print media, published literature; District Census Reports (DCRs), District Disaster profile, studies previously conducted in district and archives of the experts.

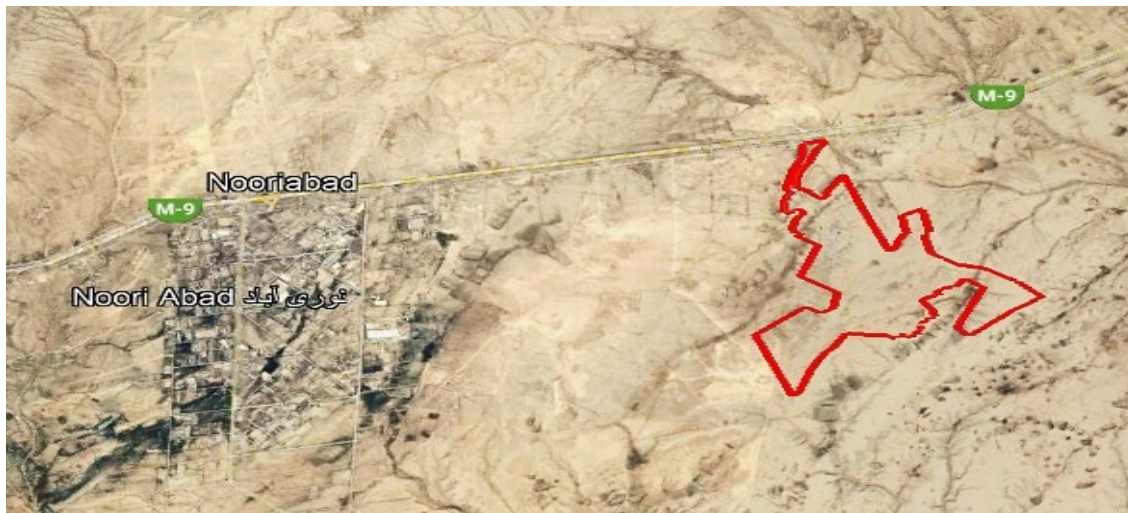
5.4. Physical Environment

5.4.1. District Thatta Location & History at a Glance

Before the introduction of the incumbent local government system, District Thatta was part of the Hyderabad division along with the districts of Hyderabad, Badin and Dadu. District Thatta is situated at a distance of 98 Kilometers in east of Karachi on National Highway. It is situated at 23° 43' to 25° 26' north latitudes and 67° 05' to 68° 45' east longitudes. The district is surrounded on the north and northwest by Jamshoro district, on the east by Hyderabad, Tando Muhammad Khan, Sujawal districts and the Indus River while Indian Ocean is situated on the south of the district as showing (Figure 2). The total area of the district is 8,570sq. Km.¹⁴ River Indus flows down- stream the Kotri Barrage through numerous creeks till its delta in the Arabian Sea near chachdehwali Mohammad at Ketu Bunder. The northern part of the district is paramount

¹⁴District Disaster Management Plan (Government of Sindh)

and known as "Kohistan" connected with a Kheerthar range of mountains. The proposed project falls near the Nooriabad Sindh Industrial Trading Estate (S.I.T.E) which is a dedicated industrial



Map-6: project area falls near Nooriabad Industrial Estate

estate mainly comprises of more 200 industrial units, i.e. wind turbines, textile mills, rice mills, oil mills, other production plant etc. Nooriabad is an industrial town which falls in two district Thatta District and Jamshoro District of Sindh, Pakistan. It is located 94 kilometres from Karachi on the N-5 National Highway. It is part of Sindh Industrial and Trading Estate.

The project area is in the vicinity of Jhimpir wind farm, the largest wind corridor of Pakistan. Thereby, industrial activities are not new to project site and its surroundings.



Picture-5 & 6: windTurbines near project area

M-9 Motorway is also nearby which is brimming with business and commercial activities. The north-south 6-laned motorway connecting Karachi-Hyderabad is 137 kilometers long and caters for all commercial traffic from Karachi Port and Port Qasim.



Picture- 7: Filling Station at Road Side of Project



Picture-8: M9 Motorway near Project Area



Picture-9:FWO School Near Project Area



Picture-10: Keenjhar Lake at Thatta



Picture-11: M-9 Motorway

5.4.2. Topography of District Thatta¹⁵

The average height of the Northern part of the district is more than 200 meter while the Southern part of the district where the height is equal to the mean sea level near Ketu Bunder is below 20m.

Indus River flows downstream from Hyderabad and passes through the middle of this district till it reaches the delta of the Arabian Sea in Ketu Bunder taluka. Four talukas of district Thatta are on the right bank of Indus River and four lie on the left bank while one taluka is on both sides of the river. Due to the long coastal line of 107 kilometers as well as shortage of river Indus water, the southwestern part of the district is saline and sea-affected. The southern portion, adjoining the Run of Kachh, on the border of India, is desert like sandy area. The northern part of this district consists of small hills and torrents that are extended till Kheerthar range of mountains.

The topography of proposed project area is quite varied with elevations ranging from 77.3 to 237 m. The highest elevation point within project area is 124 to 145 m whereas, lowest is 110 m. Following pictures show the general topography of project surrounding. The topographic map of proposed project is given in annexure to this study.



Picture-12 &13 : General topography of the project site surrounding

¹⁵ District Disaster Management Plan (Government of Sindh)



Picture-14: General topography of the project site



Picture-15: General topography of the project site

5.4.3. Geological Setting

Geologically, Thatta is formed of volcanic and sedimentary rocks of quaternary and tertiary sediments and has the same composition as that of the Indus plain and the eastern desert zone of Pakistan containing the deserts of Cholistan, Nara and Thar. The soils are silty clayey wet and

saline. The natural vegetation found in the district can be divided into two categories mangroves in the coastal or delta zone, and tropical thorns in the rest of the district.

In terms of use, the lands in the district can be divided into five major categories; lands not available or fit for agriculture, those under arable agriculture, forests, rough grazing lands and areas under human settlements. River Indus bisecting the district from north to southwest, Kohistan or hill zone in the north and North West, areas put under year round cultivation along river Indus through canals and tube wells, and coastal belt and delta area, are four broader topographical divisions of Thatta.

Keenjhar Lake is another important physical feature and surface water resource of the district. District Thatta possesses a diversity of environmental features and resources since it carries all the environmental features of the province. The district has desert, hills/gravel rocks, rangelands, water bodies, delta, tidal flats, creeks, lakes, mangrove and riverine forests and irrigated agricultural lands.

River Indus bisecting the district from north to southwest, Kohistan or hill zone in the north and North West, areas put under year round cultivation along river Indus through canals and tube wells, and coastal belt and delta area, are four broader topographical.

Geology of the project area has been divided into basins and plains. In the context of project area, there only two types of rock found, i.e., Quaternary Rock and Tertiary Rock. The Quaternary period rocks found in the lower Indus basin and Indus plain. It consists of alluvium, deltaic and tidal deposits, extinct stream deposits and stream deposits, Miocene, Pliocene, Oligocene, Eocene sedimentary rocks

According to the United States Geological Survey (USGC) the proposed project area is divided in the two categories Neogene Sedimentary Rocks and Quaternary Sediments i.e. sedimentary rocks and sediments.

5.4.4. Soil Setting

The soils are silt, clayey wet and saline. The natural vegetation found in the district can be divided into two categories-mangroves in the coastal or delta zone, and tropical thorns in the rest of the district. In terms of use, the lands in the district can be divided into five major categories;

lands not available or fit for agriculture, those under arable agriculture, forests, rough grazing lands and areas under human settlements.

5.4.5. Geotechnical Features of the Area

According to FAO UNESCO Soil Classification of the Thatta district is divided into three categories i.e. Lithosols, Calcic Yermosols and Gleyic Solonchaks as showing in the soil map of the project area in Figure 5. The soil of the proposed project area is Lithosols.

- **Lithosols:** soils which are limited in depth by continuous coherent and hard rock within 10 cm of the surface.
- **Calcic Yermosols:** Yermosols having a calcic horizon within 125 cm of the surface.
- **Gleyic Solonchaks:** Solonchack showing hydromorphic properties within 50 cm of the surface.

The project site in Nooriabad which is mainly sedimentary rocky hills (mountains) and loose sediments predominantly deposits of older River, as showing in pictures below.



Picture-16: Sedimentary Rock Hills

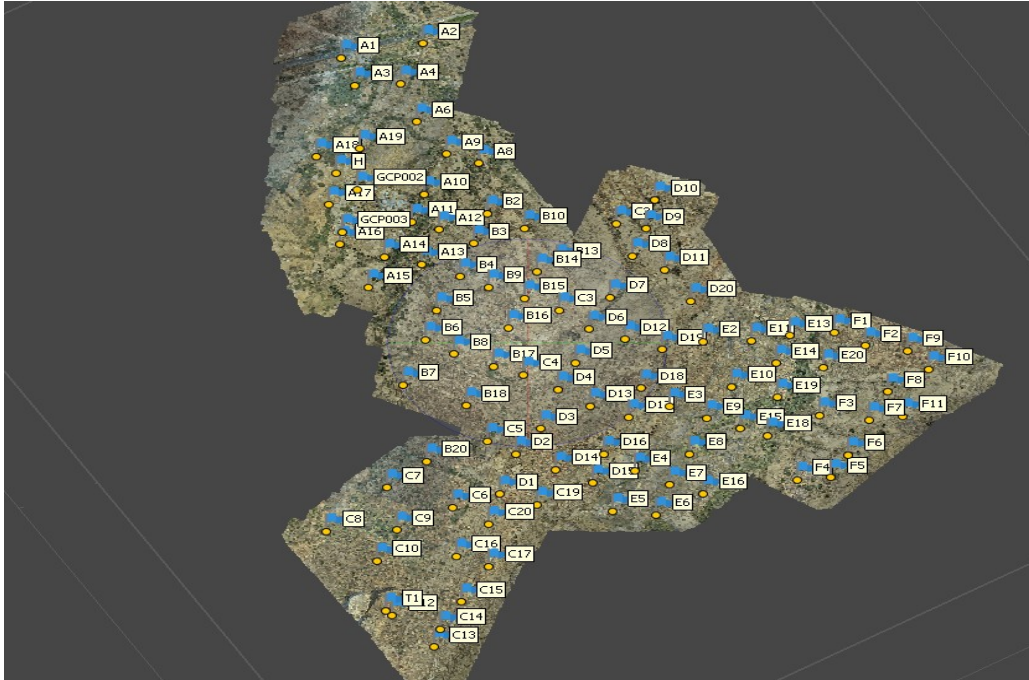


Picture-17: Sediment Soil

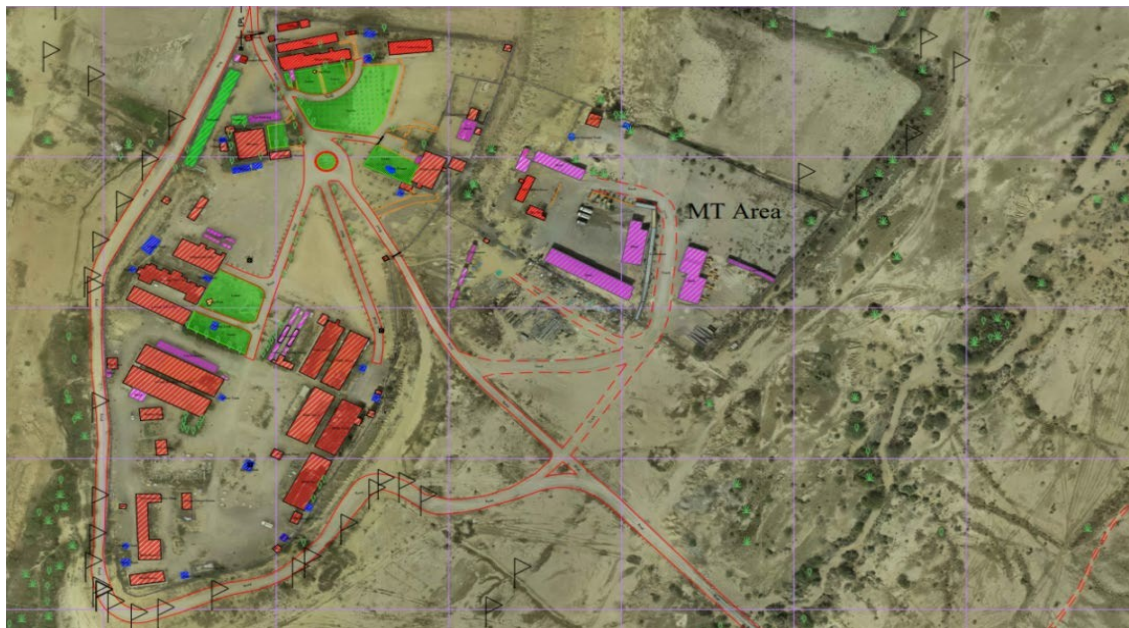
5.4.5.1. Topography of the project site

The topography of proposed project area is quite varied with elevations ranging from 77.3 to 237 m. The highest elevation point within project area is 124 to 145 m whereas, lowest is 110 m. The detailed topographic survey was conducted using contemporary tools and techniques to enable engineers in carrying out detailed engineering design of Project in accordance with the requirements identified. Permanent Control Points using Differential Global Positioning System (DGPS) Survey were installed at various

locations within the site area. Every effort was made to select locations, which were safe from conservation point of view and free of any obstruction to facilitate uninterrupted DGPS signals and observation.



Map-7: Ground Control Points (GCPs)

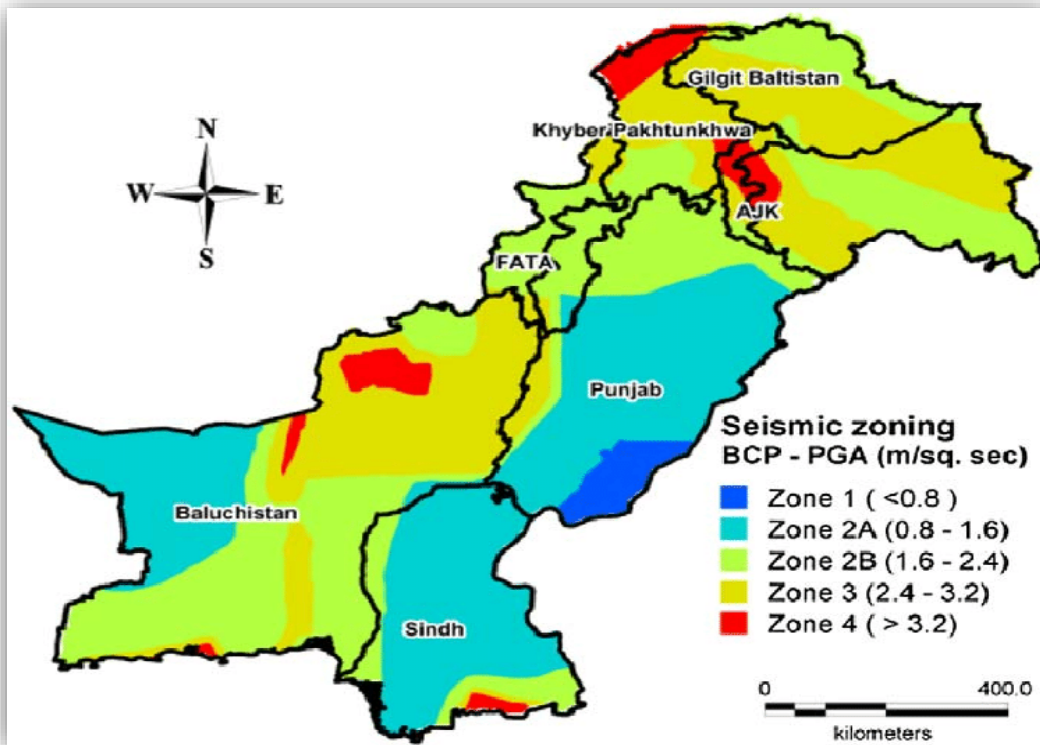


Map-8: Topographic map of proposed project

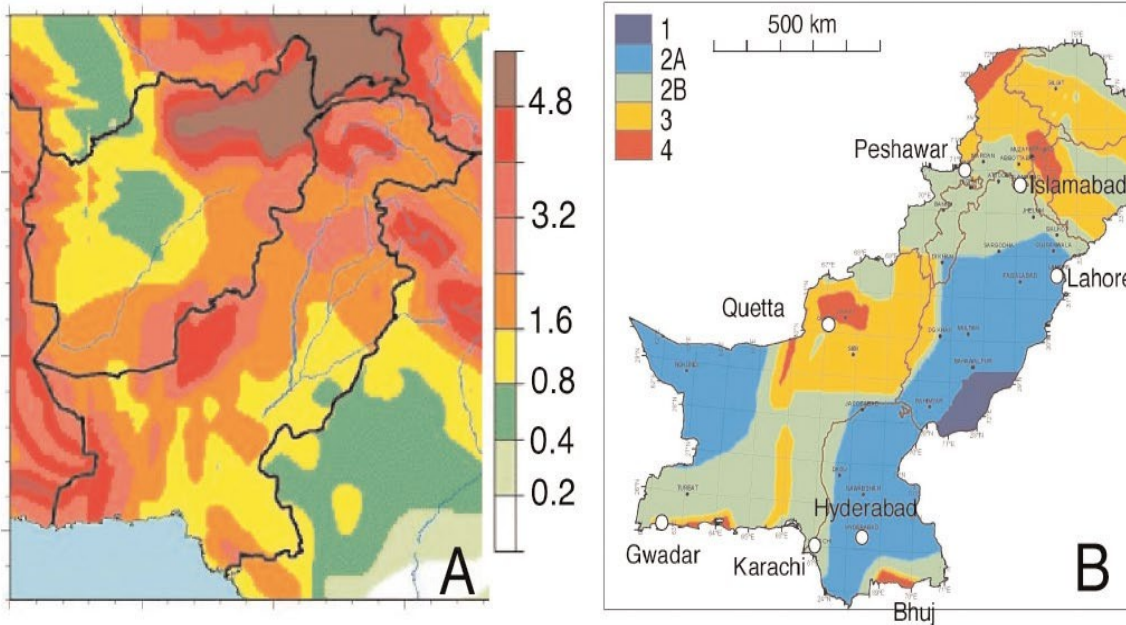
5.4.6. Seismicity

According to a map created by the Pakistan Meteorological Department, the country is divided into 4 zones based on expected ground acceleration.

- The areas surrounding Quetta, those along the Makran coast and parts of the KPK, and also along the Afghan border fall in Zone 4;
- The rest of the KPK lies in Zone 3, with the exception of southern parts of this province, which lie in Zone 2;
- The remaining parts of the Pakistani coastline also lie in Zone 3;
- The remaining parts of the country lie in Zone 2.



Map-9: Seismic Zoning Map of Pakistan (Source: Pakistan Metrological Department)



Map-10: Seismic Map of Pakistan and Project site

Seismic Zoning Map of Pakistan places district Thatta in Zone 2A and 2B where it represents peak horizontal ground acceleration from 1.6 to 0.8.

5.4.7. Climate of District Thatta

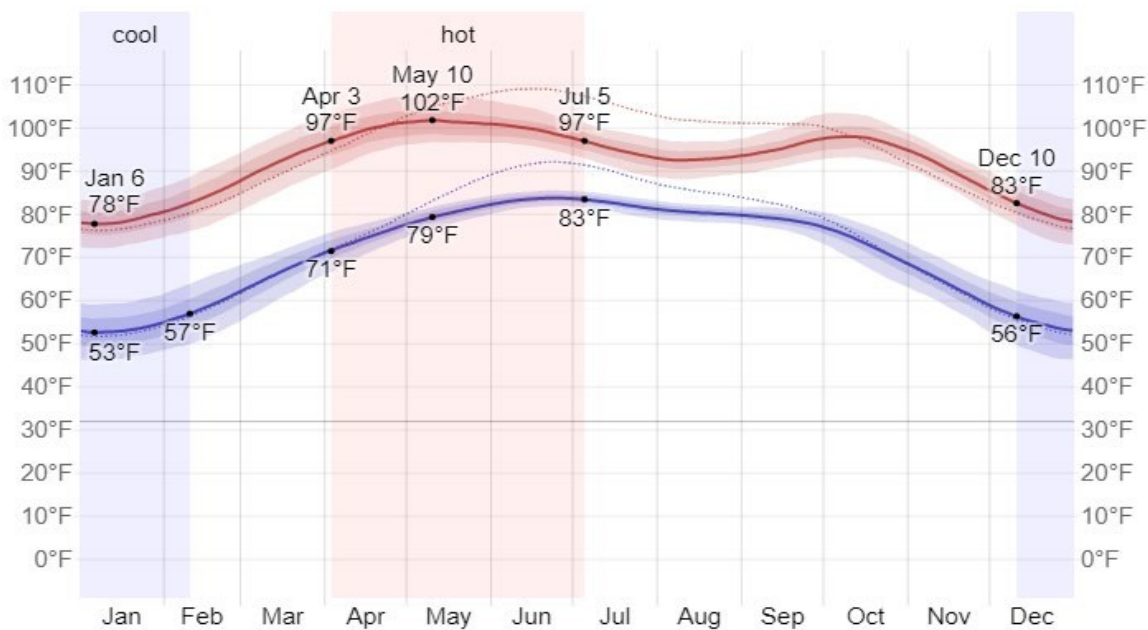
According to the average results of 2014 to 2022, the climate of the district is moderate. The mean maximum and minimum temperature recorded about 39°C and 11°C respectively. The sea breeze blows for eight months of the year, from March to October, making the hot weather comparatively cool. As a result, there is an immediate fall in temperature. January is the coldest month.

In Thatta, the summers are sweltering, muggy, arid, and windy; the winters are short, comfortable, and dry; and it is mostly clear year round. Over the course of the year, the temperature typically varies from 11°C to 39°C and is rarely below 8°C or above 42°C. The hot season lasts for 3.0 months, from April 3 to July 5, with an average daily high temperature above 36°C. The hottest day of the year is May 10, with an average high of 39°C and low of 26°C.

5.4.8. Temperature

The hot season lasts for 3.0 months, from April 3 to July 5, with an average daily high temperature above 97°F. The hottest month of the year in Thatta is June, with an average high of 99°F and low of 83°F.

The cool season lasts for 2.0 months, from December 10 to February 10, with an average daily high temperature below 83°F. The coldest month of the year in Thatta is January, with an average low of 53°F and high of 79°F.



Map-11: Average High and Low Temperature of District Thatta (Source: weathersparks.com)

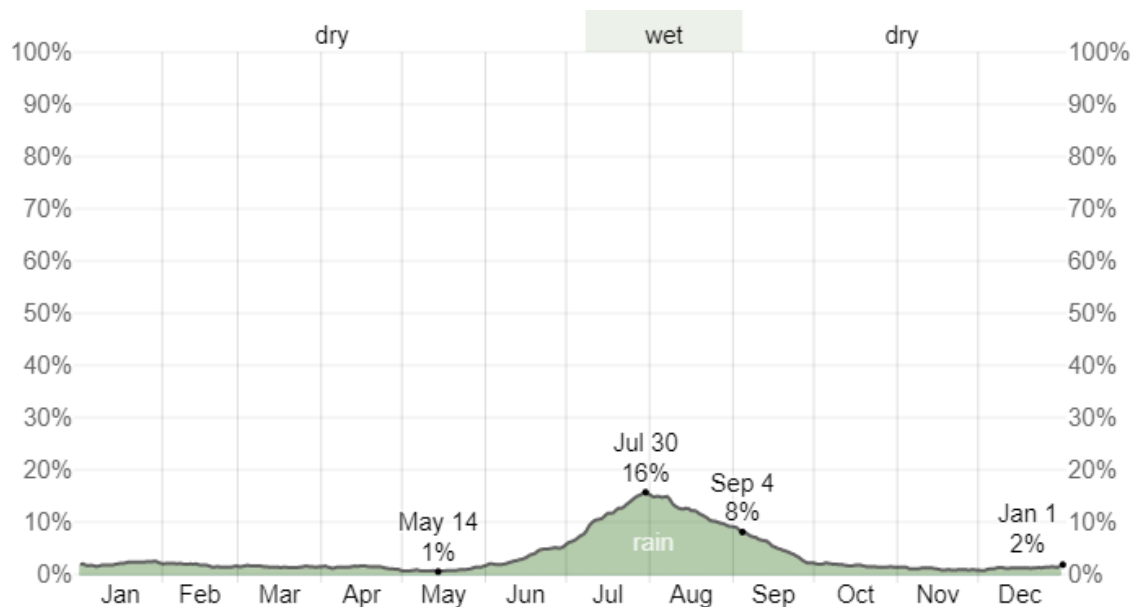
5.5. Precipitation

The wetter season lasts 1.9 months, from July 8 to September 4, with a greater than 8% chance of a given day being a wet day. The month with the wet days in Thatta is August, with an average of 3.7 days with at least 0.04 inches of precipitation.

The drier season lasts 10 months, from September 4 to July 8. The month with the fewest wet days in Thatta is May, with an average of 0.3 days with at least 0.04 inches of precipitation.

Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. The month with the most days of rain alone in Thatta is August, with an

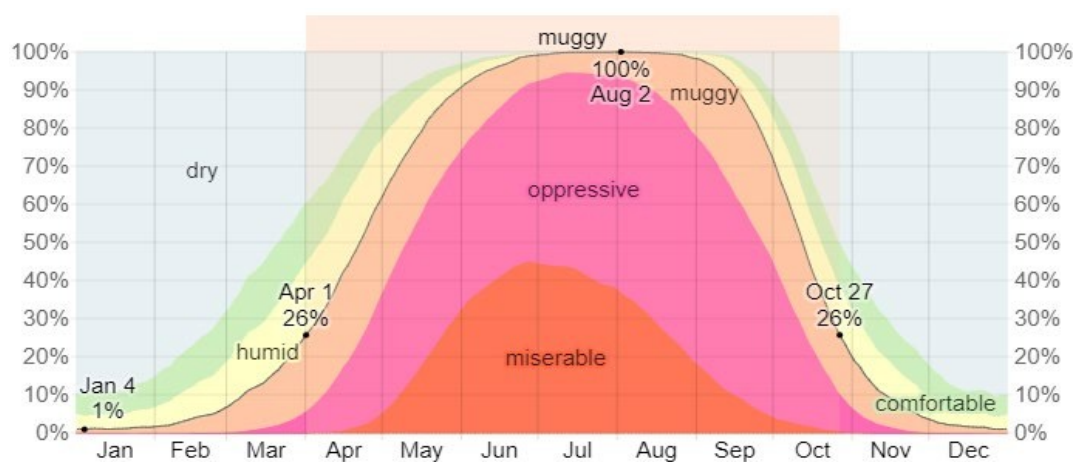
average of 3.7 days. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 16% on July 30.



Map-12: Daily Chance of Precipitation in District Thatta (Source: weathersparks.com)

5.6. Humidity

Thatta experiences extreme seasonal variation in the perceived humidity. The muggier period of the year lasts for 6.8 months, from April 1 to October 27, during which time the comfort level is muggy, oppressive, or miserable at least 26% of the time.



Map-13: Daily percentage of time spent at various humidity comfort levels, categorized by dew point.

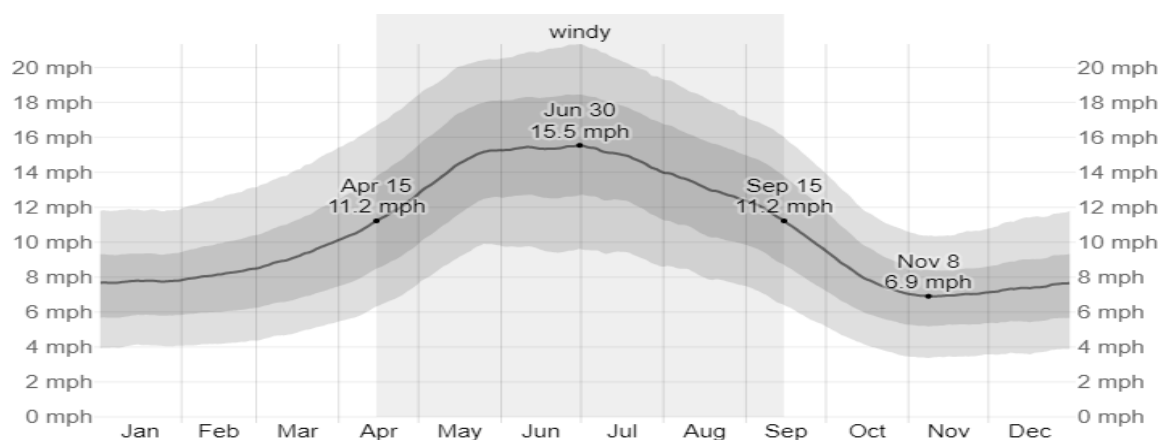
The month with the muggiest days in Thatta is July, with 30.9 days that are muggy or worse. The month with the fewest muggy days in Thatta is January, with 0.4 days that are muggy or worse.

5.7. Wind

The average hourly wind speed in Thatta experiences extreme seasonal variation over the course of the year.

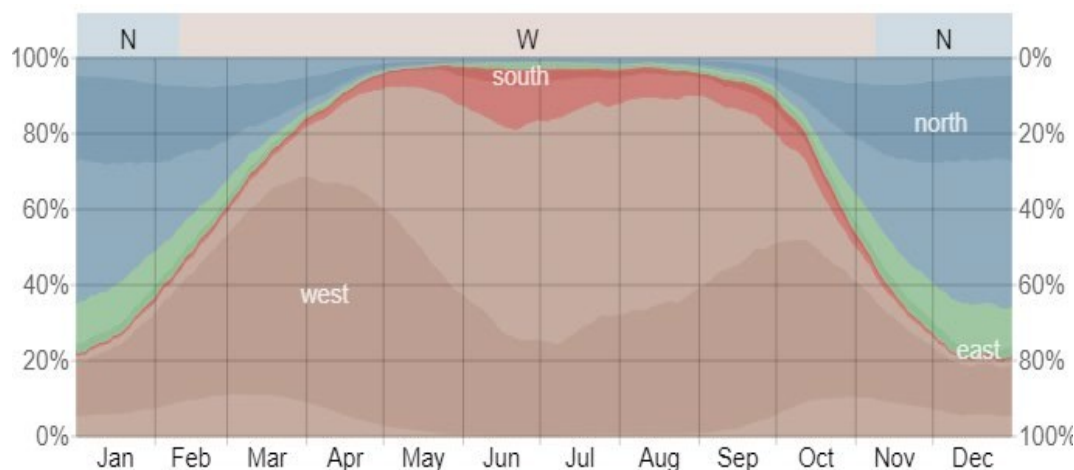
The windier part of the year lasts for 5.0 months, from April 15 to September 15, with average wind speeds of more than 11.2 miles per hour. The windiest month of the year in Thatta is June, with an average hourly wind speed of 15.4 miles per hour.

The calmer time of year lasts for 7.0 months, from September 15 to April 15. The calmest month of the year in Thatta is November, with an average hourly wind speed of 7.0 miles per hour



Map-14: The average of mean hourly wind speeds (dark gray line) (Source: weathersparks.com)

The predominant average hourly wind direction in Thatta varies throughout the year. The wind is most often from the west for 8.9 months, from February 10 to November 8, with a peak percentage of 93% on May 8. The wind is most often from the north for 3.1 months, from November 8 to February 10, with a peak percentage of 65% on January 1.



Map-15: Annual wind directions (Source: weathersparks.com)

5.8. Ambient Air Quality & Noise

5.8.1. Ambient Air Quality Monitoring

The project sites lie in district Thatta. The air quality in the project area is generally good, with very few sources of pollution like emissions from vehicles and dust due to blowing wind. The main pollutants emitted by vehicle exhaust pipes are particulate matter, carbon monoxide, sulfur dioxide and nitrogen oxides. These emissions generally may affect the air quality in the vicinity of the roads. It is reported that strong winds lead to high levels of air borne dust and occasionally give rise to short-duration dust storms. However, the effect is localized, seasonal and temporary.

24-hour ambient air quality was monitored conducted by EPA approved Laboratory (i.e. Quality Testing Services) at five (05) locations near the project area.

Average results of the monitoring have been presented in the following Table and the complete analysis report is attached in Annexure.

Parameters	SO ₂ µg/m ³	NO µg/m ³	NO ₂ µg/m ³	CO mg/m ³	SPM µg/m ³	PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	Lead µg/m ³
SEQS Limits	120	40	80	5	500	150	75	1.5
Location A Average Results Date: 27-08- 22	23.3	9.5	26.9	0.12	177.7	35.8	15.2	0
Location B Average Results Date: 28-08- 22	21.9	10.5	15.1	0.06	157.7	23.0	11.7	0
Location C	19.0	12.0	18.2	0.13	147.6	22.2	14.5	0

Average Results Date: 28-08- 22								
Location D Average Results Date: 29-08- 22	20.4	10.1	14.1	0.15	167.7	30.5	21.7	0
Location E Average Results: Date: 29-08- 22	23.7	11.3	16.6	0.11	159.2	33.0	14.1	0

Table-22: Ambient Air Quality near Project Site (District Thatta, Near Proposed Project)

5.8.2. Noise Quality Monitoring

Noise quality was monitored conducted by EPA approved Laboratory (i.e. Quality Testing Services) at five (05) locations near the project area. Location map where noise level monitoring was conducted is shown in the following figure. Average results of the monitoring have been presented in Table and the complete analysis report is attached in Annexure 2.

	Location A Average Results Date: 27-08- 22	Location B Average Results Date: 28-08- 22	Location C Average Results Date: 8-08- 22	Location D Average Results Date: 29-08- 22	Location E Average Results: Date: 29-08- 22
SEQS Limits	75	75	75	75	75
Results	58.7	52.3	57.2	57.9	59.1

Table- 23: Ambient Noise Quality near Project Site (District Thatta, Near Proposed Project)

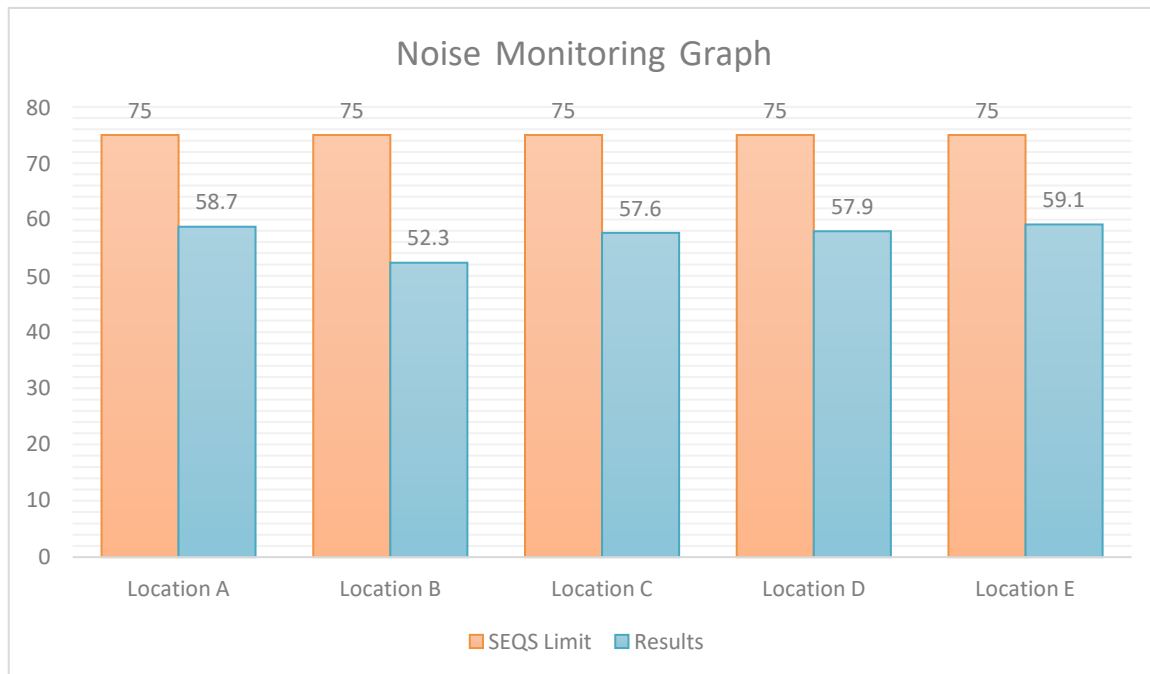


Figure-5: Graph of Noise Monitoring

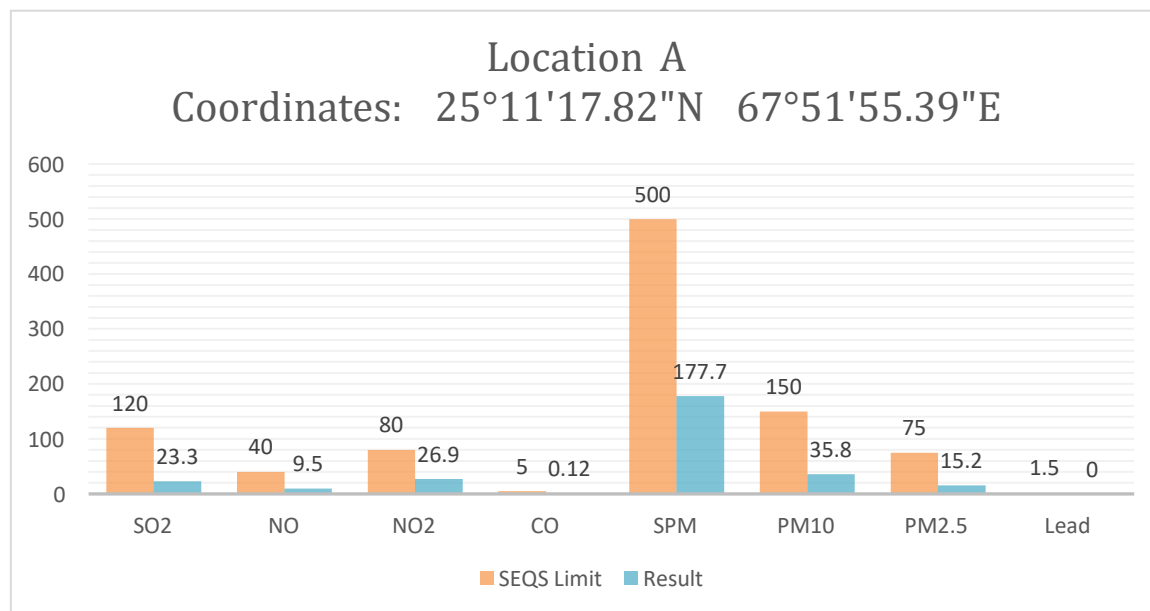


Figure-6: Graph of Ambient Air Quality at Location A

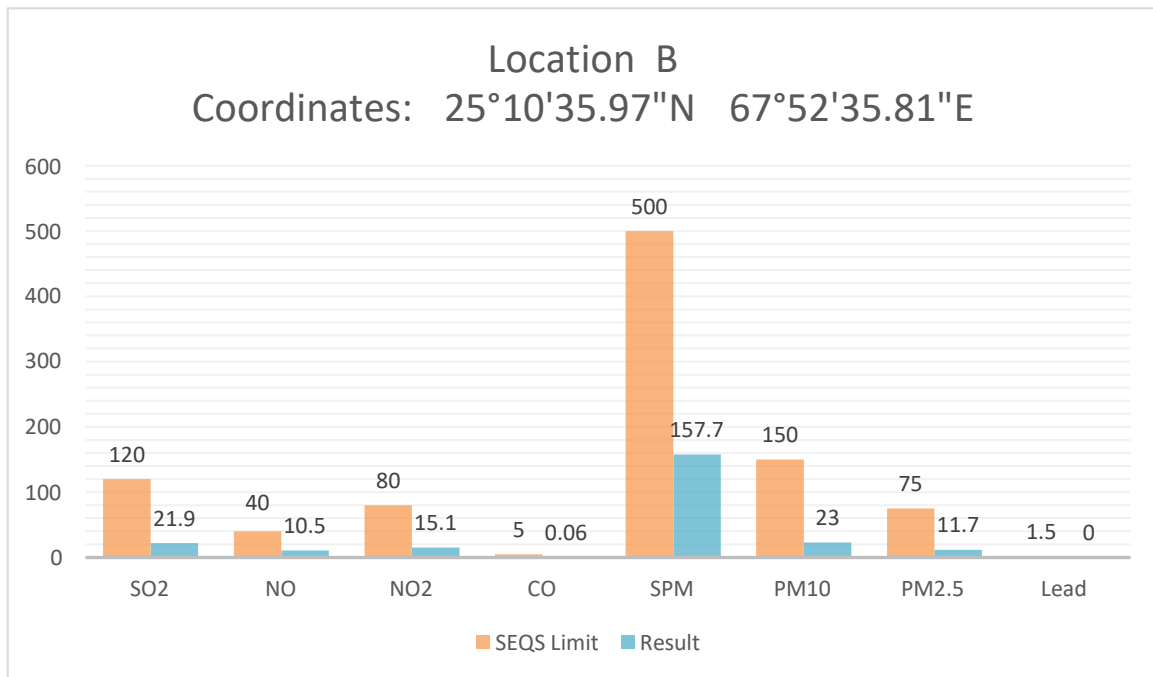


Figure-7: Graph of Location (B) Ambient Air Quality Monitoring

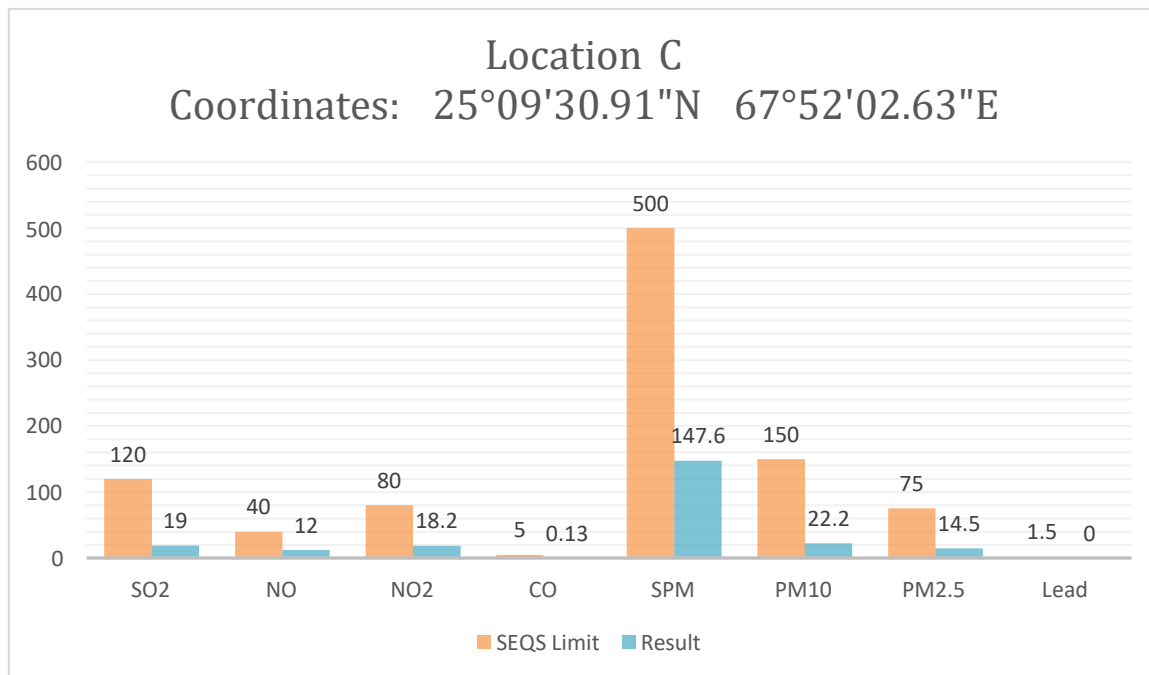


Figure-8: Graph of Location (C) Ambient Air Quality Monitoring

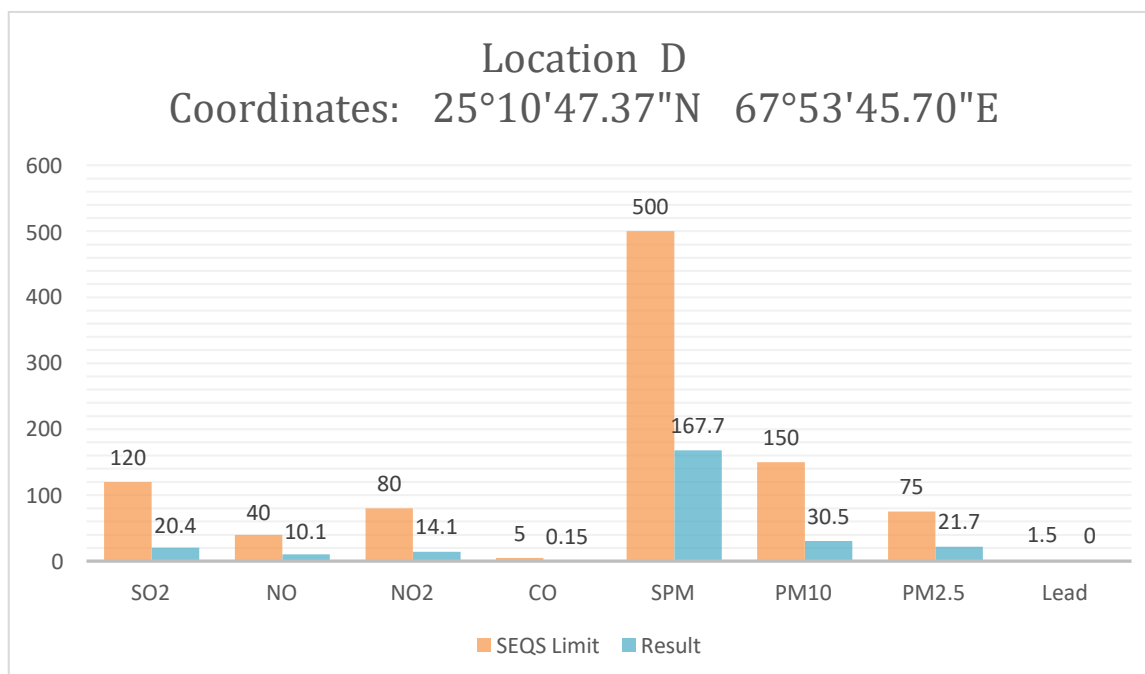


Figure-9: Graph of Location (D) Ambient Air Quality Monitoring

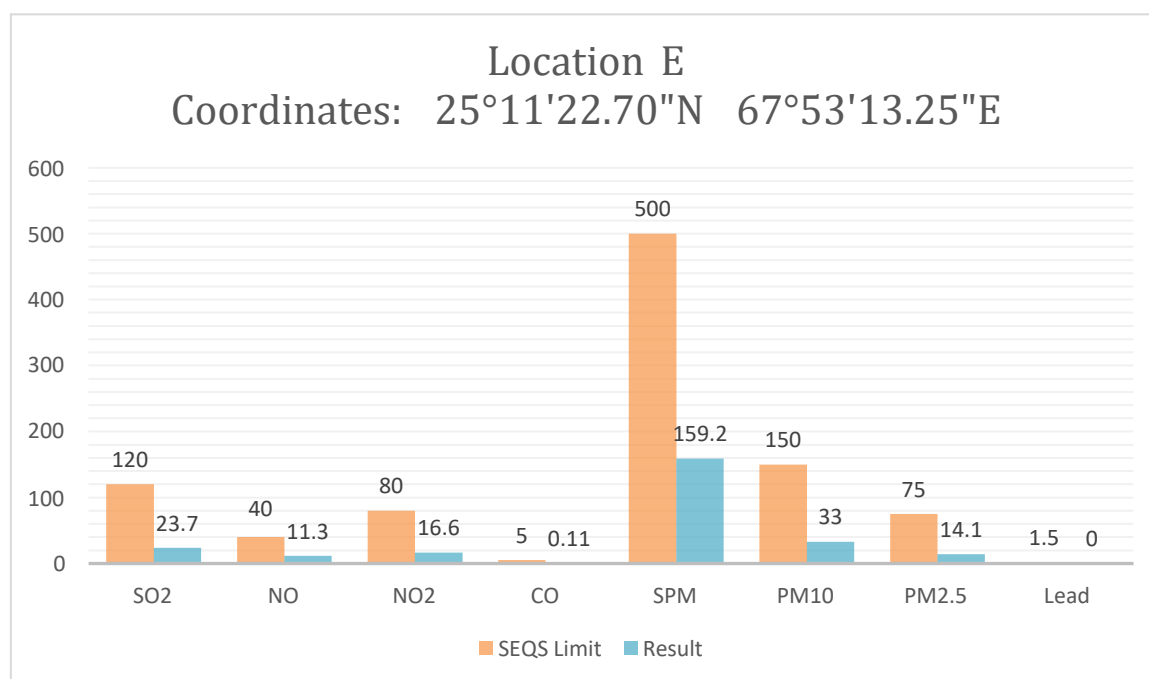


Figure-10: Graph of Location (E) Ambient Air Quality Monitoring

Ambient Air quality monitoring results show that the air quality of the project areas is in very good condition and all the parameters monitored are within the limits of SEQs. The reason for this is that the project areas (surroundings of proposed project) are very sparsely populated. The

are no settlements near project area, Natural forces i.e. strong winds give rise to dust which added dust pollutants (suspended particulate matter) in the air.

The proposed project will not produce significant amount of pollutants (dust, emissions during construction) that can cause significant impact on the air quality of the project area.

5.9. Water Resources

District having lot of creeks, freshwater lakes, estuary and river Indus thus the large variety of freshwater and estuarine fish exploited. In this district large freshwater lakes are present namely Keenjhar, Haleji, Hadero and Muradani. A number of Creeks and estuarine depressions are inter connected with seawater and river Indus which are source of fish and fisheries for the country. Well- known river Indus delta is spread over the area of about 0.61 million hectares in this district which supports mangrove vegetation. Being most productive zone, the estuary serves as excellent spawning, breeding and feeding ground for a large number of important finfish and shellfish. The water of this area can be used for intensive fish farming and productive aquaculture. In this district the river Indus falls into Arabian Sea.

Additionally, Darawat Dam Concrete Gravity Dam (substantial completed) on Nai Baran River near Jhangri village located at about 70 km West of Hyderabad and 135 km North East of Karachi and about 17km from project site in Thatta has been observed. The Darawat dam is expected to irrigate about 25,000 acres of cultivable command area. As well as can produce Hydropower up to 450 KW, and will contribute in Socio-economic uplift, poverty reduction.

Moreover, the project area can be characterized by large tracks of barren land that receive very little rainfall leading to frequent drought-like conditions. The vegetation primarily comprises of stunted scrubs. The project area lacks any prominent surface water source in proximity, and people depend upon the rainfall for raising livestock and millet crops. Locals have to walk miles every day to access clean, safe water for drinking, cooking, washing or bathing. Meanwhile for high requirement they are dependent on water tanker.

Surface water sample was collected at surface sources from different water bodies near the proposed project area which is at a distance of 2 km. The sample was collected in the month of August 2022 and analyzed to assess its quality. The analysis results are presented below and the complete analysis report is attached in the Annexure 3.

Table-24: Surface Water Analysis Results (Sample 01)

S. NO	PARAMETERS	SEQS	LDL	UNITS	RESULTS	TEST METHOD
1	Temperature	40	1	0C	28	Thermometer
2	pH value	6-9	0.01	-	8.1	USEPA 150.1
3	BOD	200	0.1	mg/L	Nil	Hach 8043
4	Chemical Oxygen Demand(COD)	400	1	mg/L	Nil	Hach 8000
5	Total Suspended Solids(TSS)	200	1	mg/L	1	Hach 8006
6	Total Dissolved Solids(TDS)	3500	1	mg/L	63.7	Hach 8160
7	Cyanide(as CN-)total	1	0.001	mg/L	BDL	Hach 8027
8	Ammonia(NH3)	40	0.1	mg/L	BDL	Hach 10031
9	Cadmium	0.1	0.001	mg/L	BDL	ASTM D-3557
10	Chromium(trivalent & hexavalent)	1	0.01	mg/L	0.001	ASTM D-1687
11	Copper	1	0.01	mg/L	0.002	Hach 8506
12	Lead	0.5	0.001	mg/L	BDL	ASTM D-3559
13	Nickel	1	0.001	mg/L	BDL	ASTM D-1886
14	Zinc	5	0.01	mg/L	0.01	USEPA 3500 Zn B
15	Oil & Grease	10	0.001	mg/L	BDL	APHA 5520-D
16	Fluoride(as F-)	10	0.01	mg/L	0.021	USEPA 340.1
17	Phenolic compounds(as phenol)	0.1	0.001	mg/L	0.001	USEPA 420.1
18	Chloride(as Cl-)	-	0.01	mg/L	10.3	Hach 8206
19	Mercury	0.01	0.001	mg/L	BDL	ASTM D-3223
20	Iron	8	0.01	mg/L	0.02	Hach 8008
21	An-ionic detergents(as MBAS)	20	0.001	mg/L	BDL	Method 5540 C
22	Manganese	1.5	0.1	mg/L	0.001	Hach 8034
23	Boron	6	0.01	mg/L	0.002	ASTM D-3082

24	Barium	1.5	0.1	mg/L	BDL	Hach 8014
25	Sulphate(SO ₄ -2)	-	1	mg/L	BDL	USEPA 375.4
26	Selenium	0.5	0.01	mg/L	BDL	ASTM D-3859
27	Total toxic metals	2	-	mg/L	BDL	-
28	Sulphide(S ₂ -)	1	0.001	mg/L	BDL	Hach 8131
29	Silver	1	0.001	mg/L	BDL	ASTM D-3866
30	Arsenic	1	0.01	mg/L	BDL	Hach method
31	Chlorine	1	0.01	mg/L	0.01	Hach 80021
32	Color	<15	1	TCU	BDL	APHA-2130 B

Table 25: Surface Water Analysis Results (Sample 02)

S.NO	PARAMETERS	SEQS	LDL	UNITS	RESULTS	TEST METHOD
1	Temperature	40	1	0C	29	Thermometer
2	pH value	6-9	0.01	-	8.23	USEPA 150.1
3	Biochemical Oxygen Demand(BOD) ₅ at 200C	200	0.1	mg/L	Nil	Hach 8043
4	Chemical Oxygen Demand(COD)	400	1	mg/L	Nil	Hach 8000
5	Total Suspended Solids(TSS)	200	1	mg/L	2	Hach 8006
6	Total Dissolved Solids(TDS)	3500	1	mg/L	59.4	Hach 8160
7	Cyanide(as CN ⁻)total	1	0.001	mg/L	BDL	Hach 8027
8	Ammonia(NH ₃)	40	0.1	mg/L	BDL	Hach 10031
9	Cadmium	0.1	0.001	mg/L	BDL	ASTM D-3557
10	Chromium(trivalent & hexavalent)	1	0.01	mg/L	0.002	ASTM D-1687
11	Copper	1	0.01	mg/L	BDL	Hach 8506
12	Lead	0.5	0.001	mg/L	BDL	ASTM D-3559
13	Nickel	1	0.001	mg/L	BDL	ASTM D-1886
14	Zinc	5	0.01	mg/L	0.01	USEPA 3500 Zn B
15	Oil & Grease	10	0.001	mg/L	BDL	APHA 5520-D
16	Fluoride(as F ⁻)	10	0.01	mg/L	0.01	USEPA 340.1
17	Phenolic compounds(as phenol)	0.1	0.001	mg/L	0.001	USEPA 420.1
18	Chloride(as Cl ⁻)	-	0.01	mg/L	9.2	Hach 8206
19	Mercury	0.01	0.001	mg/L	BDL	ASTM D-3223
20	Iron	8	0.01	mg/L	0.01	Hach 8008

21	An-ionic detergents(as MBAS)	20	0.001	mg/L	BDL	Method 5540 C
22	Manganese	1.5	0.1	mg/L	0.003	Hach 8034
23	Boron	6	0.01	mg/L	0.004	ASTM D-3082
24	Barium	1.5	0.1	mg/L	BDL	Hach 8014
25	Sulphate(SO4-2)	-	1	mg/L	BDL	USEPA 375.4
26	Selenium	0.5	0.01	mg/L	BDL	ASTM D-3859
27	Total toxic metals	2	-	mg/L	BDL	-
28	Sulphide(S2-)	1	0.001	mg/L	BDL	Hach 8131
29	Silver	1	0.001	mg/L	BDL	ASTM D-3866
30	Arsenic	1	0.01	mg/L	BDL	Hach method
31	Chlorine	1	0.01	mg/L	0.01	Hach 80021
32	Color	<15	1	TCU	BDL	APHA-2130 B

Table-26: Surface Water Analysis Results (Sample 03)

S.NO	PARAMETERS	SEQS	LDL	UNITS	RESULTS	TEST METHOD
1	Temperature	40	1	0C	28	Thermometer
2	pH value	6-9	0.01	-	7.55	USEPA 150.1
3	Biochemical Oxygen Demand(BOD)5 at 200C	200	0.1	mg/L	Nil	Hach 8043
4	Chemical Oxygen Demand(COD)	400	1	mg/L	Nil	Hach 8000
5	Total Suspended Solids(TSS)	200	1	mg/L	4	Hach 8006
6	Total Dissolved Solids(TDS)	3500	1	mg/L	128.7	Hach 8160
7	Cyanide(as CN-)total	1	0.001	mg/L	BDL	Hach 8027
8	Ammonia(NH3)	40	0.1	mg/L	BDL	Hach 10031
9	Cadmium	0.1	0.001	mg/L	BDL	ASTM D-3557
10	Chromium(trivalent & hexavalent)	1	0.01	mg/L	0.003	ASTM D-1687
11	Copper	1	0.01	mg/L	0.04	Hach 8506
12	Lead	0.5	0.001	mg/L	BDL	ASTM D-3559
13	Nickel	1	0.001	mg/L	BDL	ASTM D-1886
14	Zinc	5	0.01	mg/L	0.021	USEPA 3500 Zn B
15	Oil & Grease	10	0.001	mg/L	BDL	APHA 5520-D
16	Fluoride(as F-)	10	0.01	mg/L	0.043	USEPA 340.1

17	Phenolic compounds(as phenol)	0.1	0.001	mg/L	0.003	USEPA 420.1
18	Chloride(as Cl-)	-	0.01	mg/L	44.1	Hach 8206
19	Mercury	0.01	0.001	mg/L	BDL	ASTM D-3223
20	Iron	8	0.01	mg/L	0.03	Hach 8008
21	An-ionic detergents(as MBAS)	20	0.001	mg/L	BDL	Method 5540 C
22	Manganese	1.5	0.1	mg/L	0.002	Hach 8034
23	Boron	6	0.01	mg/L	0.005	ASTM D-3082
24	Barium	1.5	0.1	mg/L	BDL	Hach 8014
25	Sulphate(SO4-2)	-	1	mg/L	BDL	USEPA 375.4
26	Selenium	0.5	0.01	mg/L	BDL	ASTM D-3859
27	Total toxic metals	2	-	mg/L	BDL	-
28	Sulphide(S2-)	1	0.001	mg/L	BDL	Hach 8131
29	Silver	1	0.001	mg/L	BDL	ASTM D-3866
30	Arsenic	1	0.01	mg/L	BDL	Hach method
31	Chlorine	1	0.01	mg/L	0.03	Hach 80021
32	Color	<15	1	TCU	BDL	APHA-2130 B



Picture-18: Surface Water (Pond) Near Project Area



Picture-19: Surface Water (Keenjhar Lake)

5.9.1. The Indus River

River Indus is Pakistan's longest river and is considered as one of the longest rivers in Asia. River Indus flows on the Eastern side of the District Thatta. Taluka Thatta, Ghorabari and Keti Bunder are situated along the river Indus and that is why, some union councils of these three Talukas are very prone to flooding especially during the monsoon season. During 2010 flooding, District Thatta badly affected which cause heavy loss of life and property.

Like other part of the country, the monsoon season which brings major proportion of rainfall starts from June and lasts till September in the district. During the recent years, the behaviors and distribution of rainfall has been observed very abnormal mainly due to the impacts of climatic changes where the district receives heavy rainfall in the form of erratic and cloud burst especially during different time period of the monsoon season.

These types of rainfall generate flash floods and witnesses of heavy loss of life and property in the district. The history shows that District Thatta was hit by various episodes of flooding during the recent past. The Thatta district was badly hit by the 2010, 2011 2022 severe flooding.

5.9.2. Drainage Pattern

There is no main drainage being reported in the study area. The drainage pattern is dendritic in nature which is characterized by irregular branching in any direction and almost at any angle less than a right angle.

5.10. Land Use Land Classification

In terms of use, the lands in the district can be divided into five major categories; lands not available or fit for agriculture, those under arable agriculture, forests, rough grazing lands and areas under human settlements. Land use and Land cover (LULC) composition and its change are the substantial factors having direct influence on urban ecological systems and conditions. There are different classes of land including, Bare areas, closed broadleaved forest permanently flooded, open grasslands, irrigated crops lands, Sparse vegetation, and Rain fed croplands.

The proposed site has no any habitation, cultivation or grazing activity, and can be consider as barren land. Though, the immediate surroundings are mostly vacant except few infrastructures including few villages/settlements, lake, petrol pump, mosque and a tuck shop.

Except these, there are so many dried earthen dams and few agriculture fields near project area.

The land use land cover distribution of Thatta District is and LULC map of Thatta District are given in the following Figures.

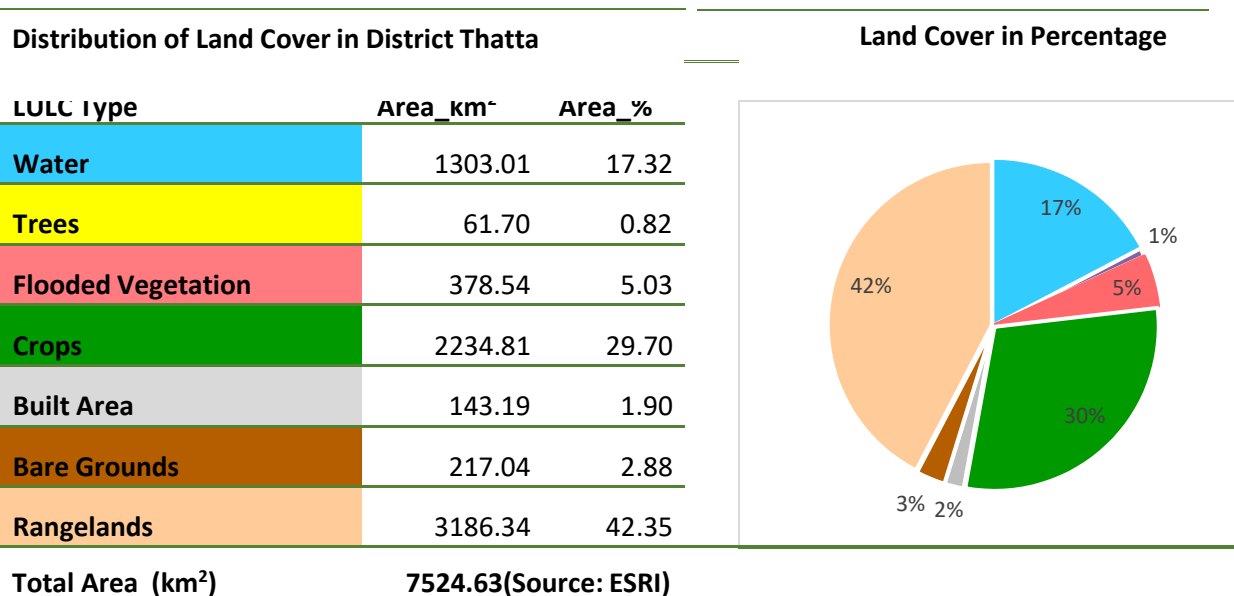


Figure-11: Land Use Land Classification of District Thatta with Area & Percentage

Figure-12: Land Use Land Classification (LULC) Map of District Thatta is over leaf

5.11. District Hazard Profile

District Thatta is vulnerable to various natural and human induced hazards including floods, cyclones, droughts, sea Intrusions, deforestation of mangroves, water logging and salinities and earthquakes as natural hazards, wild fires, civil unrests, road accidents and health epidemics are prominent human induced hazards. Besides, poor communication infrastructure, lack of health facilities, low literacy ratio and poverty especially in the remote coastal villages makes the area very vulnerable to various hazards.

Flooding has been reported as the most frequent and damaging natural hazard in the district which occurs at regular intervals during the monsoon seasons. In addition, other potential hazards are hail storm, earthquakes, epidemics, water logging and salinity and conflict are also reported time to time. District Thatta is geographically divided into three zones;

- zone 1: Coastal Belt i.e. Taluka, MP Sakro, KT Bunder and Ghorabari;
- Zone 2: Non Coastal belt i.e. Taluka Thatta;
- Zone 3: Riverine belt i.e. whole district.

5.12. Protected Area

The proposed project falls near the dedicated industrial zone, thus there is no protected area nearby. However, the Keerthar wildlife sanctuary is distanced from the project area around 20-25km.

5.13. Ecological Environment

Ecological resources are very important to create a balance in the ecological habitats. Therefore, the documentation of the state of present ecological conditions of the proposed project is highly significant to observe the impacts of the project on the indigenous environment. This section accounts the detailed description of the ecological environmental conditions of the study area. The proposed project area under consideration was evaluated for its potential impact on Biodiversity and ecosystem in short and long terms scenarios.

For this purpose, the data collection techniques are combination of both, *i.e.*, primary and secondary methods. Information was collected from Remote Sensing data, field verifications and photographic documentation in the field. Experts in the field of spatial ecology were engaged in the project area and its immediate vicinities. The floral and faunal diversity was determined by observations in and around study area which was under focus through established techniques of ecology. A hand-held GPS was used to document significant ecological habitats and its associated flora and fauna. Data were further supplemented by secondary means, which included review of published literature and previous IEE/EIA reports, conducted in the proposed project surrounding areas. The base line data defines and elaborates the present ecological environmental quality and features of the proposed project surroundings.

5.14. Methodology

To study the biological environment of the project area review of previously conducted EIA studies in the project surrounding were reviewed. This review was supplemented by on spot field visits for developing a detailed biological baseline by identifying key floral and faunal species of the project area along with their appropriate ecological habitats.

Primary data for flora and fauna were collected at different sampling locations within the proposed project area. In order to study the avifaunal diversity of the proposed project area individual count technique was also used by using Zoom Camera spotting technique with the

help of camera during field surveys, and the identified species were immediately recorded and reported accordingly. However, it is important to note that most of the avifaunal species were reported after the detailed literature review and previously conducted EIA studies in the proposed project area.

Anecdotal information regarding specific mammals was collected from the local people and relevant literature was also consulted. Active searching was also carried out in sampling areas with a focus on their micro-habitats.

5.14.1. Ecology of Project Area

The project site is located in a highly arid environment with very little rainfall. A Comprehension of this ecosystem is essential for the development of ecological profile of the area. This existing knowledge of the ecology is quite significant both at the construction and operational phases of the project. This section specifically provides the details of main ecological habitat, associated flora and prominent fauna found in the study area.

5.15. Floral Attributes of the Project Area

Flora provides the basic ingredients of the eco-system. Generally, the flora of an area is the sum of the plant species in an area. "Flora" refers to the species composition of the vegetation, whereas, the vegetation of an area is the total plant cover of that area (CRC, 2004). More specifically, Flora of the site mainly comprised of few trees, most shrubs and few grass covers. The proposed project area sustains an arid environment. Although project area falls in the harsh climatic, having sporadic rainfall and agriculture is only possible after rains. A total of 23 species of plants were observed within the vicinity of the proposed project site while the dominant plant species includes *Prosopis glandulosa*, *Suaeda fruticosa*, *Capparis decidua*, *Ziziphus nummularia*, *Acacia nilotica*, *Acacia Senegal*, *Prosopis juliflora*, *Aerva javanica*, *Parkinsonia aculeata* and *Calotropis procer*. Most dominating plant found in the area is *prosopis glandulosa* and *Ziziphus nummularia* with very high number of counts. Other common plant species were recorded are shown in the following Table.

S.No	Scientific Name	English Name/Common Name	IUCN Conservation Status
1.	<i>Eucalyptus recurva</i>	Eucalyptus	CE

2.	<i>Conocarpus erectus</i>	Button wood	LC
3.	<i>Prosopis cineraria</i>	Khejri Tree/ Jand/kandi	LC
4.	<i>Prosopis glandulosa</i>	honey mesquite/ Vilyati Kikar	LC
5.	<i>Suaeda fruticosa</i>	shrubby seablight	LC
6.	<i>Lycium edgeworthii</i>	Indian Box Thorn	LC
7.	<i>Senna holosericea</i>	Senna	LC
8.	<i>Capparis decidua</i>	Ker	EN
9.	<i>Calotropis procera</i>	Apple of sodom	LC
10.	<i>Ziziphus nummularia</i>	Karken Ber, Koken Ber	LC
11.	<i>Azadirachta indica</i>	Neem	LC
12.	<i>Acacia senegal</i>	Gum Acacia	LC
13.	<i>Acacia nilotica</i>	Kikar, Babul	LC
14.	<i>Aerva javanica</i>	Kapok Bush/ dessert cotton	LC
15.	<i>Prosopis cineraria</i>	Devi	LC
16.	<i>Cordia myxa</i>	Assyrian plum/ Lasura	NE
17.	<i>Phoenix dactylifera</i>	Date Palm	LC
18.	<i>Salvadora persica</i>	Toothbrush tree/ Khabbar	EN
19.	<i>Parkinsonia aculeata</i>	Jerusalem thorn	LC
20.	<i>Salsola</i>		LC
21.	<i>Heliotropium subulatum</i>	Heliotropes	LC
22.	<i>Grewia tenax</i>	White cross-berry	LC
23.	<i>Rhazya stricta</i>	Eshvarak	LC

Table-27: Floral Species in the Project Area

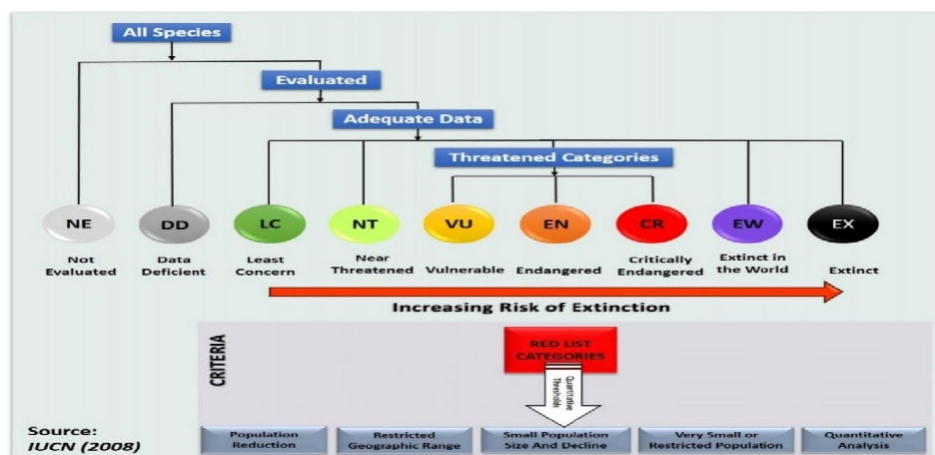


Figure-13: Structure of the Red List Categories and the five Red List Criteria



Aerva javanica



Euphorbia caducifolia



Acacia nilotica



Prosopis juliflora

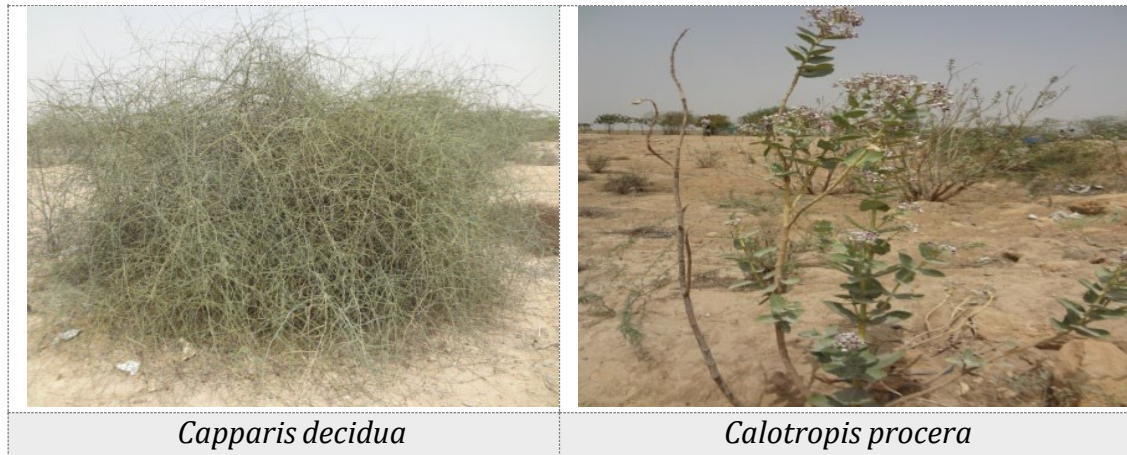


Prosopis cineraria



Blepharis indica

Picture-20: Floral Species around Project Area



Picture-21: Floral Species around Project Area

5.16. Faunal Attributes of the Project Area

Sporadic flora of the area provides few opportunities for fauna to exist in small numbers. Proposed project site is located in highly arid environment. The faunal species observed during the survey were mainly of desert origin along with few migratory birds. Moreover, it is important to note that the proposed project site sustains few rare species of birds as well. Though, it is important to note that most of the faunal species were reported after the detailed literature review and previously conducted ecological studies in the proposed project area. Furthermore, area search method was selected to observed birds, mammals and reptiles in the area.

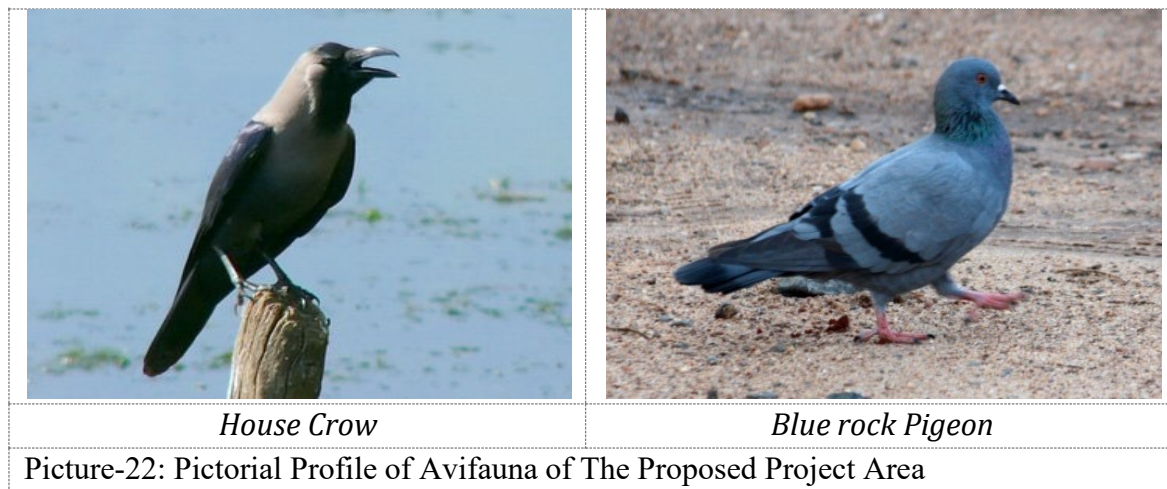
This method involves searching a set area and recording data only from within the pre-defined search zone. The area is usually covered by walking a route which is entirely flexible, but in some cases parallel, equally-spaced transects are used to ensure complete coverage of the area. Similarly, anecdotal information regarding specific mammals were collected from the local people and relevant literature was also reviewed. Active searching was carried out in sampling areas with a focus on their microhabitats. Detailed sampling protocol and method is outlined below after brief description of the species and list of identified avifauna, mammals and reptile species of the proposed project area. Reptiles' species are quite dominant and their burrow pits are quite obvious near the project area.

5.16.1. Avifauna

In order to study the avifaunal diversity of the project area individual count technique was used during field surveys and the identified species were immediately recorded and reported accordingly, mainly documented through camera. The Limited number of species were recorded during the survey and species identified in the proposed project area are of less ecological importance. Out of recorded birds, none of the species are protected under the Sindh Wildlife Protection Ordinance (SWPO) and IUCN Red List 2006 as Near Threatened (NT). The most common birds' species in the area are Doves, Shrikes and Sparrows.

Table-28: Floral Species in the Project Area

S.No	English Name	Scientific Name	IUCN Conservation Status
1.	Eurasian collared dove	<i>Streptopelia decaocto</i>	LC
2.	Helmeted Guinea fowl	<i>Numida meleagris</i>	LC
3.	House Sparrow	<i>Passer domesticus</i>	LC
4.	Sunbird	<i>Cinnyris asiaticus</i>	LC
5.	White Cheek Bulbul	<i>Pycnonotus leucotis</i>	LC
6.	Green Bee Eater	<i>Merops orientalis</i>	LC
7.	Desert Lark	<i>Ammomanes deserti</i>	LC
8.	House Crow	<i>Corvus splendens</i>	LC
9.	Blue rock Pigeon	<i>Columba livia</i>	LC
10.	Common Myna	<i>Acridotheres tristis</i>	LC



	
<i>Guinea Fowl</i>	<i>Doves</i>
	
<i>House Sparrow</i>	<i>Common Myna</i>
	
<i>White cheeked Bulbul</i>	<i>Desert lark</i>
	
<i>Green bee eater</i>	<i>Purple Sunbird</i>

Picture-23: Pictorial Profile of Avifauna of the Proposed Project Area

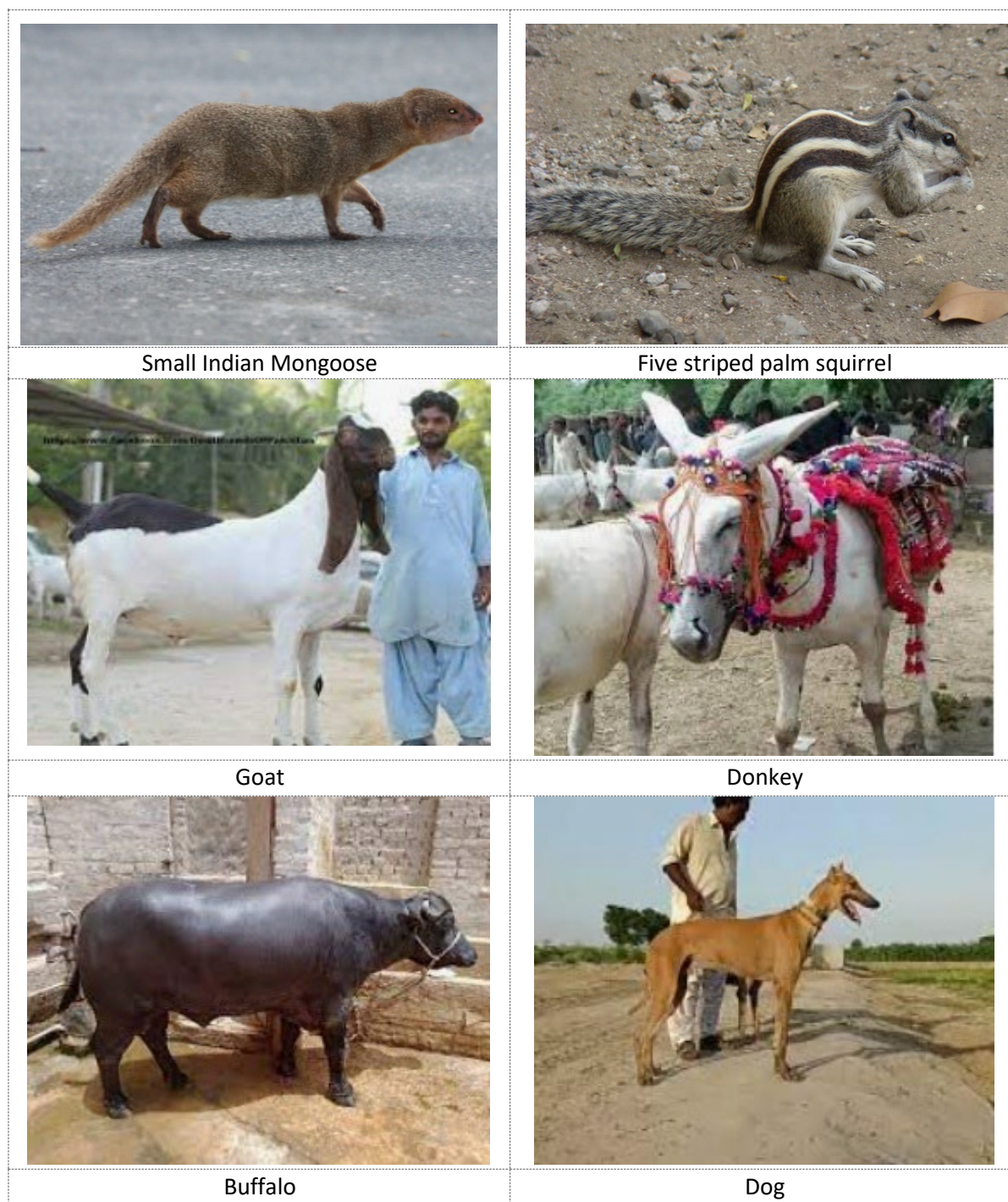
5.16.2. Mammals and Reptiles

Direct count method was adopted to identify total number of identified species during the ecological/ baseline surveys. The proposed project area sustains few domesticated mammals such as: Five striped palm squirrel, Dogs, Buffalo, Sheep, Goats, Jackals and Donkey are the common species of the area while small Indian mongoose is less common. None of the species recorded is protected, threatened or included in the IUCN appendices. The list of identified mammals is presented in Table 7.

Table-29: Mammals and Reptiles in the Project Area

S. No	English Name	Scientific Name	IUCN Conservation Status
1	Buffalo (Kundhi)	<i>Bubalus bubalis</i>	LC Domesticated
2	Domestic Goat	<i>Capra aegagrus</i>	VU Common in project area
3	Dog	<i>Ovis aries</i>	Not Defined Common in project area
4	Jackal	<i>Canis aureus</i>	LC Common in Project Area
5	Donkey	<i>Equus hemionus</i>	NT Common in Project Area
6	Small Indian Mongoose	<i>Herpestes javanicus</i>	NT Common in Project Area
7	Five striped palm squirrel	<i>Funambulus pennantii</i>	NT Common in Project Area





Picture-25: Mammals near Project Area

5.17. Endangered Species

There is no floral or faunal endangered species found in the area that has been documented in the IUCN red book. However, diversity and number of native plants and animals has reduced greatly

lately by intensive agriculture and then by water logging, salinity and industrial practices in the area.

5.18. Sensitive Areas

There is no protected area or wildlife sanctuaries located nearby.

5.19. Conclusion

The baseline study was focused on FWO land measuring 1142.83 where the proposed Jinnah SEZ will be established under the provisions of SEZ Act. The land is located near M-9 Motorway in district Thatta. The physical, biological and socioeconomic environment of district Thatta is described with respect to watershed, air shed, geology, soil characteristics and seismicity. The terrestrial environment is described by its geology, geomorphology, wild life habitat, vegetation and soil characteristics in terms of stability and seismicity of the District Thatta, the environmental conditions for the area's, hazards and water supply and sewage system, agriculture, transport and communications facilities were also described in this study.

The Thatta district is lively and diversified in nature it has agricultural lands in the left and right sides of Indus river, there are human settlements near the Indus river in south east of district, district has wildlife and mangroves in the south east where Indus river end in the Arabian ocean, District has prominent lakes i.e. Keenjhar. The District has rangeland with mountains in the North West. The proposed development will be carried in the north west of the district which is rangeland area.

The results of environmental instrumental monitoring reveal that

- There is no such ambient air, noise quality issue found near the project area;
- The ecological survey reveals that there is no prominent or endangered species found near project area;
- In-addition to this reconnaissance survey and map also reveals that there are no major settlements near project area found;
- No game reserves and wildlife sanctuaries exist in the vicinity of project area;
- Major source of noise pollution (if any) could be the passing-by traffic on M-9, which is though far away to create any pollution;

- It is a barren piece of land with sedimentary rocks or sediment only.

Further, it is also important to note that Nooriabad Industrial and Jhimpir Wind Farm are close to the project area, and are dedicated industrial activities areas; however, they are far enough not to contribute towards noise or any other pollution in the area.

In the conclusion the proposed project does not lie inside or near any environmentally sensitive area such as national park, historical building, reserved forest etc. The project area is sparsely populated with pockets of small rural settlements scattered over large area.

CHAPTER: 6

ENVIRONMENTAL BASELINE: SOCIOECONOMIC AND CULTURAL ENVIRONMENT

6.1. Introduction

This Chapter provides the socio-economic and cultural features of the project area. The purpose of this Chapter is to provide relevant information related to socioeconomic and cultural environment which is required to identify and address the potential beneficial and adverse impacts of the proposed Project on socio-economic and cultural environment of the project area.

This Chapter is organized in the following manner:

- Description of methodology and procedures adopted to develop the socioeconomic and cultural baseline;
- A general description of key socio-economic and cultural features of district Thatta; and
- Socio-economic and cultural profile of the project area.

6.2. Methodology

The socio-economic and cultural baseline provided in this chapter has been developed by using both secondary and primary data sources;

Sr.#	Sources	Data Type
1	Official Statistics and Information	▪ Official statistics and information about socio-economic and cultural features of the project area was collected by: ▪ Visit, meetings and telephone to relevant government departments located in district Thatta and in Karachi; ▪ Questionnaire was developed to collect data; ▪ Official reports and other documents available at websites of government

		departments
2	Research Articles and Reports	▪ Electronically available research articles and research reports related to socio-economic and cultural features of the project area.
3	EIA, ESIA & IEE Reports	▪ Electronically available IEE and ESIA reports related to District Thatta and Sindh province of related projects

Table- 30: Methodology of Data Collection for Stakeholders

6.2.1. Data Collection

Primary Data: Primary sources mainly included data collected through a baseline socioeconomic survey in the project area. In addition to socio-economic survey, social experts in the EIA team also recorded their personal observations during the field survey and monitoring and analysis of various environmental parameters, Discussions were also held with local communities related to their socioeconomic and cultural features.

Secondary Data: Secondary data was collected from various resources such as internet, studies previously conducted in the project areas vicinity, neighborhood, in-house sources, Government Departments and NGOs.

Prior to the detailed field survey, a reconnaissance visit of the project area was conducted. This initial assessment was used to assess the key socio-economic elements of the area and to formulate the socio-economic survey questionnaire. The socio-economic survey was conducted by an experienced social survey team under the supervision of social sector experts. The survey team includes both males and females team members. Male team members mainly consulted with male respondents and female team members with female respondents. The survey team was provided with comprehensive briefing about the project and its social dynamics.

The household survey questionnaire comprises of two major sections:

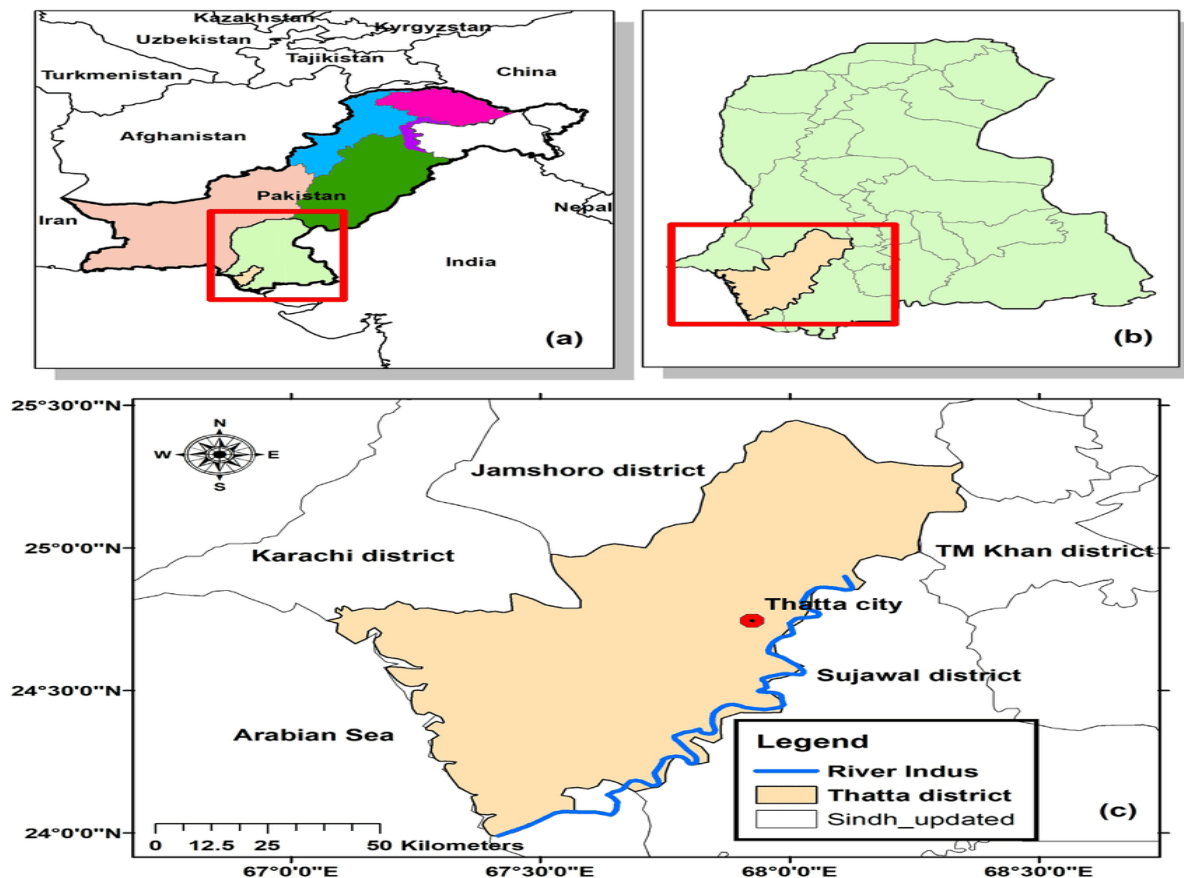
- a general information section; and,
- a respondent information section including general information section about the socio-economic and cultural features of locality and their point of view about the project.

The data collected from secondary and primary sources was logically processed and analyzed to extract requisite information for the formulation of socio-economic baseline.

6.3. Overview of Thatta District

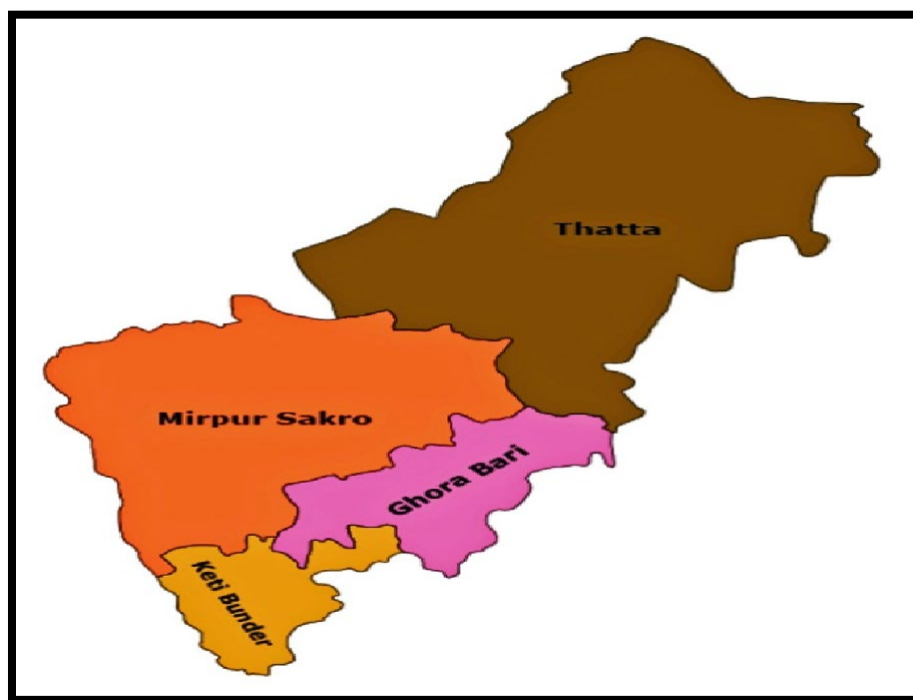
Thatta District is located in the southern area of the province of Sindh. Thatta's characteristics of economic activities range from a diversified agriculture landscape to a fast-emerging industrial hub, from rich wind energy resources to the cultivation of major crops and high-value minor crops. Still, amidst huge growth potential, this tail end district is the victim of unending water shortage and sea intrusion. The intruding sea has devoured a considerable stretch of agricultural land over the last two to three decades.

The economic activities range from a diversified agriculture landscape to a fast-emerging industrial hub, from rich wind energy resources to textile & made-ups to cultivation of major crops and high-value minor crops.



The district is administratively subdivided into 4 tehsils which were erstwhile 9 in number before creation of Sujawal District (in 2013, several talukas were separated to form the new Sujawal District);

- Thatta
- Mirpur Sakro
- Keti Bander
- Ghorabari



Map-17: Tehsils of Thatta

Thatta historically is a rice-growing area while being famous for banana production as well. The past five years' figures show rice was sown on 30,000ha to 40,100 ha between 2015-2020, cotton between 1,700 ha to 2,400 ha; banana on 4,000ha to 6,300ha; sugarcane on 13,500ha to 18,000 ha. Paan is Thatta's peculiarity and grown on around 1200ha in 2021 and was cultivated on 850-1,280ha in the last five years.

Growers show an inclination towards the cultivation of lemon, jujube and falsa as they are high-value added crops and gives better returns. Farmers are also adopting changing trends for the

cultivation of crops and paying attention to minor high-value crops. The cultivation of oilseed crops, chiefly sunflower, is part of Thatta's identity but its acreage has dropped. District has a sugar mill since sugar cane cultivation has been popular, however, people switched over to rice after getting bogged down in price controversies with mill owners.

Thatta was once the gateway of banana production but "bunchy top disease" wiped out this fruit. Two Ramsar¹⁶ sites Kenjhar and Haleji lakes have also ungraded the district's profile. Keenjhar is the primary source of water supply to the Karachi metropolis.

Once the Indus Delta was rich in resources like species of different animals, fish, honey, orchards and pastures, however, pathetic conditions prevail today primarily for want of adequate water flows. Many families, especially those associated with fishing, have migrated. As the flows of the Indus River were stored upstream, coastal communities were hit hard and natural resources vanished with people facing food deficiencies.

Mangrove cover in the coastal region was resultantly lost. Some studies show 260,000ha of mangroves existed until the 1970s which was reduced to 160,000ha until the 1990s and declined to 80,000ha afterwards.

Thatta has 1.89m animals out of Sindh's estimated population of livestock of 48.12m¹⁷. No census has been held since then. Under the World Bank funded Sindh Agriculture Growth Project, nine chillers were established in Thatta to preserve milk. Each chiller stores 260 to 350 litres and 50pc milk is consumed by the market, 30pc goes for processing and 20pc is used domestically.

Nature has blessed Thatta with abundant wind energy resources. Around two dozen projects were installed between 2006-and 2021, and currently contributing 1,235 MW of the clean energy to the national grid. Another 12 projects of 600MW will contribute clean energy while 27 projects of 1,875MW capacity are at different stages.

The bazaars of Thatta are known for hand-printed fabrics, glass bangles and Sindhi embroidery work in-laid with tinny mirrors, one of the more world known handicrafts of Pakistan. Thatta is

¹⁶ A wetland site designated to be of international importance under the Ramsar Convention

¹⁷ 2006 livestock census

slowly catching up with the modern world and is all set to emerge as a rich industrial base in the future. The local community was inclined to offer all support to the proposed project as it would add to their prosperity and bring brighter future for the youth.

6.3.1. Historical Perspective

Tracing the glorious past of Thatta makes interesting reading of this ancient district where the mighty Indus River meets the Arabian Sea after originating from the Tibetan plateau to form one of the largest deltas in the world - the Indus Delta. It has a combination of diversified agriculture and industrial landscape

Thatta was capital of three successive native Sindh dynasties and later was ruled by the Mughals, the traces of which are evident in the Makli necropolis, spreading over a twelve square kilometer area. These dynasties were;

- Samma (1335-1520);
- Arghun (1520-1555); and
- Tarkhan (1555-1665).

Located about 98 km (61 miles) away in the east of Karachi, Thatta was constantly embellished from the 14th to the 18th century being capital of Sindh. In 1739, the capital was moved elsewhere and Thatta declined. The remains of the city and its necropolis provide a unique view of civilization in Sindh and Islamic arts. It is believed that Thatta was the place where Alexander the Great rested his legions after their long march.

The town is dominated by the Great Mosque built by the Moghul Emperor Shahjahan which has been carefully restored to its original condition. The mosque's 33 arched domes give it superb acoustics and the tile work, a whole range of shades of blue, is elegant.

Old city of Thatta is situated on the outskirts of the new town, and is surrounded by narrow lanes and multi-story houses made of plaster and wood; these structures are also quite common in the city of Hyderabad. The shifting nature of the Indus makes it difficult to discern the exact location of ancient Thatta, but the name indicates its strong relation to the Indus. Thatta, derived from Thatto, a Sindhi word for a small settlement on riverbanks. All historic accounts paint Thatta as a populous and flourishing trading post and a refuge of saints and scholars. The rise of Thatta as an important commercial and cultural center was directly related to Samma-civilization

Thatta is famous for its necropolis and the sites are closely interlinked with the lives of the people. Every year thousands of people pay homage to these sites to commemorate the saints buried here. The graves testify to a period of four centuries when Thatta was a thriving center of trade, religion and scholarly pursuits and the capital of Sindh.

The British annexed Sindh in 1843 and their immediate concern was to establish a communication network throughout Sindh. The municipality of Thatta was established by the British in 1854 and several vernacular and private schools, as well as a post office, a dispensary and a subordinate jail were built.

The British established their residential areas away from the main city, on higher grounds, west of Makli necropolis. Thatta regained prosperity because of an improved communication infrastructure, though the city was never completely revived its prior importance as capital. The late nineteenth century saw a new class of merchants who took full advantage of the British need for services and goods. These merchants became rich and commissioned many buildings inspired by the elegant mansions constructed by the British throughout the British Empire.

6.3.2. Demography

Thatta district had a population of 982,138, of which 510,143 were males and 471,958 females. The rural population was 805,662 (82.03%) and urban 176,476 (17.97%)¹⁸.

The literacy rate is 27.88%: 35.46% for males and 19.63% for females. 92.92% of the population spoke Sindhi, 1.40% Urdu, 1.33% Pashto, 1.10% Punjabi, and 1.05% Balochi as their first language

6.3.2.1. Religion

The majority religion is Islam, with 96.75% of the population. Hinduism (including those from Scheduled Castes) is practiced by 3.04% of the population, and other not stated is .21 %.

6.3.2.2. Climate

Thatta has a hot desert climate and temperature in Thatta is 26.8 °C (80.2 °F). The average annual rainfall is 210 mm (8.3 in).

¹⁸ 2017 census

6.4. Project Area

The proposed Project site is located in district Thatta (Taluka Khohistan 7/1 and 7/2). For the purpose of this EIA, the total project area is divided into two components:

6.4.1. Area where Proposed project is to be located

There is no population residing at the site. Most of the site area is barren land with minor strips of vegetation, bushes, and indigenous plants. The only habitat is FWO camp office and personnel.

6.4.2. Area which is directly affected by the proposed project, other than resettlements and project surrounding

This area comprises nearest localities of the proposed Project site from where labor and other workforce may be hired. It comprises an area located within the proximity of about five-fifteen square kilometers from proposed Project site boundary. This area will be the direct beneficiary in terms of increased local business opportunities created during construction and operation of the proposed project. Influx of people in this area during project construction and operation may induce direct demographic and cultural impacts.

The settlement pattern of the nearby area is all rural. Near to project site no urban settlements exist. This was the main reason to select the site for development. Jhimphir Wind Farm and Nooriabad Industrial Estate are in the vicinity and the urban dwelling on M-9 Motor way.

The nearby areas of project area have large agricultural lands where sugarcane, rice and other fruit trees are the main crops and are used for domestic as well as selling purpose. Animal fodder has also been grown in the area for livestock.

According to socio-economic survey results, almost all the households in project area are associated with agricultural activities and agriculture is the main source of income of majority of project people. The average land holding of individual households is small in project area. Around 81% of the households are dependent on agriculture for their livelihood and grow agricultural crops for commercial purposes. Self-owned land is 87% of total area. Tenants have almost 0.50% of land. Property owners have leased their agricultural lands to poor people on

contractual basis such as rented land, mutual share of owner and lease for input and agricultural products and hiring the services of local people for crop cultivation etc. Livestock rearing is quite common in the area. Almost every household involved in agricultural practices is also involved in livestock production. There are various uses of livestock in the area. Cows, Buffaloes and Goats are mostly used for milk and milk products for household. Sheep, Bulls and calf are commonly grown for meat production.

6.4.3. Archaeological Sites

There is no archaeological site falls around the proposed site. Mosques are located in the nearby community but project has no affect on these mosques. There will be a grand mosques inside the propose Jinnah SEZ which will reflect the Islamic and local Sindhi culture.

6.4.4. Basic Amenities

Electricity is available in entire project area. However; there exists load shedding of about 4-5 hours daily in the area. Wells are used for drinking purpose and laundry purposes as well. No treatment plant was found in the area. The solid waste is disposed in open places. Sewage waste is disposed of in individual domestic septic tanks. Gas is not available in the area and woods are also used for cooking and heating purposes. Under certain circumstances, LPG cylinders are also used mainly for cooking purposes. Most of the tracks in the locality are katcha. The vehicle type used is mainly rickshaw and motorcycle. Cell phone network is available in the area. Basic health services are also available.

6.5. Employment and Income Sources

About 71.2% of the population in the project area is presently employed (self employed or having employment contracts) including both males and females. The unemployment ratio is substantially higher in females (45.49% of the total female population) than in males (48% of the total male population). Unemployed people have been considered to include all those having no permanent source of employment. It includes following categories:

- People without any permanent labor contract (either government or private);
- People having no private business; and,
- People not involved in any agricultural activities.

Therefore, the majority of people in the un-employment category have to work on daily waged basis. The employed male population in the area is engaged in many types of public and private jobs, private businesses and labor works. Majority of people occupation is agriculture. In general, the categories of employment in the study area are

- Construction labor-working on public or private construction activities in the area;
- Daily waged jobs related to farming and agriculture; and,
- Daily waged household jobs.

Most of the employed population in study area falls in the age group of 40-6. The key role of females in the area is to look after the household matters, children upbringing and agriculture.

6.5.1. Income and Expenditure

In the project area the average household income is in the range of about PKR: 25 to 30 thousands per month per household. Agriculture also has a prominent direct share in income of the people in project area. Agriculture often compensates daily food needs of the local people as well. It also helps to meet the fodder need for livestock, which would have to be purchased otherwise. Similar to other areas of Pakistan, there exists an imbalance between household expenditures and income of people in project area.

6.5.2. Income and Expenditure of People in the Surrounding Area

The nature and detail of various expenses is provided below;

Sr.No	Items	Nature of Expenses
1	Food	Food expenses are high in the area though agriculture contribute a lot in lowering down the expenses, however, due to large size of families, expenses are more. The project area is in the rural part of district which exhibits typical rural culture and socio-economic features of province. People have simple foods and eating habits. Vegetables with Chapati (Roti prepared by wheat and maize flour) and rice are most commonly used as food items. The average food expense per household around is PKR: 10-15 thousands per month per household.

2	Utility Bills	The utility expenditure is the gas and electricity bill. The average bill per household is Rs.1500-2000.
3	Education	Education expenses are not too high in project area. According to the socio-economic survey results, about 35% students attend government schools located in the project area, which have very nominal monthly expenses. Major share in education expenses is of the students going to other cities for graduation and higher-level studies.
4	Transport	Most People in area use public transport in form of bus and rickshaw in the area. Transportation expenses are almost twenty five hundred as they have to move to nearby areas for daily needs.
5	Miscellaneous	t includes occasional expenses which are not part of routine and which don't fall under the above categories. Miscellaneous expenses are Rs.4000-5000 per month on average.

Table-31: Income and Expenditure of People in the surrounding Area

6.6. Conclusion

District Thatta has had a glorious past and industrial activities are not new to the area. People are hospitable and have the motivation to grow and expand their skill sets, education, life style, income and prosperity. The proposed project being environmental friendly and having the vision of sustainable development will bring tangible and intangible benefit to the area.

The location of project site is a barren land and will neither displace any existing human habitat nor will infringe upon their land holdings. FWO is a familiar name in the area and people are ready to welcome to the proposed project and to share the benefits, it will bring along for the society.

CHAPTER: 7

STAKEHOLDERS CONSULTATION AND INFORMATION DISCLOSURE

7.1. Introduction

Under PART-X of the Sindh Environmental Protection Act, 2014, Section (31) Public participation is required during the environmental assessment process to cause relevant details of any proposed project regarding which an Environmental Impact Assessment has been received to be published, along with an invitation to the public to furnish their comments thereon within a specified period.

Stakeholder's consultation leads to better and more acceptable decision-making. Stakeholder's consultation is an on-going process, which is required at various stages of developmental projects such as during:

- initial project planning;
- pre-construction; and
- construction.

Consultation with relevant stakeholders may be required even during the post developmental stages of a project. This helps to communicate and share significant information to general public and other stakeholders at all stages. It lays the basis for on-going positive relationships between various stakeholders and project developer.

Moreover, it is important to consult with the “affected” communities in order to make the project more sustainable by addressing the concerns / apprehensions of the directly and indirectly “affected communities”. In this way, stakeholder's consultation improves the transparency of the developmental processes, increases the likelihood of participation of stakeholders ensuring the success and acceptability of the project.

7.2. Principles of Stakeholders Consultation

For this EIA, the stakeholder's consultation activities were executed based on the following principles:

- Transparency;
- Openness;
- Accessibility; and
- Inclusion.

7.2.1. Purpose and Objectives of Stakeholders Consultation

- The basic purpose of the stakeholder consultation for EIA is to obtain a response from the relevant government departments and NGOs, and also the general public, regarding installation of the proposed Project. Therefore, the specific objectives of the stakeholder consultation are to:
 - Inform the stakeholders about the development of proposed Project;
 - Provide an opportunity for stakeholders to present their views, concerns and apprehensions and therefore allow more sensitive consideration of mitigation measures and trade-offs;
 - Confirm to the stakeholders that the benefits of the proposed Project have been maximized and no major impact has been overlooked;
 - Build trust and manage the stakeholder's expectations in general;
 - Provide an opportunity for local people to influence the design of the proposed Project in a positive manner;
 - Increase public confidence and provide better transparency and accountability in decision making; and,
 - Reduce conflicts through early identification of issues.

Based on this purpose and objective, a well-defined approach has been adopted during the course of the stakeholder consultation. The approach comprised:

- Informing the stakeholders about the project, its purpose and tangible and intangible benefits;
- Gathering and assembling the views from stakeholders on the proposed project;
- Enhancing the social and environmental benefits of the proposed Project, thereby inclusions of remedial actions focusing on improving the quality of life of any project-influenced people; and

- Addressing the issues of environmental and social sustainability by minimizing the adverse environmental and particularly the social impacts of the proposed Project.

7.3. Identification of Stakeholders

The basic purpose of identification of stakeholders is to recognize all institutions, organizations and persons who have influence on, or who may be influenced by, the proposed Project. The identification of stakeholders started at the preliminary stage of the EIA process and was initiated by a visit to the project area. Accordingly, stakeholders have been divided into two broad categories.

7.3.1. Government Departments and NGOs

Government institutions and NGOs may interact with the proposed Project in many ways. For example;

- There may be some on-going or future developmental activities / plans by various government departments and NGOs in the area of proposed Project. Therefore, obtaining information about such activities at early stage of project is essential to avoid any counter effects;
- These stakeholders may have some specific concerns and suggestions with respect to the proposed Project. It is necessary to address all concerns at an early stage to avoid any future conflicts and complications; and
- Relevant government departments and NGOs may provide valuable technical and non-technical information about the project area. This information may provide useful input in the EIA process.

7.3.2. Local Community

The stakeholders in the local community have been categorized as;

- **Directly Affected:** Stakeholders directly affected by the proposed Project in terms of land acquisition and loss of property / assets or any other type of economic displacement; and,

- **Indirectly Affected:** Stakeholders indirectly affected by the proposed Project, for example through:
 - Effects on community health and safety due to emissions;
 - Impacts on agriculture due to construction activities and movement of heavy machinery in the area;
 - Economic impacts on employments and local businesses; and,
 - Socio-cultural impacts due to the influx of people in the area.

Public consultation from people residing in vicinity of project site revealed that people want such industrial setup which promotes green businesses, healthy ecology, social justice and fair wages.

7.4. Consultation Process

Stakeholder's consultation for this EIA has been conducted in accordance with Sindh EPA, Guidelines for Public Consultation during IEE / EIA. The requirements of other relevant international guidelines of WB and IFC have also been considered. For the execution of stakeholder consultation activities, a team of environmental and social experts visited the project area.

7.4.1. Consultations with Government Departments and NGOs

Visits to district and tehsil level relevant government departments were conducted. Provincial Departments were also visited and consulted over the telephone during the EIA for guidance and consultations. A questionnaire was also developed for institutional consultations for the following purposes;

- Record the concerns and suggestions of relevant government departments and NGOs; and
- Collect the available information / data from institutions about environmental and socio-economic conditions of the project area.

Government offices provided the required information and guidance either during the consultations or few days after the visits (via emails and postal mails). All relevant aspects of proposed Project were discussed with government officials. Concerns and suggestions of the officials were noted in questionnaires prepared for institutional consultations.

7.4.2. Consultation with Local Community

Concerns and views of local communities were noted through questionnaires survey and focused group discussions in the areas around the project area. About 20-25 local people of different age groups ranging from 18-60 years attended each focused group discussion. The duration of each discussion was 60-90 minutes.

Key participants included business community, cultivators; shopkeepers; farmers; and, students. A focused group session was also held with local heads in project area. At the end of discussion sessions, concerns and views of the people were recorded in questionnaires prepared for this purpose. Interactive and participatory methods were adopted during focused group discussions to ensure the transformation of thoughts and perceptions from general public regarding the proposed Project. All stakeholders were encouraged to share their concerns related to propose Project which were recorded carefully.

Participants were also asked to suggest alternatives of what they think to be more suitable in case of their particular concerns. Males and females were separately consulted.

7.5. Outcomes of Stakeholders Consultations

7.5.1. Views of Institutional Stakeholders

Relevant stakeholders including Agriculture, Communication and works, Education, Environment, Fisheries, Forest, Health, Public Health Engineering, Revenue, Wildlife department were consulted. According to these offices there is no existing or ongoing project of their departments at site area. District office environment was in full support of the Project.

7.5.2. Views and Suggestions of Community Members

- About 90% participants of focused group discussion and due to door to door questionnaires survey were aware about the construction of proposed Project. FWO is a known entity for the local community due to construction of M-9 Motorway and the existing Camp Office at the project site. Moreover, FWO has built a school in the vicinity and a Trauma Center at M-9. It was common perception of people that the proposed Project would bring prosperity in their livelihoods and daily lives. It will create better job

opportunities and open the doors of development for the youth. A brief summary of the views of local people is provided below;

- The general public of the area expected new and better facilities of health, education and livelihood due to the construction of the proposed Project in their area;
- Local business community/ shopkeepers were quite happy with the construction of proposed Project as they were expecting better and increased business opportunities and activities in the area;
- Local community emphasized that they should be preferably considered for the skilled and unskilled jobs during the construction as well as operation of the proposed Project;
- The workforce working away from their homes emphasized on provision of labor jobs during the construction and operation of the proposed Project for them;
- Local community was expecting that the project developer would take care of the environment as well as the culture of the area and will provide better facilities for local people;
- People were also concerned about the health issues which according to them are related with air emissions and polluted water released by the existing industry in the area;
- People were happy to learn that solar power project will be installed and Palm Oil tree plantation will also be done. People were also informed that Developer of the Project will build labor colony, technical training centers to make people able to earn better through on-the job-training.

7.6. Conclusion

The outcome of discussions with stakeholders was very encouraging as from the Government Departments to Local Community assured full support and appreciation for the project. Their valuable suggestions and recommendations were noted down to incorporate in the different phases of project development.

CHAPTER: 8

ENVIRONMENTAL IMPACTS ASSESSMENT

8.1. Introduction

Any project or development would certainly have positive and negative impacts on the environment. The negative impacts must need to identify and their mitigation measures essentially drafted before the implementation. This Chapter identifies potential impacts due to the implementation of proposed project by GID on the physical, biological and social environment of the project area. The chapter also identifies measures that will help to mitigate the project's adverse environmental effects (if any) and will enhance positive impacts.

8.2. Impacts on Physical Environment

This section provides the potential adverse impacts of the proposed Project on physical environmental resources of the area, and includes land, air, water, buildings and other infrastructure, and all of the natural resources that provide basic needs and opportunities for social and economic development. The notable potential impacts are discussed below;

8.2.1. Impacts on Land Resources

This section explains how the proposed project will affect the land use, soil erosion and contamination, and describes mitigation measures to manage these impacts.

8.2.2. Land Productivity and Use

Following are the major impact on land productivity and use.

- Most significant impact will be the conversion of some agricultural land into industrial land. It is worth to mention here that land in the project area is presently barren with no agriculture activity and is under the use of FWO and its Camp Office Operations, hence remote chances of having agriculture productivity;
- Due to proposed project construction and operation, other industrial and commercial activities may start in the vicinity of area, where at present there is no such type of activity. This may cause negative impact on the existing environment;

- Borrow pits and other landscape depressions if left open may prove hazardous to human beings, livestock and wildlife;
- Open pits containing water are potential sources of mosquito breeding if left stagnant, and can create health problems;
- Surface run-off from the impervious surface of the proposed carriageway can further aggravate the flooding of embankment sides during the operation stage;
- Induction of infrastructural development works may change the local drainage pattern of the area. This can cause pounding in the vicinity of the project area in rainy season, which ultimately affect the current use of land patterns;
- Construction activity may cause dust and smoke emission may be injurious to the residents of adjacent settlements.

8.2.3. Soil Erosion and Land Sliding

Soil erosion may occur in the workshop areas as a result of improper runoff drawn from the equipment washing-yards and improper management of construction activities. Due to development of project area, velocity of runoff will be increased, which will ultimately enhance the soil erosion. Once the proposed and existing roads (after rehabilitation) return to normal operation, it will be subject to a natural depreciation as high embankments become increasingly prone to soil erosion.

8.2.4. Soil Contamination

Soil of the project area may get contaminated due to the following reasons;

- Scraped materials, if not disposed of properly, may contaminate soil resource;
- Spillage of chemicals like fuels, solvents, oils, paints and other construction chemicals and concrete and this normally happens when these materials are transported in open or loosely capped containers;
- The possible contamination of soil by oils and chemicals at campsites, workshop areas, and equipment washing-yards may limit the future use of land;
- A large quantity of solid waste will be generated by the Project during operational stage. If this solid waste is not properly disposed of, it will contaminate the soil resources especially during monsoon season;

- Some chemicals used in laying of water supply pipe joints, sheathing on electric wires and cables are hazardous and toxic in nature. All the carbon based compounds are toxic to varying degrees. Hydrocarbon group of chemicals are toxic and fuel, petrol, diesel and all the lubricants are too toxic in nature. In case proper care is not taken for handling, storing and transportation of these toxic substances may cause damage to the health of the workers as well as their spills will contaminate the soil.

8.2.5. Mitigation Measures

The mitigation measures, which will be carried out in design stage, construction as well as operation stages to protect land resources and to minimize the damages to land productivity and use are as under:

8.2.5.1. Land Productivity and Use

- Damage to the land due to implementation of the Project will be a permanent loss as it will change the natural physical appearance and contours of the land permanently. However, this will be compensated due to increased income level of the local people and availability of more job resources due to the Project. The local people will have better quality of life due to industrial activities;
- The exposure and enhanced connectivity will make people more aware and they can use more productive ways to get better yield of adjoining agricultural land and this will compensate to this loss of change in complexion and appearance of land due to industrial use;
- The expected mushroom commercial and industrial growth around the proposed SEZ (Jinnah SEZ) should be properly controlled by formulating and enforcing the rules and regulations;
- As far as possible, waste/barren land and natural areas with a high elevation will be used setting up project facilities. The excavation of earth fill will be limited to an approximate depth of 50 cm;
- This practice will be applied uniformly across the entire land. Where deep ditching is to be carried out, the top 1m layer of the ditching area will be stripped and stockpiled. The ditch will initially be filled with scrap material from construction and then leveled with

the stockpiled topsoil to make it even with the rest of the area. It shall be ensured that the scarp does not contain any material, which may contaminate the soil;

- Ditches or pits that cannot be fully rehabilitated will be landscaped/converted into green areas to minimize erosion and to avoid creating hazards for people and livestock;
- The Project works have been designed in line with natural drainage to ensure that local drainage pattern should not be disturbed. Side drains will be constructed to prevent flooding on the carriageways. In development areas, side drains will be constructed along the road sides; in open areas, a drain will be constructed along the embankment;
- Proper storage place of each type of material to be used during the construction period to avoid any hindrance to natural slope;
- Contractor will be made responsible for the clearing of left over material at the site. In this regard prior to the start of work, it will be mandatory that contractor should submit the site restoration plan;
- Site restoration plan should be as pragmatic as possible and GID technical team and engineers will monitor and have rigorous oversight on the activities.

8.2.5.2. Soil Erosion and Land Sliding

Good engineering practices will help control soil erosion both at construction sites and in peripheral areas, particularly in burrow areas and along transportation tracks. These will include the following measures;

- Low road embankments will be protected from erosion by planting indigenous grasses and low height trees that can flourish under project site conditions;
- High road embankments will be protected by constructing stone pitching or a riprap across the embankment. This practice will also be applied along cross drainage structures where embankments are more susceptible to erosion by water runoff;
- The Design Consultants will be required to include appropriate measures for slope protection, i.e. vegetation cover and stone pitching, in the detailed construction drawings and implement them accordingly;
- Main drainage courses within the proposed development area should be lined to avoid erosion. Growing of creepers and planting local fast growing and deep rooted species will act as sponge and will significantly help in reducing soil erosion;

- A tree plantation program (especially Palm Tree Plantation) will be developed to reduce the soil erosion;
- Cutting of existing trees will be kept at minimum level and for every tree cut two trees must be planted.

8.2.5.3. Soil Contamination

The following practices will be adopted to minimize the risk of soil contamination;

- The contractors will be required to instruct and train the workforce in the storage and handling of materials and chemicals that can potentially cause soil contamination;
- Solid waste generated during construction and at campsites will be properly treated and safely disposed of only in demarcated waste disposal sites;
- Oil leakages, chemicals and other materials will be minimized by providing appropriate storage places depending on the type of material for storage;
- Oil and other lubrication material should be stored in water proof tanks especially built for oil storage. These tanks should be built away from the main road and residential areas. Access to these tanks should only be allowed to concerned personnel;
- Safety equipment like fire extinguishers should be placed near to these places along with signs for danger and fire;
- Workers must be familiar with the Material Safety Data Sheets (MSDS) of each chemical used at site;
- MSDS will be provided with each chemical drum;
- Chemicals will be stored as per their MSDS;
- Utmost care will be taken during the handling of these chemicals;
- Accidental spills of fuels or other materials pose a potential for contamination of soils;
- Precautions should be taken to prevent spills and all workers shall be trained in proper handling, storage and disposal of hazardous or toxic materials.

8.2.5.4. Solid Waste Disposal System

Proper solid waste storage will be adopted for the project such as:

- Fiber glass Waste Bins with lids and easy unloading mechanism shall be placed throughout the Project Area;
- Separate bins for recyclable materials shall be provided;
- All garbage or other putrid waste shall be securely wrapped in recycled papers or similar material bags;
- All cans, bottles, or other food containers would be rinsed free of food particles and drained before being placed in collection containers;
- Collection containers shall be kept tightly sealed or covered at all times;
- Solid waste must not protrude or extend above the top of the container;
- Keeping in view the quantities and composition of solid waste generated from different clusters, it is proposed that the solid waste collection, transportation and disposal system will be designed.
- The solid waste management system should involve the following major operations:

Collection of Waste: As far as solid waste generated from commercial and institutional area, it is proposed that manual and vehicular system of waste collection be adopted. The vehicular system of waste collection is not only fast but also convenient. However, in case of industrial waste collection, it is proposed that each industry should be responsible to transport the waste up-to the storage place or transfer station located within or outside the project area.

Storage Place / Transfer Station: For storage of the solid waste at industrial level, it is proposed that two types of waste bins should be placed within the premises of each industrial unit to contain organic and inorganic waste separately. This arrangement will segregate the waste at point source.

Organic and Inorganic Waste: It will be transferred to the transfer station and inorganic waste will be recycled or reused. However, if any toxic or hazard waste is encountered it will be properly land fill through appropriate measures. From the transfer station, waste will be transported to the sanitary landfill site;

- The solid waste system shall consist of the following:

Land Fill Site: It is proposed that instead of providing all the above facilities by the Developer, the solid waste system can be handled by private Contractors (under the monitoring system of

the Developer) who will be responsible for providing all the facilities for collection of solid waste up-to its disposal at the land fill site. This matter shall be worked out before the process of disbursement for timely completion of the project.

- During the design of the land fill site facility, the following important factors shall be considered:
 - Availability of cover materials;
 - Provision of effective drainage system;
 - Leachate collection and disposal system;
 - Provision of geo-membranes such as HDPE etc.;
 - Fire prevention arrangements;
 - Ground water protection system such as vertical walls etc.;
 - Operational and management plan.

8.3. Impacts on Water Resources

This section explains how the proposed project will affect the water resource use, contamination of water bodies and groundwater, siltation of surface water resources and alterations in drainage pattern, and also describes mitigation measures to manage these impacts.

8.3.1. Contamination of Surface and Ground Water Resources

Following are the major impact on surface and ground water resources;

- Surface and subsurface water resources in the vicinity of the proposed project site may be contaminated by fuel and chemical spills, or by solid waste and effluents generated by the kitchens and toilets at construction campsites;
- If cross-drainage structures are not adequately maintained, culverts and water channels tend to become choked with debris and eroded soil, adversely affecting the quality of surface water; Seepage of polluted water during monsoon season through garbage areas will deteriorate the groundwater quality during operation stage of the Project;
- During the rainy season storm water that would be finally disposed of through open drainage system may contain certain types of pollutants such as grit, suspended solids, oil, grease, etc;

- These pollutants could exist on the outside paved areas of industrial units, surface of primary and secondary road network, and open unpaved areas and may contaminate the existing water resources;
- Siltation of Seepage Channels by burrow material in the runoff from the construction area in the project area during operation of the project, due to increased runoff, soil erosion may take place, which may ultimately silt up the nearby surface water resources;
- Water is a valuable commodity and waste of water can stress the water levels, thereby, the workforce will be briefed not to waste water unnecessarily;
- Road embankments restricting cross-drainage, and causing the land on either side of the embankment to flood in case of heavy rains, may cause natural streams and irrigation channels to become silted.

8.3.2. Mitigation Measures

Measures to mitigate the adverse impact on water resources and surface drainage patterns will be incorporated into the project design and are discussed below:

8.3.2.1. Use of Local Water

In the project area, prior to start of construction activities, the availability of water will be assessed to evaluate the impacts on the community resources. There are two wells already operational on project site. And local water supplies are not being used presently, and during the project construction and operations, more water wells, and tube-well will be installed, and no water resources under the use of community will be exploited by the project operations without consultation with concerned community (if so required). Availability of water for project operations facilities and construction purposes will be ensured prior to start of construction activities.

8.3.2.2. Contamination of Surface and Ground Water Resources

Following are the mitigation measures to prevent Contamination of Surface and Ground Water Resources;

- Project is located at least 1-2 km away from the nearest local settlement to prevent the contamination of community-owned water resources like wells, hand pumps, shallow wells, etc;
- Construction camps will be established in areas with adequate natural drainage channels in order to facilitate flow of the treated effluents;
- Wastewater effluent from the work stations, workshops and equipment washing yards will be passed through gravel/sand beds to remove oil/grease contaminants before discharging it into near natural stream/drain;
- According to local laws, the Biochemical Oxygen Demand (BOD5) concentration in sewage must be brought down to less than 80 ppm (parts per million) before being discharged into a natural stream with a capacity to dilute the effluent further by 10 times;
- Burrow pits and natural depressions with pre-laid impervious liners will be used to dispose of scarified/scraped asphalt (if involved), and then covered with soil;
- Retention work will be carried out on roadside drainage channels as per the drainage design to prevent silting;
- New drains will be constructed for proper drainage of the area as it will reduce the siltation of natural stream;
- The wastewater from industrial processes and sanitary sources shall be properly treated before its disposal or reuse. The wastewater treatment process depends on the concentration and type of wastewater, whereas the degree of treatment depends on the required effluent quality and its final re-use. Each industry will be responsible to treat the effluents following the Sindh and National Environmental Quality Standards (PEQS), Other than above mentioned effluents, individual industries will also be responsible for in house treatment following the national and provincial EQS limits;
- Treated wastewater will be disposed of into the nearby ditch drain and it will be ensured that treated waste water should never be allowed to dispose without treatment;
- To minimize the wastewater quantity, efforts will also be made for reuse of the water within industry after primary treatment (if possible);
- Recycling of wastewater from one process and one industry to another inside the proposed zone;

- Use of treated effluent as make-up water wherever possible and to design systems that recycle water repeatedly for the same purpose e.g. cooling of towers;
- Provision of oil skimmers for removal of oil from the water; and
- To protect the ground water, surface water and soil contamination, provision of geo-membrane at the solid waste management sites (land fill site).

8.3.2.3. Siltation of Natural Streams and Irrigation Channels

Following mitigation measures will be adopted to avoid Siltation of Natural Streams and Irrigation Channels;

- Appropriate locations and required capacities for new cross-drainage structures across road embankments, intersecting natural streams and irrigation channels, to protect nearby agricultural land and settlements from flooding;
- It will also reduce the chances of siltation of the streams due to un-disturbed flow. Main drainage courses within the proposed development area shall be lined to avoid erosion;
- Steep bed slopes will be avoided; and
- It will be ensured that storm water drains and road drainage system are periodically cleared to maintain water flow.

8.4. Impacts on Ambient Air Quality and Noise Level

This section discusses the impact of the construction and operation on the ambient air quality and noise levels in the proposed Project Area. It also describes the mitigation measures to manage these impacts.

Environmental monitoring report is given in the study and also placed at Annexure.

8.4.2. Ambient Air Quality

Air quality will be affected by the fugitive dust and emissions from the construction machinery, and vehicular traffic during the construction phase. Emissions may be carried over long distances, depending on wind speed and direction which generally varies with seasons, the temperature of the surrounding air, and atmospheric stability. The critical sources of air pollution during the construction phase are listed below:

- Asphalt plants that generate toxic emissions containing un-burnt carbon particulates;
 - sulphur compounds;
 - dust from aggregate preparation;
 - Earth haulage trucks that generate dust, particularly during loading and unloading processes;
 - Commissioning of Project may affect the air quality in the area due to the increase in traffic volume and frequency.
-
- Most of the industries in each industrial sector will cause air emissions resulting in deterioration of ambient air quality and ultimately effecting human health;
 - In extreme circumstances, NO_x and SO_x will be dry-deposited around the emission sources and when carried away may cause wet deposition in the form of acid rain.

8.4.2. Noise Level

Noise generated by the construction machinery during the project construction and subsequently by vehicular traffic during operation stage is likely to affect the project area particularly the sensitive receptors like schools, hospitals etc. However, no sensitive receptor has been observed within the project area. Industrial units and other commercial activities will create noise and vibrations. The direct effected of this noise pollution will be the workers working in the proposed SEZ.

8.4.3. Mitigation Measures

The following measures will be implemented to mitigate the impacts on the ambient air quality and noise level

8.4.3.1. Ambient Air Quality and Ambient air quality Protection

Ambient Air Quality Ambient air quality will be protected by following practices;

- Good engineering practices will be used at quarry areas to minimize the impact of dust emissions;
- The existing quarries will be used to burrow the aggregate materials

- Asphalt and concrete batching plants will be equipped with dust control equipment such as fabric filters or wet scrubbers to reduce the level of dust emissions;
- Vehicles and other construction machinery shall be properly tuned and maintained so as not to emit any smoke;
- The recommended quality standards applicable to gaseous emissions generated by the construction vehicles, equipment and machinery will be enforced during the construction works;
- Where dust emissions are high, unpaved tracks will be overlain with shingle or surface treated;
- Where necessary, dust emissions will be reduced by a regular sprinkling of water for keeping the dust settled, at least twice a day;
- Haul-trucks carrying, earth, sand, aggregate and other materials will be kept covered with tarpaulin to help contain construction materials being transported within the body of each carrier between the sites;
- Emissions of Sox and NOx (Sulphur Oxides and Nitrogen Oxides) are anticipated to be common air pollutants in case of industrial activities. For PM (particulate matters, tiny particles of solid or liquid) control gravitational settling chambers, cyclones, fabric filters or electrostatic precipitators can be installed;
- Selection of air pollution control devices shall be done carefully keeping in view its removal efficiency and its economic viability;
- Sulphur oxides are the gases of principal concern in furnace exhausts. It has been demonstrated that wet scrubbers provide good control for both sulphur oxides and particulates. Usage of multi-tube cyclones may remove varying amounts of these pollutants. It has been reported that treating the exhaust streams with an alkaline spray converts gaseous sulphur oxides to solids which can then be collected as particulates;
- Control systems for air pollution control will generate solids. These presently have little or no economic value and are not considered to be an attractive source of chemicals. Generally, these solids are best disposed of by recycling to other industrial process or through land filling;
- Control of gaseous emissions arising from fuel sources can be achieved by changing to fuels having a lower content of certain pollutants, such as sulphur;

- Ensure the proper tuning of the construction vehicles;
- GID (developer) will set up a system to monitor the air quality in the project area in accordance with the accepted international standards. The system will cover protocols for sampling and analysis, assessment of air quality at sensitive locations, reporting, and information sharing;
- GID will coordinate all the efforts in this area with the SEPA and local authorities.

8.4.3.2. Noise Levels Mitigation Measures

Following mitigation measures will be adopted to control noise level;

- During operation stage of the Project, proper mitigation measures will be provided to the sensitive sites (like hospitals, schools, training centres, etc) including vegetative barrier, double glazed windows, etc.;
- Noise generated from the industries machinery and other moving parts will be reduced by using protective covers made of noise absorbing material;
- All the noise generating machinery will be placed inside the industrial units building to reduce the noise levels for outside of these units;
- Workers working near the noise generating machines will be strictly required to use ear muffs and other appropriate measures.

8.5. Impacts on Biological Environment

The biological environment mainly includes flora and fauna. Impact on flora and fauna and corresponding mitigation measures are described in the following paragraphs;

8.5.1 Impacts on Flora

Following impacts are expected on flora of the area;

There is no proper tree growth at the project site as the area is barren and having bushes and wild grass. Cutting of these bushes and shrubs will not have any significance impact. Palm Oil Trees and other shady, decorative and medicinal trees to be grown at the project site. Around 41.6 acres of the scheme has been kept for green initiatives which include parks and green corridors.

These trees will be planted alongside the boundary walls and in green corridors to act as buffers along roads. Tree Plantation Plan has already given in Chapter-3.

8.5.2. Impacts on Fauna

Following are the specific classes of fauna which are expected to be affected due to the project implementation.

Mammals and Reptiles: During the construction phase, there will be negative impacts on the mammals and reptiles of the area. Mammals, such as squirrel, jackal etc. will avoid these areas for fear of being hunted. Same will be the case with reptiles; some reptiles might be killed during the digging and dragging operations.

Birds: Birds will try to find shelter and food somewhere else and will tend to move away from the Project site. The fear of being hunted / trapped and commotion created by human activities will fly the birds away.

8.5.3. Mitigation Measures

The following mitigation measures will be adopted to alleviate the adverse impacts;

- A tree plantation program will be incorporated into the detailed design not only to compensate the loss of existing shrubs and bushes but also to enhance the aesthetic view as well as to reduce the air and noise problems;
- Maximum efforts will be made to avoid damage to the existing natural vegetation.
- While making paths for carriage of construction materials to the site care will be taken that minimum land is utilized and minimum area is disturbed;
- Cutting of trees should be avoided by making diversions;
- The camps and workshop facilities will be established on barren land; however, if such type of land is not available, it will be ensured that minimum clearing of the vegetation occurs and minimum damage to trees and undergrowth is ensured;
- The Contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes in the nearby areas;
- Contractor will provide the fuel wood/gas cylinders at the camps for cooking purposes and cutting the trees/bushes for fuel will not be allowed.

The following mitigation measures will be adopted to reduce the impacts of project and protect fauna.

8.5.3.1. Mammals and Reptiles

Mammals and reptiles will be protected by following practices;

- Hunting and harassing of wild animals shall be strictly prohibited;
- Comprehensive written directions will be issued that no harm should be given to fauna;
- Lights used in the camps, during construction activities will be kept to the minimum requirement;
- In the wildlife sensitive areas, upward scattering lights will preferably be used;
- Vehicle speed will be controlled to avoid incidental mortality of small mammals and reptiles;
- Periphery of the camps will be fenced and gated to check the entrance of the wildlife into the construction camps;
- Camp wastes harmful to wildlife shall be properly disposed of or dumped.

8.5.3.2. Birds and Migratory Birds

Although no significant impacts have been envisaged on the birds but even staff working on the project shall be given clear orders, not to shoot snare or trap any birds.

Construction of the project will not have any impact on the migratory birds, because the proposed site is far away from the main sanctuaries or water bodies and game reservoirs.

8.6. Impacts on Socioeconomic and Cultural Environment

This section describes the impact of the proposed Project on local communities, construction workers, indigenous and vulnerable people as well as on structures or sites of cultural and religious significance.

8.6.1. Impacts on Local Communities/Workforce

The area's surrounding communities will be affected during the construction and operation phases as follows:

- During the construction phase the general mobility of the local residents and their livestock in and around the project area is likely to be hindered;
- Unmonitored construction activities may create an accident risk for the local residents particularly their children at quarry areas;
- Usage of Community's common resources like potable water, fuel wood etc. by Contractor workforce may create conflicts between the community and the Contractor;
- Community will have to face the noise and dust problems during the construction phase and air and noise emissions during operation stage;
- Induction of outside workers in the Contractor labour may cause cultural issues with the local community.

8.6.2. Generation of Income

Local people will find business activities due to implementation of the Project particularly persons settled in the vicinity of project area. Approximately hundreds of thousands jobs will be generated by the implementation of project which subsequently enhance the living standards of community.

8.6.3. Gender Issues

As the project area lies close to the rural areas and rural community, women activities in the field may become affected due to the construction activities. The rural women normally use the open field latrines and their privacy may suffer due to the project activities.

The induction of outside labour may create social and gender issues due to the unawareness by them of local customs and norms. It will also cause hindrance to the mobility of local women.

8.6.4. Indigenous, Vulnerable and Women Headed Households

- During the social field survey of the project, no indigenous group of people was identified. So, no impact on the indigenous people is envisaged due to the implementation of the project;
- Income of vulnerable people: project will not affect the vulnerable people;
- No women headed household was identified during the social survey of the Project.

8.6.5. Mitigation Measures

- The Project will plan to prioritize the recruitment of people living, or originating from, the project affected communities during Project construction and operation. Irrespective of origin, and with prejudice or discrimination, the Project will accommodate all construction and operation workers within a camp inside the Project location;
- Coordinated recruitment efforts related to non-skilled labor with non-skilled labor positions shall be created;
- Local recruitment commitment will be clearly defined and extended to the employees of contractors and to the construction phase of the Project and the geographic scope of local recruitment will be based on prioritization by proximity to the Project;
- The commitments will be articulated as a clearly defined policy supported by procedures and quantified targets. To specifically help reduce significant potential social and demographic impacts for more vulnerable or marginalized sectors of the host communities, the Project employment opportunities for women and senior citizens will be promoted wherever feasible and culturally appropriate;
- The vulnerable people of the communities located in the vicinity will be given priority in provision of jobs, donations and scholarships;
- Through CSR activities, special focus on the vulnerable people and their socioeconomic status will be regularly monitored;
- A grievance redress mechanism will be especially designed for the vulnerable people of the community;
- Their complaints will be addressed on priority basis and a liaison officer will be designated to accommodate them and address their grievances;
- Feedback consultations will be held with the vulnerable people to record the efficiency and effectiveness with which their complaints are addressed;
- Their views and feedback will be registered and if required, improvements in the grievance redress mechanism will be made;
- The Project labor will be sensitized on local cultural and social values as part of the induction program who originates from other parts of the country or from abroad.

8.7. Safety Hazards

Occurrence of accidents/incidents during the construction and operation stages may occur to the workers. During the operation stage, people believe that they will be prone to danger due to the current flows from towers, breaking of conductors, etc. by the transmission lines.

Maximum efforts and technical and financial resources will be utilized to have a hazard free environment for the workers, staff and managerial personnel. Training and briefing will also be provided to deal with emergency situations.

8.8. Conclusion

The business concept of the Jinnah SEZ is based on green and sustainable development. The sustainable development can only be achieved if the industrial activities are environmental friendly and have consideration for all stakeholders from humans, to resources to environments to flora and fauna thus to create a balance between industrial advancement to preservation of nature.

The Developer of the Zone has deep commitment to establish an industrial zone which should contribute towards socio-economic development and environment protection.

CHAPTER: 9

ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

9.1. Introduction

This chapter provides the Environmental Management and Monitoring Plan (EMMP) for the proposed Project (Jinnah SEZ, Thatta). EMMP has been prepared for the construction and operation / maintenance phases of the proposed Project.

9.2. Purpose and Objective of EMMP

The purpose of EMMP is to provide a framework for the implementation of the mitigation and monitoring measures which were identified in Chapter 8. Based on this, the key objectives of EMMP are to:

- Facilitate the implementation of the identified mitigation and monitoring measures from the assessment;
- Define the responsibilities of the project proponent and contractor, and provide a means of effective communication of environmental issues between them;
- Identify parameters in order to ensure the effectiveness of the mitigation and monitoring measures;
- Provide a mechanism for taking timely action in the face of unanticipated environmental situations; and identify training requirements at various levels.

This EMMP has been prepared on the basis of the details currently available about the construction and operation / maintenance of the proposed Project. However, this EMMP should be considered a live document which may need to be amended in order to incorporate changes in the design of the proposed Project along the line. However, it should be noted that no mitigation measures which have been committed to in this EMMP can be changed unless approved by the relevant regulatory authority.

9.3. Management Approach and Responsibilities

The organizational roles of the key players are:

Developer (GID): Developer will undertake overall responsibility for compliance with EMMP and will carry out regular monitoring to ensure that the contractors and other duty staff are effectively implementing their environmental and social requirements.

Construction Contractor/s: The contractor/s will implement the most of environmental and social mitigation and monitoring measures as required as per the contract with GID. The construction contractor/s is subject to certain liabilities under the environmental laws of the country, and under their contracts with the project developer. The separate responsibilities of the developer/GID and the construction contractor are:

▪ **Primary Responsibilities:**

- GID's Project Management Team will be responsible for overall EMMP compliance on behalf of GID;
- GID will coordinate with the concerned government departments; and
- Respective high-ranking officers of GID and the construction contractor will assume the primary responsibilities for environmental performance of the proposed Project.

▪ **Project Management and Quality Control:**

GID's representatives will be responsible for the overall environmental soundness of all field operations; and,

The construction contractor's Site Managers will be responsible for carrying out the construction activities in an environmentally sound manner. Specific roles and responsibilities for monitoring are provided in following Table;

Aspect	Project Developer (GID)	EPC Contractor	Relevant Documentation
Contracting	Ensuring that monitoring and mitigation requirements are included in the contract between CID and the construction contractors	Understanding the requirements and estimating the required resources	Contract between GIDC and the construction contractor/s.
Monitoring Plan	Confirming finalization of	Prepare a Construction	Finalized Monitoring Plan and Construction

	Monitoring Plan before commencement of project construction.	Management Plan.	Management Plan.
Resources	Ensuring availability of required resources for environmental monitoring.	Ensuring availability of required resources for environmental management and monitoring.	Project Budget
Environmental Staff	Nominating and designating a qualified person in the field (an Environmental Manager) along with a Team for the proposed project.	Nominating an Environmental Manager for the proposed Project (may be combined with Health and Safety)	Job description and KPIs
Monitoring Surveys, oversight and Inspections	Carrying out regular inspections of contractor's environmental performance and carrying out further measurements when necessary.	Conducting regular inspections and collecting data on environmental performance, and carry out surveys.	Inspection and survey reports.
Environmental Audit	Conducting periodic audits of the construction site.	Conducting periodic internal audits.	Audit reports
Reporting	Ensuring that periodic environmental monitoring reports are received from the construction contractor/s. Reviewing those reports.	Generating environmental monitoring reports periodically and circulating those among the developer's management and appropriate staff members.	Environmental monitoring reports.
Corrective Actions	Confirming/ verifying that activities carried out comply with EIA/EMMP and identifying corrective actions if necessary	Carrying out corrective actions as required	Corrective actions reports and record.
Maintenance of Records	Maintaining the monitoring data and	Maintaining monitoring data and	Environmental databases.

	recording all incidents of environmental significance and related corrective measures.	recording all incidents of environmental significance and related corrective measures	
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Table-31-a: Roles and Responsibilities for Environmental

Monitoring **9.4. Mitigation Plan**

The Mitigation Plan is a key component of EMMP. The Mitigation Plan lists all of the mitigation measures identified in EIA. Based on EIA for the proposed Project, the mitigation measures for the construction phase are provided in **Table-32**, and for the operational / maintenance phase in **Table-33**.

9.5. Waste Management

The construction contractor/s under the vigilance of Developer will be responsible for preparing a comprehensive waste management plan. A summary is provided in the following Table;

Sr.#	Material Waste	Final Disposal Method	Associated Risks	Recommended Procedure
1	Iron	▪ Material returned to store as un-useable ▪ Scrap Store ▪ Recycling	Equipment and parts may be contaminated with oil or other liquids. This may pose hazards during recycling and/or melting.	Separate contaminated parts and ensure disposal contractor cleans and removes contaminations before recycling equipment
2	Copper	▪ Recycling ▪ Scrap Store	Copper wires and tubes may be covered with insulation and may pose hazard if melted.	Separate insulated copper from rest and ensure disposal contractor removes it before recycling
3	Wood, Cotton, Plastic, Waste and Packing Materials	▪ Recycling ▪ Landfill	Burning of wood, paper, plastic and other materials may cause air pollution Littering due to improper disposal	Ensure waste contractor disposes all non–recyclable plastic wastes and other non–recyclable materials at land disposal.
4	Electronics	▪ Material returned	Some electronic	Ensure contractor

		to store as un-useable	equipment may contain toxic materials and pose a health risk if opened or dismantled.	disposes equipment properly and equipment is opened only under guidance of qualified professional.
5	Insulation	▪ Material Re-used Landfill	Burning may cause air pollution. Littering due to improper disposal	Ensure contractor disposes insulation properly at landfill site
6	Oil	▪ Recycling Contractors	May cause contamination of soil or waterways	Ensure properly certified recycling contractors are used.
7	Concrete	▪ Landfill or reuse for filling	Non	Ensure safe storage till disposal

Table-34: Waste Management Plan and guide lines

9.6. Monitoring Plan

Environmental monitoring is a vital component of an EMMP. It is the mechanism through which the effectiveness of EMMP is evaluated. Furthermore, the feedback provided by environmental monitoring is instrumental in identifying any problems and then planning corrective actions to improve the Plan.

9.6.1. Objectives of Monitoring

The main objectives of environmental monitoring during the construction phase of the proposed Project will be to

- provide a mechanism to determine whether the project construction contractor/s and the developer are carrying out the project in conformity with EIA and EMMP;
- identify areas where the impacts of the proposed project are exceeding the criteria of significance and, therefore, require corrective actions;
- document the actual impacts if the proposed project on physical, biological, and socio-economic / cultural receptors, quantitatively where possible, in order to design better and more effective mitigation measures; and
- provide data for preparing the monitoring report to be submitted to the SEPA in accordance with the provincial and national legal requirements.

9.6.2. Performance Indicators

Environmental parameters that may be qualitatively and quantitatively measured and compared are selected as ‘performance indicators’ and recommended for monitoring. These performance indicators will be monitored to ensure compliance with the provincial, national or any other applicable standards and comparison with the baseline conditions established.

9.6.3. Environmental Monitoring Plan

The detailed environmental monitoring plan will be finalized prior to commencement of construction and operation. The requirements identified in this for EIA of construction Phase are given in **Table-35** and for Operation Phase are given in the **Table-36**.

9.7. Environmental Records

The following environmental records will be maintained:

- Periodic inspection reports of Contractor’s Environmental Officer;
- Incident record of all moderate and major spills and the record will include:
 - Location of spill;
 - Estimated quantity;
 - Spilled material;
 - Restoration measures;
 - Photographs;
 - Description of any damage to vegetation, water resource;
 - Corrective measures taken, if any; and
 - Corrective measures taken, if any.
- Waste Tracking Register that will records of all waste generated during the construction and operational period. This will include quantities of waste disposed, recycled, or reused;
- Survey reports, in particular, the following:
 - Soil erosion: Baseline survey, including photographs (or video), will be conducted to document pre-construction condition of the construction site;
 - Vehicle and equipment noise; and
 - Ambient noise survey reports.

9.8. Communication and Documentation

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

9.8.1. Meetings

Two kinds of environmental meetings will take place during the development of the proposed Project:

- Kick-off meetings; and,
- Monthly meetings.

The purpose of the kick-off meetings will be to present EMMP to project staff and discuss its implementation. Following the kick-off meetings, monthly meetings will be held during construction phase at the proposed Project site. The purpose of the monthly meetings will be to discuss the environmental issues and their management. The proceedings of the meeting, the required action, and responsibilities will be recorded in the form of a brief report.

9.8.2. Reports

Environmental reports will be prepared on a quarterly basis during construction and operation / maintenance. The report will be provided to the project Developer (GID).

9.8.3. Change-Record Register

A change-record register will be maintained at the site, in order to document any changes in EMMP and the procedures related to changes in the project design, construction plan or external environmental changes affecting EMMP. These changes will be handled through the change management mechanism.

9.9. Change Management

This EIA has been undertaken on the basis of the project description available. However, it is possible that changes in design of the proposed project may be required at the time of project implementation. This section describes the mechanisms that will be put into place to manage changes that might affect the environmental and social impacts.

Potential changes in design have been categorized as first-order, second-order and third-order changes.

9.9.1. First-Order Change

A first-order change is the one that leads to a significant departure from the description of the proposed Project used for EIA and consequently requires a reassessment of the environmental and social impacts associated with the change. In such an instance, the environmental and social impacts of the proposed change will be reassessed, and the results will be sent to SEPA for approval.

9.9.2. Second-Order Change

A second-order change is the one that entails activities but not significant departure from those described in EIA but may result in impacts whose overall magnitude would be similar to those reported in EIA. In case of such changes, the environmental impact of the activity will be reassessed, additional mitigation measures specified if necessary, and the changes will be reported to SEPA.

9.9.3. Third-Order Change

A third-order change is the one that is of little consequence to the findings of EIA. This type of change does not result in impact levels exceeding those already discussed. Rather these may be made onsite to minimize the impact of an activity. The only action required in this case will be to record the change in the change record register.

9.9.4. Changes to EMMP

Changes in design may necessitate changes in EMMP. In this case, the following actions will be taken:

- A meeting will be held between the project Developer and the contractor's representatives, to discuss and agree upon the proposed addition to EMMP;
- Based on the discussion during the meeting, a change report will be produced collectively, which will include the additional EMMP clause and the reasons for its addition;

- A copy of the report will be sent to the head offices of the Developer and the contractor; and
- All relevant project personnel will be informed of EMMP addition.

9.9.5. Environmental Training

Environmental training will help to ensure that the requirements of EIA and EMMP are clearly understood and followed by all project personnel in the course of the project. The contractor will be primarily responsible for providing training to all project personnel.

An environmental and social training program is provided in **Table-37**. This training program will be finalized before the commencement of the proposed Project.

9.10. Construction Management Plan

The construction contractor will develop a specific construction management plan (CMP) based on the CMP as indicated in the **Table-38**, and execution time lines are given in **Table-39**.

CMP will be submitted to Developer (GID) for approval, and will clearly identify all areas that will be utilized during construction for various purposes, including:

- Areas used for camp;
- Storage areas for raw material and equipment;
- Waste yard;
- Location of any potentially hazardous material such as oil;
- Parking area; and
- Loading or unloading of Material.

9.11. Grievance Redress Mechanism

Timely and effective redress of stakeholder grievances contribute to bringing sustainability in the operations of a project. In particular, it will help advocate the process of forming and strengthening relationships between project management and the stakeholder community groups and bridge gaps for consensus building and to create common understanding, thus providing the project management the ‘social license’ and ‘social approval’ to operate in the area.

The Grievance Redress Mechanism (GRM) proposed for the Project will help achieve the objectives of sustainability and cooperation by dealing with the environmental and social issues of the Project. GRM will also be designed to cater for the issues of the people that can be affected by the Project.

9.11.1. Framework for Grievance Redress Mechanism

Under the Guidelines for Public Consultation, 1997, the proponents are required to consult stakeholders during the implementation phase of the project. In this regards, the representatives of local community will participate in the monitoring process to promote a stable relationship between the project management and the community.

9.11.2. Outline of Mechanism for Grievance Redress

The Developer will also have an effective mechanism to ensure timely and effective handling of grievances related to the project. It may include:

- A Public Complaints Unit (PCU), which will be responsible to receive, log, and resolve complaints;
- A Grievance Redress Committee (GRC), responsible to oversee the functioning of the PCU as well as the final non-judicial authority on resolving grievances that cannot be resolved by PCU; and,
- Grievance Focal Points (GFPs) consisting of educated people that can be easily approached by the community members for their grievances against Developer. GFPs will be provided training by the Developer in facilitating grievance redress.

Table-32: MITIGATION PLAN FOR DESIGN & CONSTRUCTION PHASE

Sr.#	Environmental or Social Aspects	Measure	Responsibility
1.	Design Stage Environmental Aspects	▪ Choice of appropriate land i.e. not major agriculture land ▪ Choice of environmental friendly technologies ▪ Provision of combined effluent treatment plant ▪ Provision of treatment facilities like recovery and recycling units etc. ▪ Proper sewerage and solid waste management system provision ▪ Adequate roads, sewerage, drainage, electricity etc. in the design ▪ Proper raising of road level to mitigate flood disaster	Design Consultant
2.	Construction Noise Control Plan	Periodic noise level surveys will be conducted for construction equipment's, operational machinery and vehicles.	Construction Contractor
		All high noise generating activities will be planned during the day time	Construction Contractor
		Use of horns will be banned and construction traffic will be kept to a minimum during night time	Construction Contractor
3.	Ambient Air Control Plan	Dust Frequency of sprinkling will be kept such that the dust remains under control.	Construction Contractor
		Water will be sprinkled on all open surfaces to control emission of dust	Construction Contractor
		Dust emission from aggregate storage stockpiles and soil piles will be reduced by	Construction Contractor
		Keeping the material moist by sprinkling of water at appropriate frequency or erecting windshield walls around the piles or covering the pile to reduce dust emission.	Construction Contractor
4.	Soil Contamination	Maintenance of construction vehicles at site and equipment will be avoided to maximum extent.	Construction

			Contractor
		Spill prevention trays will be provided and used at re-fuelling locations.	Construction Contractor
		Vehicles will be washed in external commercial services.	Construction Contractor
		Systematic inspections will be carried out to notice leakages in construction vehicles and equipment.	Construction Contractor
		If maintenance at site is unavoidable, tarpaulin or other impermeable material will be laid on the ground to prevent contamination of soil.	Construction Contractor
		Lubricants, fuels and chemicals will be stored in covered bounded areas, underlain with impervious lining.	Construction Contractor
		Emergency arrangements such as shovels, plastic bags and absorbent materials, will be provided near fuel and oil storage areas.	Construction Contractor
		If soil gets contaminated, will be removed from the site and taken to the incineration.	Construction Contractor
		Emergency plan for spill management will be prepared and inducted to the staff for any incident of spill.	Construction Contractor
5.	Vehicle and Equipment Exhaust Control Plan	Generators, Vehicles, and other equipment used in construction will be maintained and tuned in good condition to minimize emission of pollutants.	Construction Contractor
		Generators stack height will be at least 3 m above the ground	Construction Contractor
		The area that is disturbed during construction will be kept to a minimum extent.	Construction Contractor
		Construction site will be appropriately marked	Construction Contractor
		The machinery movement will be restricted only to the construction area	Construction Contractor

6.	Soil Erosion	Measures for soil erosion control (e.g. silt fences, rip rap) will be carried out where necessary during construction	Construction Contractor
		The construction sites will be restored as close as possible to their natural (pre-project) conditions after completion of construction activities. For this purpose, a Site Restoration Plan will be prepared that may include the following: a. Removal of remains, extra construction material, equipment parts cable, or timber; b. Disposal of extra soil; c. Filling of all trenches and pits; d. Repair to damaged or blocked drainage; e. Soil erosion control measures where necessary.	Construction Contractor
7.	Water Management	Potable Water Supply: a. The provision of drinkable water and safe drinking utensils at various points on the site.	Construction Contractor
		Water Conservation: b. To create awareness and boost the construction workforce to use water carefully and there is no water wastage. c. Negotiate the use of water for any purpose with the appropriate authorities and obtain written approval. d. The contractor will not collect/make use of water from any other source than those designated to them as suitable for use	Construction Contractor
8.	Waste Water Management	e. The Contractor will submit a site design of waste water management system as part of the environmental management plan for prior approval	Construction Contractor
		f. Water discharged from the works including effluent from sewage treatment, wash water and storm-water workshops and re-fuelling areas, as well as all runoff from areas with pollution potential will comply with	Construction Contractor

		Provincial effluent standards	
		g. Plan the layout of batching areas, wash areas, and workshops with the following rules in mind: h. Improve the layout to lessen disturbance to the environment and to neighbours. i. Concrete slabs need slope towards a conservancy tank so that run-off water can be collected. These tanks must be emptied, at least once in a week or when they are 60% full.	Construction Contractor
9.	Solid Waste Management	Construction wastes on site must be reused or recycled when possible. The Contractor must familiarize themselves with the definitions of waste and the handling, storage and transport as suggested in the applicable environmental legislation.	Construction Contractor
		On site Integrated waste management will be carried out by applying, in preference order of waste avoidance, reuse, recycling and disposal.	Construction Contractor
		Burning of waste material will not be allowed except under special conditions and with earlier approval of the Site Manager.	Construction Contractor
		The appropriate facilities must be provided and maintained for waste collection (e.g. bins) at specific locations around the site camp such as the office, garage, parking, housing facilities and locations where food is consumed.	Construction Contractor
		At source waste will be sorted (<i>i.e.</i> the separation of tins, glass, paper etc). Recycled waste of this type will be collected by a local contractor.	Construction Contractor
		Waste bins will be supplied throughout the site at locations where construction working is going on. These must be provided with lids and an external closing mechanism to prevent contents from blowing out, and must be scavenger proof to prevent animals attracted to waste.	Construction Contractor

		Bins must be emptied and the waste removed to the construction camp where it must be contained in scavenger, water and windproof containers until disposed	
10.	Storage and Handling of Hazardous Substances	Any spills will be rendered harmless and arrangements made for appropriate collection and disposal including cleaning materials, absorbents and contaminated soils.	Construction Contractor
		To ensure that spill kits are available on site to clean the leaks and spills.	Construction Contractor
		To obtain storage and disposal permits / approvals necessary and comply with the conditions attached.	Construction Contractor
		To ensure that only nominated areas are used for the handling/storage of construction materials.	Construction Contractor
		The Contractor will be accountable for the training and education of all staff on site who must be handling the material about its proper use, handling and disposal as well as spill response.	Construction Contractor
		A contingency procedure will be developed for dealing of spills	Construction Contractor
		Hazardous chemicals used in construction must be kept in secondary containers. The relevant Material Safety Data Sheets (MSDS) must be provided on site.	Construction Contractor
		Appropriate and approved facilities for the storage and recycling of used oil and contaminated hydrocarbons must be provided.	Construction Contractor

		Maintain a register to record all activities that includes the handling of potentially hazardous substances, as well as develop and supervise the implementation of protocols for the handling of these substances. This will include all fuels, oils, lubricants and greases.	Construction Contractor
11.	Interference in Aviation Traffic	The NOC terms and conditions of Civil Aviation Authority (CAA) and the Airport Management and relevant legislations must be firmly adhered with.	Construction Contractor
		Fire-fighting system and emergency response plan must be effectively implemented to avoid an outbreak of fire which could lead to generation of excessive smoke	Construction Contractor
12.	Occupational Health & Safety (OHS) Management	A Health and Safety Management Plan will be established in respect of construction worker safety. This plan must be in line with Proponent's HSE Policy and relevant	Construction Contractor
		A health and safety officer/HSE Officer must be hired to monitor project activities for any potential issues and problems.	Construction Contractor
		Contractors must follow the guidelines of the relevant health and safety legislation and standards. The contractor must aware himself -and his workers with the contents of the HSE legislations and standards.	Construction Contractor
		The Contractor must implement appropriate and compulsory safety precautions. Such safety measures and work procedures/instructions must be transferred to construction workers.	Construction Contractor

		The use of personal protective equipment's (PPE) on site is compulsory for all personnel and construction team members. Minimum requirements must include the use of an appropriate safety helmet and safety shoes. Ensure that all laborers are supplied with the appropriate personal protective equipment's.	Construction Contractor
		Existing fences must be maintained throughout the construction period. All temporary fencing must be removed on completion of the contract.	Construction Contractor
		Speed limits must be imposed in all areas, including public roads and private property to avoid, dispersion of dust and possible accidents.	Construction Contractor
		Leakages of chemicals or fluids must be cleaned up instantly using the suitable procedures.	Construction Contractor

TABLE: 33 MITIGATION PLAN FOR OPERATION PHASE

Sr. No	Environmental or Social Aspects	Measures	Responsibility
1.	Air Pollution Management	The Jinnah SEZ must be designed so as to ambient air quality will fall within the levels acceptable for regulatory bodies (<i>i.e.</i> within PEQS and where PEQS are not provided NEQS, international standards must be complied with).	Proponent
		The Jinnah SEZ must be provided with the appropriate NOx control equipment to minimize the production of NOx.	Proponent
		Dust control mechanisms must be utilized including the following: Electrostatic Precipitators will be installed in the units where necessary for the control of Dust.	Proponent's Environment Manager
		For SOx control Flue Gas Desulfurization (FGD) System will be installed in the units.	
		All operational air pollution control equipment must be maintained according to industry standards. This will ensure that emissions, odour and dust continue to fall within standards.	Proponent's Environment Manager
2.	Ground Water Management	Inspection of Ground water quality must be carried out periodically to check any adverse effect on ground water quality.	Proponent's Environment Manager
		All chemical usage areas and zone areas must be cemented.	Proponent's Environment Manager
		Contaminated water must be collected to a settling tank. Oily water	Proponent's Environment Manager

		must be removed from site through licensed contractor.	
		Any run-off that is discharged from the site must be cleaned.	Proponent's Environment Manager
3.	Waste Management	Water The Combined Effluent Treatment Plant (CETP) must be installed for wastewater treatment.	Proponent's Environment Manager
		Water discharged from the works including wash water, effluents from sewage treatment and storm-water from workshops and refueling areas, and areas of run-off with potential of pollution will comply with Punjab Environmental Quality Standards.	Proponent's Environment Manager
		On regular basis chemical analysis of crops cultivated on treated wastewater will be done once in every crop season to ensure there will be no contamination of food from treated wastewater	Proponent's Environment Manager
4.	Operational Control	Noise In order to control the overall noise level to Permissible limits, final design of the zone will ensure the level of noise from the operation must be within the level suggested by the manufacturers.	Proponent's Environment Manager
		Noise from activities at the zone site during the operation must be within acceptable limits (according to the standards discussed previously), taking into consideration that maintenance activities may be required at the outside of working hours, for example, in the case	Proponent's Environment Manager

		of emergencies.	
		Periodic monitoring of noise level will be ensured inside and outside at a distance of 25 meter around the boundary wall.	Proponent's Environment Manager
		All relevant noise mitigation measures requisite to be taken in accordance with the relevant standards must be executed to minimize the noise impacts linked with the development	Proponent's Environment Manager
5.	Fauna and Flora	Implementation of Site restoration plan and area ecology up-gradation plan.	Proponent's Environment Manager
		Use of indigenous plants in the premises and provision of green belt inside the project site. Fragrance producing trees plantation to evade odor issue (if any).	Proponent's Environment Manager
		The worker may not harm/kill any wildlife during the operation and maintenance activities.	Proponent's Environment Manager
6.	Solid Waste Management	Solid wastes generated must be reused or recycled upto maximum extent.	Proponent's Environment Manager
		Integrated waste management will be done by applying in preference order of, waste avoidance, reuse, recycling and disposal.	Proponent's Environment Manager
		The appropriate facilities must be provided and maintained for waste collection (e.g. Bins, containers) at specified areas within the zone.	Proponent's Environment Manager
		Sorting of waste will be carried out at source (i.e. the separation of	Proponent's

		glass, tins, paper etc.). Recycled waste of this sort will be collected by a local licensed contractor.	Environment Manager
		Every industry in the zone would be the accountable for the supply of waste bins/skips throughout the site at areas where construction staff are working. These waste bins must be provided with lids and an external closing system to prevent fillings from blowing out, and must be scavenger proof to prevent animals appealed to waste.	Proponent's Environment Manager
		Waste bins must be emptied on a periodic basis and the waste removed to the construction camp where it must be contained in water, scavenger and wind proof containers until it is disposed.	
		Open dumping of solid waste would not be allowed as it fascinates scavengers and finally result in problems for flight operations of nearby airport.	Proponent's Environment Manager
		Segregated waste would be disposed of as per its disposal requirement, either recycled or reused, either incinerated or land filled.	Proponent's Environment Manager
7.	Storage and Handling of Hazardous Substances	Availability of spill kits on site will be ensured to clean up spills and leaks.	Proponent's Occupational Health & Safety (OHS) Manager
		Any spills will be rendered harmless and arrangements made for appropriate collection and disposal including cleaning materials, absorbents and contaminated soils.	Proponent's Occupational Health & Safety (OHS) Manager
		The OHS Manager will also be accountable for the necessary training, awareness and education of all staff regarding the safe handling and disposal as well as spill response.	Proponent's Occupational Health & Safety (OHS) Manager
		An emergency procedure for the control of spills must be formulated.	Proponent's (OHS)

			Manager
		Hazardous chemicals must be stored in designated containers made up of appropriate material, clearly marked and labeled with appropriate safety sign. The relevant Material Safety Data Sheets (MSDS) must be provided on site.	Proponent's(OHS) Manager
		Approved and adequate services for the storage and recycling of used oil and contaminated hydrocarbons must be provided. These services must be planned with the purpose of preventing pollution of the nearby area and environment.	Proponent's(OHS) Manager
		Recording of all activities in register that involve the handling of potentially hazardous substances, as well as devise and supervise the implementation of the handling of these substances. This will include all fuels, oils, lubricants and greases. The register will be properly recorded and maintained.	Proponent's(OHS) Manager
8.	Occupational Health & Safety Management	A Health and Safety Management Plan will be established to ensure worker safety.	Proponent's(OHS) Manager
		OHS manager must adhere to the guidelines of the appropriate health and safety legislation and standards.	Proponent's(OHS) Manager
		Communication of suitable and obligatory safety measures relating work procedure/instruction of site to all aspects of the operation to the workers	Proponent's(OHS) Manager
		The use of Personal Protective Equipment (PPEs) on operation of is mandatory for all personnel while entering in the operational areas.	Proponent's(OHS) Manager

		Specific firefighting system must be installed to deal with fire hazard and equipment's must be positioned on sites easily accessible and visible.	Proponent's(OHS) Manager
		Speed limits must be followed in all areas of the zone, including public roads and private property to avoid potential hazard of accident.	Proponent's(OHS) Manager
		Smoking will be limited to only designated smoke corners	
		Emergency contact Numbers and appropriate warning sign boards, clearly indicating emergency exit routes and warning procedures must be demonstrated at appropriate locations in the facility.	Proponent's(OHS) Manager
		Safety training must be carried out on regular basis and each visitor must be trained with necessary instructions before visiting the area. Safety Induction training will be provided to every newly inducted staff.	Proponent's(OHS) Manager
		Proper Safety Signs will be installed at suitable locations in local language describing the potential hazard for understanding of workers.	Proponent's(OHS) Manager
9.	Disaster & Emergency Response Management	Disaster management plan will be developed after the complete risk assessment of the Zone processes, operations and storage facilities.	Proponent's(OHS) Manager
		Emergency response plan and procedures will be developed such as: Alarm procedures/Emergency notification including names and contact numbers of internal and external emergency	Proponent's(OHS) Manager

		service officials, Evacuation routes, Emergency exit, maps, route signs etc. Directions to showers, eye wash, fire extinguishers, wash stationsetc.	
		Emergency squad will be trained to deal with the emergency situations	Proponent's(OHS) Manager
		Regular training and drills will be carried out to check the efficiency and effectiveness of the emergency response plan and the training of emergency squad.	Proponent's(OHS) Manager

Table-35: Monitoring Plan for Construction Phase

Project Activity and Potential	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Disturbance due to noise from construction activity	To determine the effectiveness of noise abatement measures on sound pressure levels	Ambient noise level near receptors	A-weighted noise levels —24 hours, readings taken at 15 s intervals over 15min. every hour, and then averaged	At three locations on the Jinnah SEZ boundary and three locations at the receptor level.	Baseline before start of construction: On three typical working days and one weekend During construction: Once every four weeks on a typical working day	Contractor's Environment officer
	To determine the effectiveness of noise control measures on the sound pressure level of the noise sources	Source noise level of generators, major equipment and large vehicles	A-weighted noise levels measured at 7.5 m from the source in four directions. Measurement should be taken at full throttle, typical operating and idling conditions	7.5 m from the source in four direction	Once in a month	Contractor's Environment officer
Air Quality: Dust emissions from construction equipment's	To determine the effectiveness of dust control program on dust at receptor level	PM10 (particulate matter smaller than 10 microns) concentration at receptor level	1-hr and 24-hr concentration levels	At three representative locations	Baseline before start of construction: On three typical working days During construction: Once every four weeks on a typical working day	Contractor's Environment officer.

Project Activity and Potential	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
working on construction sites		Visible dust	Visual observation of size of dust clouds, their dispersion and the direction of dispersion	construction sites	Once daily during peak construction period	Contractor's Environment officer
Air Quality: Exhaust emissions from generators and construction	To determine the effectiveness of gaseous emission control measures on source emission	Gaseous emission rates from generators and other key equipment	CO, NOX, SO2 and PM. Measurement should be taken at full throttle, typical operating and conditions as per PEQS.	Exhaust	Baseline when the equipment is inducted in Pool and once three months subsequently	Contractor's Environment officer
Ground Water Contamination due to leakages of oil and chemicals	To determine the effectiveness of spill and leakage control measures	Inspection of ground water quality during and after the construction	Chemical and Biological analysis of all parameters given in PEQS	Tube-wells at construction site	On monthly basis	Contractor's Environment officer
Waste water due to construction activities	To determine the effectiveness of CETP	Inspection of wastewater quality during the construction	Chemical analysis of all parameters given in PEQS.	Wastewater collection and discharge points at construction site	Monthly Basis	Contractor's Environment officer
Project Activity and Potential	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Soil Contamination due to leakages of oil and chemicals on ground	To determine the effectiveness of control measures taken to minimize the risk of spillages of oil and chemicals	Procedures in place to handle liquids and availability of procedures and equipment's for emergency response incidents	Chemical Analysis and Visual inspections.	Fuel, Chemical and Waster Storage Sites	Monthly Inspections	Contractor's Environment officer
Waste Disposal Insufficient	To check the availability of waste	Inspection of waste generation,	Visual inspections	Waste Collection & Segregation	Once daily	Contractor's Environment officer

procedures for waste collection , storage, transportation and disposal	management system and its implementation	collection, segregation, storage, recycling and disposal will be undertaken at each site of the project activity		sites at construction		
Project Activity and Potential	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Noise Disturbance due to noise from operation	To determine the effectiveness of noise abatement measures on sound pressure levels	Ambient noise level near receptors	A-weighted noise levels-24 hours, readings taken at 15s intervals over 15 min. every hour, and then averaged as per PEQS	Complete Noise level Survey	On bi-annually basis	Environment Manager
	To determine the effectiveness of noise control measures on the sound pressure level of the noise sources	Source noise level of New FSD-IE operation activities	A-weighted noise levels measures at the source in four directions. Measurement should be taken at full throttle, typical operating and idling condition-as per PEQS	From the source in four direction	Quarterly Basis (after every 3 month)	Environment Manager
Air quality: emissions from the industrial processes boilers, generators	To determine the effectiveness of gaseous emission control measures on source emission	Gaseous emission rates, and pollutant concentration from generators and other key equipment	CO, Nox, So2 and PM. Measurement should be taken at full throttle, typical operating and idling conditions as per PEQS.	Boilers , Generators	Quarterly Basis (after every 3 month)	Environment Manager
Ground Water Contamination due to leakages of oil and chemicals on ground	To determine The effectiveness of spill and leakage control measures	Inspection of ground water quality	Chemical and Biological analysis of all parameters as per PEQS.	Tube-wells at site, and in the vicinity of the project area owned by local community.	Monthly basis	Environment Manager
Project Activity and Potential	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Wastewater due activities of construction	To determine the effectiveness of CETP	Inspection of wastewater quality being discharged	Chemical analysis of all priority parameters of the PEQS	Waste-water discharge points	Quarterly Basis (after every 3 months)	Environment Manager
Soil Contamination	To determine the effectiveness of control	Procedures in place to handle liquids and	Chemical Analysis and Visual inspections	Fuel, Chemical and Waster	Monthly inspections	OHS Manager

due to leakages of oil and chemicals on ground	measures taken to minimize the risk of spillages of oil and chemicals	availability of procedures and equipment's for emergency response incidents		Storage Sites		
Waste Generated:	To check the availability of waste management system and implementation	Inspection of waster generation, collection, segregation, storage, recycling and disposal will be undertaken at each site of the project activity	Visual inspections and quantification of waste components generated	Waste disposal facility I.e landfill site	Weekly	Environmental Manage r
Community	To check that project is not resulting any harm to local or nearby community	Community grievances or complaints, categorized by type.	Grievance Re-adressal Mechanism	Grievance register maintained at project site	Monthly	Environmental Manage r

Table: 36-Monitoring Plan for Operation Phase

Project Activity and potential Impact	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Noise Disturbance due to noise from operation	To determine the effectiveness of noise abatement measures on sound pressure levels	Ambient noise level near receptors	A-weighted noise levels - 24 hours, readings taken at intervals over 15 min. every hour, and then averaged as per PEQS	Complete Noise	-On biannually basis	Environment-Manager
	To determine the effectiveness of noise control measures on the sound pressure level of the noise sources	Source noise level of Jinnah SEZ operation activities	A-weighted noise levels measured at the source in four directions. Measurement should be taken at full throttle, typical operating and idling conditions-as per PEQS	From the source in four direction	Quarterly Basis (after every 3 month)	Environment Manager
Air quality: emissions from the industrial processes boilers, generators	To determine the effectiveness of gaseous emission control measures on source emission	Gaseous emission rates, and pollutant concentration from generators and other key equipment	CO, Nox, So2 and PM. Measurement should be taken at full throttle, typical operating and idling conditions as per PEQS.	Boilers, generators	Quarterly Basis (after every 3 month)	Environment Manager

Ground Water Contamination due to leakages of oil and chemicals on ground	To determine the effectiveness of spill and leakage control measures	Inspection of ground water quality	Chemical and Biological analysis of all parameters As per PEQS	Tube-wells at SEZ site, and in the vicinity of the project area owned by local community	Monthly basis	Environment Manager
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Project Activity and potential Impact	Objective of Monitoring	Parameters to be Monitored	Measurements	Location	Frequency	Responsibility
Wastewater due to activities of construction	To determine the	Inspection of wastewater quality being discharged	Chemical analysis of all priority parameters of the PEQS	Waste-water discharge points	after every 3 month, on quarterly basis	Environmental Manager
Soil Contamination due to leakages of oil and chemicals on ground	To determine the effectiveness of control measure taken to minimize the risk of spillages of oil and chemicals	Procedures in place to handle liquids and availability of procedures and equipment's for emergency response incidents	Chemical Analysis and Visual inspections	Fuel, Chemical and Waste Storage Sites	Monthly inspections	OHS Manager
Waste Generated	To check the availability of waste management system and implementation	Inspection of waste generation collection, segregation storage, recycling and disposal will be undertaken at each site of the project activity	Visual inspections and quantification of Waste components generated	Waste disposal facility i.e. landfill site	Weekly	Environmental Manager
Community	To check that project is not resulting any harm to local or nearby community	Community grievances or complaints, categorized by type.	Grievance Re-dressal Mechanism	Grievance register maintained at project site	Monthly	Environmental Manager

Table-37: Framework for the Environmental and Social Training Program

Type of Training	Training Description	Training BY	Personnel to be Trained	Period	Duration
Occupational Health and Safety	Training should be provided to aware staff to conform to safety codes.	External Sources	OHS Manager	Before starting of project activities	Full day (8 hour session)
Occupational Health and Safety	Health, safety and hygiene Proper usage of personnel protective equipment Precautions to be taken for working in confined areas.	OHS Manager	Workers Staff	Before starting of project activities; During Project Activities	Full day (8 hour session)
Environmental Auditing	Health, Safety and Full Procedures to carry out Health, Safety and Environmental Audits	External Sources	Staff responsible for inspection/	Before starting of project activities	Full day) 8 hoursession)
Waste Disposal and Handling	Segregation, identification of hazardous waste, use of PPEs, waste handling	External Sources	Relevant Workers Relevant Staff	Before starting of project activities	Full day (8 hour session)
Social & Environmental Laws & Regulations, norms, procedures and guidelines of Government	Environmental standards and their compliance Govt. regulations	External sources	OHS staff managers and supervisors	Before starting the project activities	Full day (8 hoursession)
Implementation of environmental management and monitoring plan	Concepts of environmental management and monitoring plan	External Sources	OHS staff Responsible supervisory staff Management	Once in 3 months during the entire construction period	Full day (8 hoursession)

TABLE-38: CONSTRUCTION MANAGEMENT PLAN

Aspect	Objective	Mitigation and Management Measure
Vegetation clearance	Minimize vegetation clearance and felling of trees	▪ Removal of trees should be restricted to the development footprint. ▪ Construction activities shall minimize the loss or disturbance of vegetation ▪ Use clear areas to avoid felling of trees ▪ A procedure shall be prepared to manage vegetation removal, clearance and reuse ▪ Inform the GID/ Developer before clearing trees
Discharge from construction sites	Minimize surface and ground water contamination Reduce contaminant and sediment load discharged into water bodies affecting humans and aquatic life	▪ Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials ▪ Prevent all solid and liquid wastes entering waterways by collecting waste where possible and transport to approved waste disposal site or recycling depot ▪ Ensure that tires of construction vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This should be done in every exit of each construction vehicle to ensure the local roads are kept clean.
Soil Erosion and siltation	Avoid sediment and contaminant loading of surface water bodies and agricultural lands.	▪ Minimize the length of time an area is left disturbed or exposed. ▪ Reduce length of slope of runoff ▪ Construct temporary cut-off drains across excavated area ▪ Setup check dams along catch drains in order to slow flow and capturesediment

		▪ Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. ▪ Increase the watering frequency during periods of high risk (e.g. high winds) ▪ All the work sites (except permanently occupied by the industrial units and supporting facilities) should be reinstated to its initial conditions (relief, topsoil, vegetation)
Excavation, earth works, and construction yards	Proper drainage of rainwater and wastewater to avoid water and soil contamination.	▪ Prepare a program for prevent/avoid standing waters, which Construction Supervision Contractor (CSC) will verify in advance and confirm during implementation ▪ Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there
Ponding of water	Prevent mosquito breeding	▪ Do not allow ponding of water especially near the waste storage areas and construction camps ▪ Discard all the storage containers that are capable of storing of water, after use or store them in inverted position
Storage of hazardous and toxic materials	Prevent spillage of hazardous and toxic materials	▪ Implement waste management plans ▪ Construct appropriate spill containment facilities for all fuel storage areas ▪ Remediate the contaminated land using the most appropriate available method to achieve required commercial/industrial guideline validation results
Land clearing	Preserve fertile top soils enriched with nutrients required for plant growth or agricultural development	▪ Strip the top soil to a depth of 15 cm and store in stock piles of height not exceeding 2m and with a slope of 1/2 ▪ Spread the topsoil to maintain the physio-chemical and biological activity of the soil.

		▪ The stored top soil will be utilized for covering all disturbed area and along the proposed plantation sites ▪ Topsoil stockpiles will be monitored and if any adverse conditions be identified corrective actions will include: ○ Anaerobic conditions: turning the stockpile or creating ventilation holes through the stockpile; ○ Erosion: Temporary protective silt fencing will be erected.
	Avoid change in local topography and disturb the natural rainwater/ flood water drainage	▪ Ensure the topography of the final surface of all raised lands are conducive to enhance natural draining of rainwater / flood water; ▪ Reinstate the natural landscape of the construction sites after completion of works
Construction vehicular traffic	Control vehicle exhaust emissions and combustion of fuels.	▪ Use vehicles with appropriate exhaust systems. ▪ Establish and enforce vehicle speed limits to minimize dust generation ▪ Cover haul vehicles carrying dusty materials (cement, borrow and quarry) moving outside the construction site ▪ Level loads of haul trucks travelling to and from the site to avoid spillage ▪ Use of defined haulage routes and reduce vehicle speed where required. ▪ Regular maintenance of all vehicles ▪ All vehicle exit points from the construction site shall have a wash-down area where mud and earth can be removed from a vehicle before it enters the public road system.
	Minimize nuisance due to noise	▪ Maintain all vehicles in good working order ▪ Make sure all drivers comply with the traffic codes concerning maximum speed limit.
	Avoid impact on existing traffic conditions	▪ Prepare and submit a traffic management plan ▪ Operate transport vehicles, if possible, in non-peak periods to minimize

		traffic disruptions.
	Prevent accidents and spillage of fuels and chemicals	▪ Restrict the transport of oversize loads. ▪ Operate transport vehicles, if possible, in non—peak periods to minimize traffic disruptions. ▪ Design and implement safety measures and an emergency response plan to contain damages from accidental spills. ▪ Designate special routes for hazardous materials transport.
	Prevent impact on air quality from emissions	▪ Use machinery with appropriate exhaust systems. ▪ Regular maintenance of all construction machinery
Construction machinery	Reduce impact of noise and vibration on the surrounding	▪ Appropriately site all noise generating activities to avoid noise pollution to local residents. ▪ Ensure all equipment is in good repair and operated in correct manner. ▪ Install high efficiency mufflers to construction equipment. ▪ Operators of noisy equipment or any other workers in the vicinity of excessively noisy equipment are to be provided with ear protection equipment
	Minimize dust generation	▪ Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. ▪ Increase the watering frequency during periods of high risk (e.g. high winds). ▪ Stored materials such as gravel and sand should be covered and confined
Construction activities	Reduce impact of noise and vibration on the surrounding Avoid driving hazard where construction interferes	▪ Notify adjacent landholders or residents prior to noise events during night hours ▪ Install temporary noise control barriers where appropriate

	with pre-existing	
	Minimizing impact on water quality	▪ Stockpiles of potential water pollutants (i.e. oils, construction materials, fuel, etc.) shall be located so as to minimize the potential of contaminants to enter local watercourses or storm-water drainage. ▪ Storm-water runoff from all fuel and oil storage areas, Workshop, and vehicle parking areas is to be directed into an oil and water separator before being discharged to any watercourse. ▪ An Emergency Spills Contingency Plan shall be prepared.
Site and location of construction camps	Minimize impact from construction footprint	▪ Locate the construction camps at areas which are acceptable from environmental, cultural or social point of view
Construction Camp Facilities	Minimize pressure on local services	▪ Adequate housing for all workers ▪ Safe and reliable water supply. ▪ Hygienic sanitary facilities and sewerage system. ▪ Treatment facilities for sewerage of toilet and domestic wastes ▪ Storm water drainage facilities. ▪ In-house community entertainment facilities.
Disposal of waste	Minimize impacts on the environment	▪ Ensure proper collection and disposal of solid wastes in the approved disposal sites ▪ Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. ▪ Establish waste collection, transportation and disposal systems ▪ Ensure that materials with the potential to cause land and water contamination or odour problems are not disposed of on the site. ▪ Ensure that all on-site wastes are suitably contained and prevented from escaping into neighbouring fields, properties, and waterways, and the waste contained does not contaminate soil, surface or groundwater or create unpleasant odors for

		neighbors and workers.
Fuel supplies for cooking purposes	□Discourage illegal fuel wood consumption	▪ Provide fuel to the construction camps for domestic purpose ▪ Conduct awareness campaigns to educate workers on preserving the biodiversity and wildlife of the project area, and relevant government regulations and punishments on wildlife protection.
Site Restoration	Restoration of the construction camps to original condition	▪ To the extent possible, restore the camp site and all other areas temporarily used for construction to their conditions that existed prior to commencement of construction work.
Construction activities near religious and cultural sites	Avoid disturbance to cultural and religious sites	▪ Stop work immediately and notify the site manager if, during construction, an archaeological or burial site is discovered. ▪ It is an offence to recommence work in the vicinity of the site ▪ Until approval to continue is given by the project management. ▪ Maintain appropriate behavior with all construction workers especially women and elderly people ▪ Resolve cultural issues in consultation with local leaders and supervision consultants.
Best practices	Minimize health and safety risks	▪ Implement suitable safety standards, ▪ Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas, ▪ Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full—face eye shields, and ear protection. ▪ Maintain the PPE under a regular checking and replacement program
Water and sanitation facilities at the construction sites	Improve workers personal hygiene	▪ Provide portable toilets at the construction sites and drinking water

		facilities. ▪ Portable toilets should be cleaned once a day. ▪ All the sewerage should be pumped from the collection tank once a day to a packaged treatment facility for further treatment.
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Table 39: Execution Plan

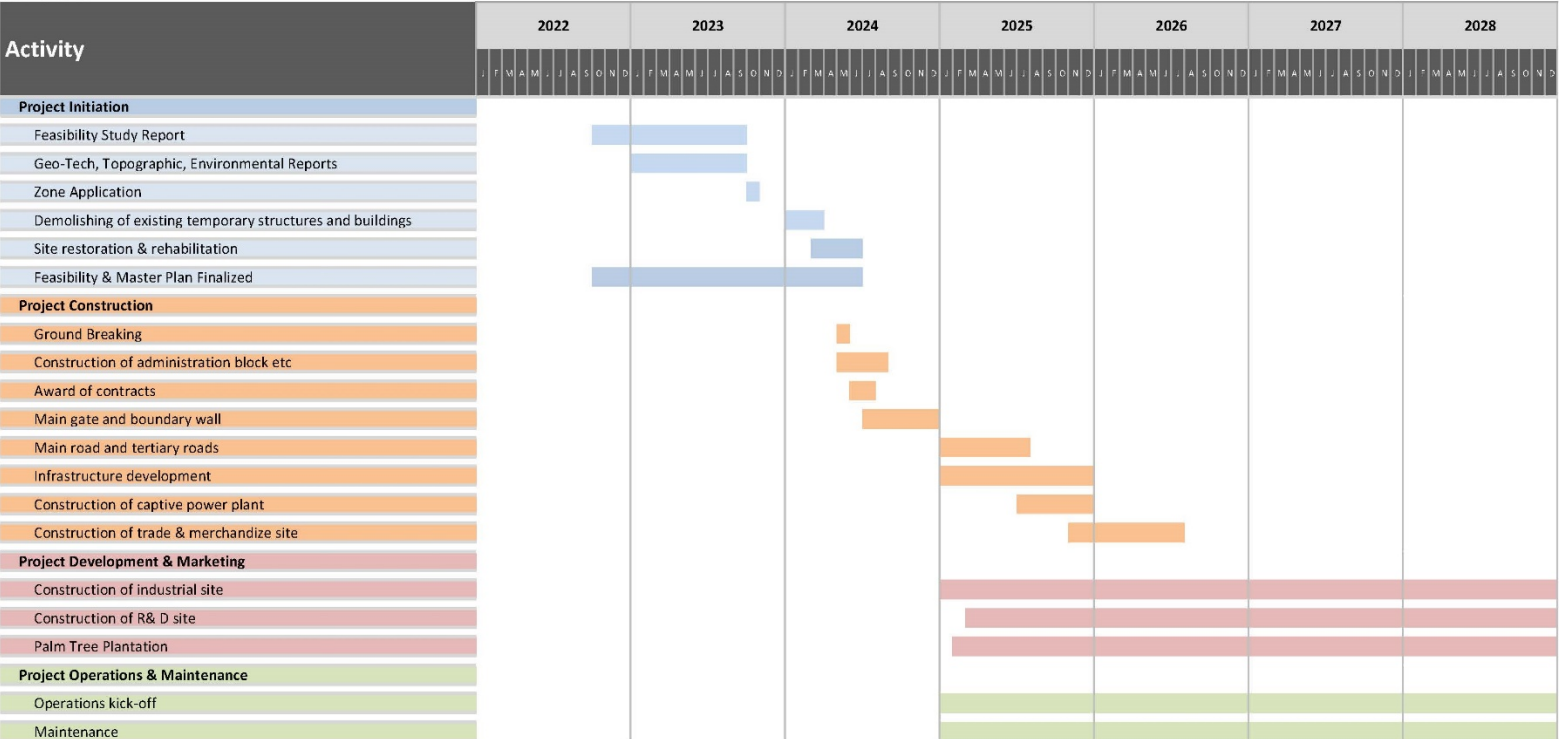
Green Infrastructure Development (Pvt) Ltd (GID)

Project: JINNAH SEZ

Sub: JINNAH SEZ Time Lines

Lead: Dr. Raania Ahsan

Date: 24 Sep 2022



CHAPTER:10

CONCLUSION

10.1. Conclusion

Based on the Master Plan, Preliminary Design, environmental and social field surveys, and impacts assessment of the proposed Project, it may be concluded that although there can be some negative impacts generated by the development/ industrial initiatives but would be of short term during the construction stage.

However, there can a few negative impacts expected during the operational stage but their intensity can be reduced by taking appropriate mitigation measures.

The environmental issues related with the Project Activities are summarized as under:

Physical impacts like soil erosion, soil contamination, water contamination, air pollution, high noise level, etc. are of temporary nature during the construction stages. However, during the operational stage by adopting abatement technologies such as combined effluent treatment plant (activated sludge system), air bags, electrostatic precipitators, development of buffer zones and green areas, use of technology and solar power plant, the intensity of negative impacts could be minimized to acceptable thresholds. Detailed impacts and mitigation measures have been discussed in the Environmental Management Plan. During operational stages the disposal of waste will become a problem.

Therefore, a proper mitigation has been adopted in the preliminary design including wastewater treatment plant, safe and environmental friendly disposal of solid waste and control of gaseous emissions at source. The standards to be followed both for wastewater treatment and gaseous emissions have been discussed and reported.

Social issues like safety of general public and workers, security problems, community accessibility issue, women accessibility to fields for their daily routine life etc. will be of temporary nature and proper mitigations have been provided in EMP.

A comprehensive EMMP has been developed identifying the impacts, mitigation measures, agencies responsible for implementation, monitoring and auditing of the proposed measures. It

may be concluded that if proper mitigation measures as given in this report be implemented, the Jinnah SEZ will cause the least effects on the area's existing environmental and social setting. On the other hand, it is expected that Project will generate large number of revenues, employment opportunities to the residents of the area and will contribute significantly towards local, provincial and national levels.

10.2. Social and Economic Impacts

According to the conservative estimates that project will create around 50000 direct and around 200,000 indirect jobs offering bright job opportunities for skilled and semi skilled youth and middle aged people of the area and adjoining communities.

The multiplying effects of the project are more profound and there will be indirect jobs and opportunities for the people that will enhance their disposable income, economic situation and will give them confidence.

The project is set to add value to work force market of the country. Lock-down of business during Covid-19 had affected the area, and recent floods have given inundated loss to small land holders, unprivileged households and other income generating activities. Establishment of Jinnah SEZ will indemnify the losses by making respectable and better opportunities for rehabilitation. GID's commitments under social responsibilities will also contribute to the social sector (education and health) of the local area for sustainable impact.

10.3. GID's Resolve to contribute to Sustainable Development

GID is committed to enhance the prosperity in the country while putting the wheel of economy in motion and will provide tangible and non-tangible benefits to society as a whole. Earning the trust, loyalties and confidence of the local community and employees is one the pillars of our corporate culture.

GID's resolve is to create jobs, bring investment, develop industrial infrastructure, substitute imports, and make efforts to enhance Pakistan's international competitiveness to mobilize a sustainable economic cycle with long-term impact which is environmental friendly and thus contribute to sustainable development.