TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

TITLE AND LOCATION OF THE PROJECT

"Shenzhen City" at Mouza Shamky Bhatian & Sultanky, Tehsil Raiwind, Multan Road, District Lahore.

NAME AND ADDRESS OF THE PROPONENT

Saad Nazir S/O Nazir Ahmed choudry

Address: House No: 210-C, Mohalla tech, Lahore.

CNIC no: 35202-2809698-3

NAME OF THE ORGANIZATION PREPARING THE REPORT

EnvironTech Consultants (Pvt) Limited.

Office No. 11, 2nd Floor, Center Point Plaza, Main Boulevard Gulberg, Lahore.

Phone: 0303-4342302

A BRIEF OUTLINE OF THE PROPOSAL

Proposed project is the establishment of Shenzhen City of 662 Kanal. This will comprise of residential plots, commercial plots, public buildings, graveyard and open green spaces. It is located at Mouza Shamky Bhatian & Sultanky, Tehsil Raiwind, Multan Road, District Lahore with the total cost of 80 million. The current land use at site is agricultural cum residential. Project site is well connected to the other parts of the city through a metaled road and the major road linked to the site is canal Bank road.

Land Distribution of Shenzhen City

S#	Description	Proposed Area (K)	Proposed Area (%age)
1.	Residential Plots	212.31	32.07
2.	Commercial	66.10	9.98
3.	Parks & Open Spaces	47.29	7.14
4.	Grave Yard	13.24	2.00

5.	Public Buildings	14.68	2.22
6.	O.H.W.T	0.26	0.04
7.	Solid Waste Management	1.13	0.17
8.	Society offices	1.45	0.22
9.	Disposal Station	0.86	0.13
10.	Roads, Footpaths, Parking & Passages	304.68	46.02
Grand Total		**662.00**	**100.0**

The proponent of the Shenzhen City engaged M/S **EnvironTech Consultants (Pvt) Limited** to carry out the environmental Assessment for the development of aforesaid project in accordance with Punjab-EPA guidelines. The salient features of the proposed project are given below:

Salient Features of Project

1	**Project Title**	**Shenzhen City**
2	**Proponent**	Saad Nazir
	Project Location	Mouza Shamky Bhatian & Sultanky, Tehsil Raiwind, Multan Road, District Lahore.
	Co-ordinates	31°19'29.4"N 74°06'55.4"E
3	**Land Use in Surrounding of Proposed area** **North:** **South:** **East:** **West:**	Surrounding are of the project is agricultural cum residential in nature. Open Land Open Land Road Open Land
4	**Consultant**	EnvironTech Consultants (Pvt) Limited
5	**Total Area**	662 Kanal

6	**Cost of Project**	PKR 80 million
	Purpose of proposed project	To provide adequate space for standard living at affordable prices.
	Nearby emergency services i.e. Hospital, police station, rescue, fire brigade etc.	Life Hospital (8.8 km) Police Station green town, Lahore (27.1 Km) Rescue 1122 Manga Mandi (7.4 Km)
7	**Tree Planation**	7% designated area
8	**Water Source**	Ground Water
9	**Status of Project**	Open/Vacant Land
10	**Nature of Area**	Agricultural cum Residential
11	**Source of Power**	WAPDA(MEPCO)
WAPDA= Water and Power Development Authority		

THE MAJOR IMPACTS

Environmental impacts have been identified and mitigation measures are recommended within the project area of influence. The major impacts on physical, biological and social environments are described as under:

Impacts Summary

Environmental Parameters	Impact Assessment	
	During Construction	After Construction
1. Location	+2p	+3p
2. Design	+1p	+2p
A: Physical		

Land Resources		
1. Solid Waste	-1t	-2p
2. Land Use	-1p	-1p
Air Resources		
1. Air Emission	-1p	-1p
2. Noise	-1t	-1t
Water Resources and Wastewater Management		
1. Water Resource	-1p	-2p
2. Wastewater Management	-1p	-1p
B: Ecological		
Flora		
1. Vegetation	0	+2p
Fauna		
2. Wildlife	NA	NA
C: Socio-Economic		
1. Transportation	0	+2p
2. Employment	+1p	+1p
3. Aesthetic	-1t	2p
4. Energy Consumption	NA	-1t

- **Legends: 1= Low; 2= Medium; 3= High; 4= Extremely High; NA= Not Applicable; t= Temporary; p= Permanent; app= Applicable; 0= Negligible**
- **All adverse environmental impacts except natural calamities are manageable easily by implementing EMMP**

RECOMMENDATIONS FOR MITIGATION MEASURES

To manage the environmental and social impacts of the project, significant negative impacts and their mitigations have been covered in this section. For the ease to understand and identify the impacts and to implement their mitigations, a mitigation plan has been developed as a ready reference for the Proponent and Contractor to

minimize the negative impacts or to manage activities in such a manner to avoid any adverse negative impact.

Mitigations for physical, biological and socio-economic parameters will be measured to determine compliance with standards established in EMP. The Monitoring Plan will record the inputs provided by various participants in the environmental and social management process. The air quality is determined once before the commencement of the development and once after the end of the development. During the operational phase solid waste management practices and wastewater disposal practices will be monitored by the concerned authority on the regular basis. Moreover, fire-fighting equipment installed in the public and private buildings will be maintained and monitored on the regular basis.

The total estimated cost for the implementation of EMMP in proposed project area is approximately 2% of the total cost of the project.

PROPOSED MONITORING

A comprehensive Environmental Management and Monitoring Plan (EMMP) have been prepared to effectively manage and monitor the environmental and social impacts for the development of the housing scheme. However, in the interest of commercial viability of the society, all necessary measures to keep the houses and its surroundings environment neat and clean will be adopted. Further recommendations are as following;

- The adverse environmental impacts can be reduced significantly by adopting best management and monitoring practices as well as by implementation EMMP effectively.
- It is recommended to construct the green building instead of conventional building, having green-roofs, insulation as well as maximum utilization of the sunlight. Green roofs will not only attract the customers but will serve as an insulator. In addition, the life of the green roofs is longer than conventional roofs.

- It is recommended that the Proponent should obtain an Environmental Approval (NOC) from the Punjab-EPA before proceeding further into the construction activities.

1. INTRODUCTION

1.1 INTRODUCTION

The development of any project leads to positive and adverse changes in environmental and change in social settings of the project area. The intensity and level of change, however, depends upon the nature of the project and the baseline environmental and socio-economic conditions of the area. The development and commencement of housing society will cause minor adverse environmental impacts on the surrounding area. Thus, an environmental and social study is mandatory to establish the baseline conditions, evaluate the possible adverse impacts if any, and devise the mitigation measures.

The development of a housing scheme is a commercial venture. Availability of a land at the best convenient place and at economical price is the main consideration for the site selection. Availability of access roads, communal facilities, communication facilities, electricity, gas, basic infra-structure, sewerage lines and water supply pipelines are the basic requirement of the development of the housing scheme which will be provided to the residents of the Green Land. As these all facilities are available in the vicinity of the project area.

1.2 SCREENING

Section 12 of Pakistan Environmental Protection Act, 1997 (PEPA, 1997) states "No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an Initial Environmental Examination (IEE) or where the project is likely to cause an adverse environmental effect, an Environmental Impact Assessment (EIA), and has obtained approval from the Federal Agency in respect thereof." Later, Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000 provided the guidelines for categorizing the Projects. According to PEPA (Review of IEE and EIA) Regulations, 2000; the development of the housing falls under **Schedule II Category H "Urban Development and Tourism" (1) (Housing Scheme more than 300 kanals).** i.e., the project requires an EIA Study.

Proposed project is the Shenzhen City located Mouza Shamky Bhatian & Sultanky, Tehsil Raiwind, Multan Road, District Lahore, comprised of residential plots and commercial plots. When it comes to health and vitality of our communities, affordable housing is the key. The need for quality, affordable homes is an important part of Sustainable Development Goals especially with the economic issues Pakistan and majority of countries are facing today. Housing today, has become a serious issue for low-middle income societies and affordable housing does not only provide a shelter rather research shows it promotes improvements to individual outcomes such as employability, crime, health, wellbeing and community cohesion.

M/S Captain Developers have put up this proposal in line with the vision of the Prime Minister to fulfil his mission to provide housing to low-middle income people.

The anticipated project will comply with regulation of Pak-EPA 1997, Punjab Environmental Protection (Amendment) Act 2012 and Punjab Development of Cities Act 1976. The land of the project area is owned by the Client. The land ownership documents are attached as Annexure.

Purpose of this study is to identify the environmental baseline i.e. physical, biological and socio-economic/cultural conditions and assess all possible impacts arising during the construction and operation phase of the project and to find out appropriate measures for their mitigation, to either eliminate those impacts or to bring them to acceptable level and formulation of Environmental Management Plan (EMP) for implementation of the project in environment friendly manner.

This report is prepared by critical examine of the environmental factors which might be affected due to construction and operation of the project. The purpose of this report is to analyze impacts of the project. This EIA provides the basis for a determination of the degree of the environmental impacts of the project.

The report provides relevant information, as required under the officially approved format, to help the decision makers i.e. EPA Punjab before issuing for the Environmental Approval.

The main objectives of this EIA study were:

- To determine and document the state of the environment of the project area to establish a baseline in order to assess the suitability of the Project in that area.
- To identify pre-construction, construction and operation activities and to assess their impacts on environment.
- Provide assistance to the proponent for planning, designing and implementing the project in a way that would eliminate or minimize the negative impact on the biophysical and socio-economic environment and maximizing the benefits to all parties in cost effective manner.
- To present Mitigation and Monitoring Plan to smoothly implement the suggested mitigation measures and supervise their efficiency and effectiveness.
- To provide opportunity to the public for understanding the project and its impacts on the community and their environment in the context of sustainable development.
- Prepare an EIA Report for submittal to the Environmental Protection Agency, Punjab for according Environmental Approval.

The Project site is geographically located at 31°19'29.4"N 74°06'55.4"E

1.3 PURPOSE OF REPORT

The purpose of Environmental Impact Assessment (EIA) study is to identify the possible beneficial and adverse environmental impacts of the project as presently envisaged and propose the applicable mitigation measures to be implemented during the construction and operational stages of the project in order to minimize the negative impacts and preparation of Environmental Management Plan (EMP) to obtain No Objection Certificate (NOC) from EPA-Punjab.

This EIA report has been prepared keeping in view the following regulations and guidelines:

a) Pakistan Environmental Protection Act (PEPA), 1997 & Punjab Environmental Protection Act (PEPA), 1997 (amended 2012)

b) Pakistan Environmental Protection Agency Regulations, 2000 for review of IEE and EIA.

c) Pakistan Environmental Impact Assessment procedures, 2000.

d) Guidelines for Preparation and Review of Environmental Reports

1.3.1 NEED OF ENVIRONMENTAL ASSESSMENT

The preparation and submission of IEE/EIA Report for any development project is a statutory obligation under Punjab Environmental Protection Act, 1997 (PEPA, 1997) amended in 2012 in terms of Section 12 of the Act which states as under: "No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency, an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof."

The current Project falls under Schedule II **Category H "Urban Development and Tourism" (1) (Housing Scheme more than 300 kanals)** and above of IEE/EIA Regulation as per section 12 of Environmental Protection Act and thus requires Environmental Impact Assessment (EIA).

1.3.2 IDENTIFICATION OF PROJECT AND PROPONENT

The proposed Project consists of the design and construction of Shenzhen City. The silent features of the project are given as under-:

Table 1: Salient Features of Project

1. Name of proponent	Saad Nazir S/O Nazir Ahmed choudry **Address:** House No: 210-C, Mohalla tech, Lahore. **CNIC no:** 35202-2809698-3
2. Name of project	Shenzhen City.

3. Location/ Address of the site	Mouza Shamky Bhatian & Sultanky, Tehsil Raiwind, Multan Road, District Lahore.
4. Nature/ Feature of the project	Mix Use Development
5. Major process during construction	Excavations, Concrete, Mixing, Elevation, Finishing
6. Estimated cost of project	80 million
7. Plot area of the project	The total project area is about 662 Kanal. The Shenzhen City consists of residential and Commercial plots.
8. Electricity connection capacity	0.5 MW
9. Detail of standby generators	No Standby Generator will be installed during Development and operation.
10. Project start	1 month after getting NOC from all relevant departments
11. Project completion duration	6 Months

1.4 DETAILS OF CONSULTANTS

For the preparation of the EIA Report of this Proposed Project, the proponent has hired the services of the environmental consultants; M/S EnvironTech Consultants (Pvt) Limited. Team comprising of environmental engineers, chemical engineers, environmental experts and environmentalists. Following table lists the names of those experts:

Table 2: List of Experts

Sr. No.	Team Member	Position Held	Qualifications

1.	Kamal Ahmed Cheema	Chief Executive Officer Central Environmental Services Pvt Ltd	M.Phil. Environmental Economics, Pakistan Institute of Economic Development (PIDE)Islamabad BS Environmental Sciences, University of Gujrat (UOG)
2.	Amna Hafeez	Environmentalist	M.Sc. Mountain Conservation and Watershed Management Punjab University, Lahore
3.	Huda Ashfaq	Environmentalist	M.Phil. Environmental Sciences UVAS, Lahore
4.	Arslan Iqbal	Environmental Specialist	M.Phil. Environmental Sciences University of Lahore.
5.	Muhammad Umer	Manager Operations	BS.c Electrical Engineering

1.5 NATURE, SIZE AND LOCATION OF THE PROJECT

Shenzhen City is a Mix-Use development comprising of commercial and residential Plots. Total project area is 662 Kanal. 41.46% of total area is residential while 5% is commercial and remaining area is open. The Housing colony consists of Residential and Commercial plots, Parks, Mosque, Parking Area, Public Building and Service area.

The site location map of the project and the significant localities around the project are given as under-:

1.6 APPROACH ADOPTED TO CONDUCT THE STUDY

Following approach and methodology has been adopted for conducting the EIA studies:

1.6.1 REVIEW OF AVAILABLE DATA

A detailed review of the following available documents of the project was conducted:

- Desk Studies
- Preliminary Design Report
- Construction Drawings
- Layout Plans

The basic objective of the review was to fully understand the Project and the extent of the developmental activities. The review of studies helped to assess the nature and extent of the impacts related to the implementation and operation of the proposed project activities.

1.6.2 ENVIRONMENTAL BASELINE SURVEY OF THE PROJECT

Prior to the start of the baseline environmental survey, a checklist was developed. The major items, which were considered for physical, ecological and social environment, are discussed in the subsequent paragraphs.

Physical Environment

For collecting information on the physical environment, the following main parameters were considered:

a) Land Resources (including land use, soil composition, topography, geology, contamination of soil and soil erosion, etc.)

b) Water Resources (including available surface water resources and natural streams, spring water, etc.)

c) Climate (including temperature, rainfall, humidity, wind direction, etc.), Ambient Air and Noise Quality

d) Existing solid waste management and effluents disposal practices and storm water drainage

Ecological Environment

Under the ecological environment, the following main parameters were covered:

a) Flora

b) Fauna

Social and Cultural Environment

To assess the social and cultural baseline settings of the Study Area, social survey was carried out to accomplish the following specific objectives:

a) To establish the socio-economic conditions.

b) To identify the potential disruption of private infrastructure.

c) To identify poor and vulnerable groups and strategies to ensure that such groups should get benefit from the Project.

d) To ensure adequate public/stakeholder consultations and their participation.

e) To identify the effects on available common resources of the community due to the implementation of the Project.

1.6.3 ANALYSIS OF DATA

After collection of the physical, ecological, environmental and social data from both primary and secondary sources; a critical analysis was made to assess the existing baseline conditions and potential impacts.

1.6.4 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

- Environmental problems due to project location.
- Environmental problems related to design.
- Environmental problems resulting from project operations.
- Potential environmental enhancement measures.

1.6.5 PREPARATION OF ENVIRONMENTAL MANAGEMENT PLAN (EMP)

An EMP depicting the mitigation measures and monitoring plan has also been developed. Institutional capacity building of the Client has also been reviewed and enhancement was proposed for the effective implementation of the EMP.

2. PROJECT DESCRIPTION

2.1 TYPE AND CATEGORY OF PROJECT

Pakistan Environmental Protection Act (PEPA), 1997 amendment in 2012 stipulates that an IEE/EIA is mandatory for Development Projects. Therefore, an EIA is required for projects for policy procedure, filing, review and approval of environmental assessments". As this project is enlisted in EIA/ IEE regulation 2000. Schedule II Category H "Urban Development and Tourism" (1) (Housing Scheme more than 300 kanals) so, EIA is conducted.

2.2 OBJECTIVES OF THE PROJECT

The main objectives of the project Shenzhen City:

- To revive the economic status of the area
- To overcome the Shortage of standard living space
- It will Prevent Distress Migration
- To Improve Standard of Living
- This project will result in Promoting Business & Employment
- Providing buyers through Long-Term Financing of10-20 years period

2.3 STUDY OF ALTERNATIVES

2.3.1 NO PROJECT OPTION

This project is situated At Mouza Shamky Bhatian & Sultanky, Tehsil Raiwind, Multan Road, District Lahore. So, the Housing Society will be developed at this place in order to boost up commercial activities along with the best residential facilities to the residents of Area. Furthermore, it will be an extension to existing housing scheme, so no other project is considered by the proponent.

2.3.2 YES, PROJECT OPTION

Urban and Peri-Urban areas in a country usually account for 30-40% population and in Pakistan's framework they account for 35% population of the country. During periods of recession, developed countries boost their economy through spreading on

housing sector and in particular on the development of rural societies that accord to almost 2/3rd of the population of a country to prevent distress migration towards urban areas in search of better living conditions and employment opportunities by providing the same facilities and opportunities in rural areas

This project intends to do same through outlining key goals and solution to achieve Prime Minister's vision of providing shelter and employment opportunity to the masses of Pakistan by providing affordable houses in the classified categories (urban, peri-urban & rural).

2.3.3 SITE FEASIBILITY

Economic viability, investment limitations, market volume, ensured availability of costumers, availability of dependable energy source, availability of project basic support systems and environmental management are the main considerations. All these factors were taken into consideration while selecting a suitable site for the project. The present place from all point of views was the most suitable. The major points taken into consideration and their summary discussion, for the site selection is given as under-:

- Easy access for everyone

Proposed project can be accessed directly from Bosan Road.

2.4 ELECTRICITY ALTERNATIVES

The main supply of electricity is from MEPCO.

2.5 WATER ALTERNATIVES

Water is necessary to carry out daily routine work and some water is also necessary during Development. For construction and operational phase ground water will be used.

2.6 LOCATION AND SITE LAYOUT

Figure 1: Site Location Map

Shenzhen City is located At Mouza Shamky Bhatian & Sultanky, Tehsil Raiwind, Multan Road, District Lahore. The project site is accessible through Canal Bank Road and Piran Ghaib Road, Co-ordinates of project site are at 31°19'29.4"N 74°06'55.4"E, location of the project site is given below;

2.7 LAND USE ON SITE

The surface land in and around the project area is levelled and peri-urban in nature. Boundary wall is constructed around housing scheme area. No ecology sensitive receptor such as; forest or reserved area is present within 4 km vicinity that could be impacted due to the establishment and operation of the Housing Society.

2.8 ROAD ACCESS:

Proposed project site is easily accessible through Canal Bank Road

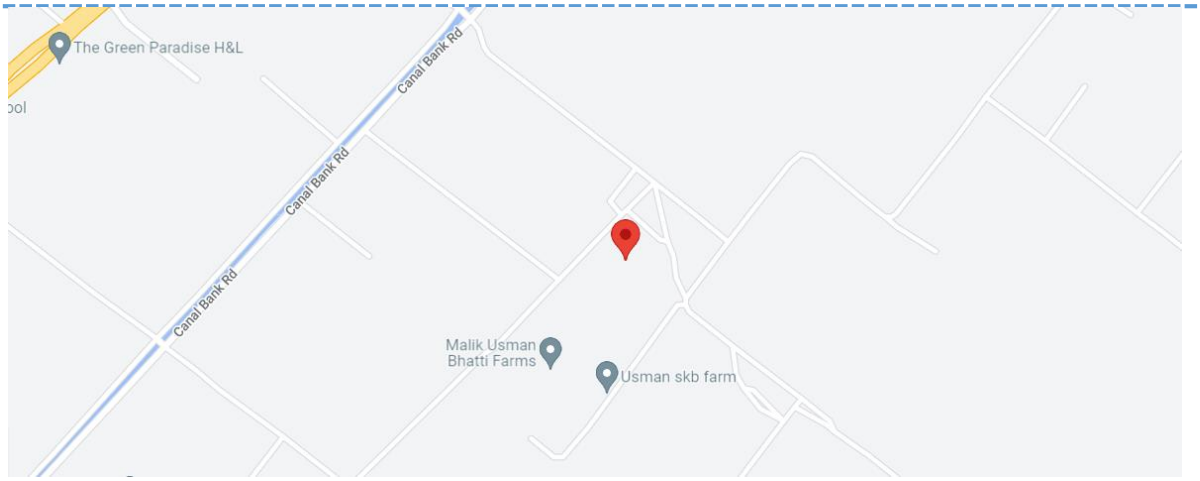

Figure 2: Road Access Map

The layout plan with detail features of the project is attached in Annexure.

2.9 VEGETATION FEATURE ON SITE

The site is partially covered with grass patches and some trees of single species along north-east side of the site boundary. These trees will not cut down during or after the completion of project.

2.10 WATER REQUIREMENT AND WATER BALANCE

For construction stage the ground water will be used. About average 94meter cube per day of ground water will be used in construction phase of the project. About 1 cusec per day of water will be used during the operational phase of the project. Water balance during the operational phase is given as under-:

- Total Water Usage = 1 Cusec per day
- Washrooms, washings, restaurants = 0.50 cusec
- Gardening = 0.20 Cusec
- Others = 0.10 cusec
- Wastewater production = 0.80 Cusec per day

2.11 WASTEWATER DISPOSAL

The wastewater will be municipal in nature and will be passed from septic tanks. The extra treatment will be done by treating the wastewater through wastewater treatment plant which will be installed by Shenzhen City before the final disposal which is 400

meters from the project site municipal drain permission letter attached from the WASA. Wastewater treatment plant has a capacity of 6000 liters/shift and the chemicals used will be sodium hydroxide and alum.

Specifications:

Sr.	Description	Dimensions	Area in SFT
I.	Screen Chamber	3.0*0.6*3.0	54
II.	Equalization Tank	10*10*6.50	650
III.	Aeration TANK	12*14*4.60	772.8
IV.	Lamella Clarifier	06*05*6.45	193
V.	SDB	3.3*06*1.2	23.76
VI.	Control Room	04*08*06	192
VII.	Influent Pumps Value Pad	1.5*1.5*0.30	0.675
VIII.	Ras/ Was Pumps Pad	1.5*1.5*0.30	0.675
IX.	Lift Station	5.5*2.5*3.5	48.13
Total			1,935.04

2.12 COST AND MAGNITUDE OF THE PROJECT

Main activities will be taken during construction phase are the excavation works, foundation works and Structures concreting. As it is a residential housing scheme, so the activities take place during operation will be according to the project scope. The development and civil work cost of the project is about approximately 80 million.

Table 3: Cost Breakup

Sr.No	Kinds of Cost	Amount in Million
1.	Land Cost	43
2.	Machinery Cost	20

3.	Land Development, Infrastructure & construction cost	4.8
4.	Environmental Budget	0.2
5.	Total Cost	68

2.13 SCHEDULE OF IMPLEMENTATION

Duration for the completion of Shenzhen City is about 1 year. There will be a symmetrical process. The process is divided in to 3 phases

Preconstruction phase

This phase includes:

- Site investigation & Evaluation
- Budgeting
- Design
- Schedules of working
- Obtaining all relevant NOC

Construction phase

This phase includes:

- Management team& Construction Crew
- Excavation
- Construction of building
- Provision of allied facilities
- Mitigation process

- Amenities and Shops Development
- Managing safety
- Monitoring & Evaluation

Operational phase

This phase includes:

- Implementation of fire safety, emergency evacuation plans
- Security management
- Finishing of amenities, restaurants, club, gymnasium and shops
- Open for the Visitors

2.14 PROJECT DESCRIPTION

2.14.1 Project's Construction Activities

2.14.1.1 Site Preparation Works

The proposed project site will be prepared for construction. This will involve clearing of vegetation, excavation works and transportation of construction materials. This will be undertaken in a phased approach to mitigate soil erosion and the impacts of excessive dust generation. Due to the nature of the proposed project, construction will involve the use of heavy machinery such as excavators. The engineers will also utilize human labor where necessary so as to create employment to the local residents especially the youth.

2.14.1.2 Storage of Materials

Constructional materials will be stored on site. Bulky materials such as stones, ballast, sand and steel will be carefully piled at designated areas on site. To avoid piling large quantities of materials on site, the proponent will order bulky materials such as sand, gravel and stones in quotas.

2.14.1.3 Masonry, Concrete Work and Related Activities

The project involves a lot of masonry work, laying of plumbing and related activities. General masonry and related activities include, concrete mixing, plastering, slab construction, construction of foundations, and erection of building walls and curing of fresh concrete surfaces. These activities are known to be labor intensive and will be supplemented by machinery.

2.14.1.4 Structural Steel Works

The building will be reinforced with structural steel for stability. Structural steel woks involve steel cutting, welding and erection.

2.14.1.5 Plumbing

Installation of pipe-work will be done to connect sewage from the ablution blocks to a sewer system. Plumbing activities will include metal and plastic pipe cuttings, the use of adhesives, metal grinding and wall drilling among others.

2.14.2 Project's Operational Activities

2.14.2.1 Facility Users

The Proposed commercial and recreational development, when completed will target both local and foreign visitors.

2.14.2.2 Solid waste

The proponent will provide facilities for solid waste generated within the facility. These will include dust bins/skips for handling temporarily holding waste within the premises before final disposal at the designated sites. Shenzhen City intends to develop a solid waste management plan to ensure that the volume of solid waste generated within the entire development is minimized through the principles of reduce, re-use and recycle.

2.14.2.3 Land Use Plan

Shenzhen City comprises of following features with the total area 662 Kanal.

Table 4: Distribution of Land

S#	Description	Proposed Area (K)	Proposed Area (%age)
1.	Residential Plots	212.31	32.07
2.	Commercial	66.10	9.98
3.	Parks & Open Spaces	47.29	7.14
4.	Grave Yard	13.24	2.00
5.	Public Buildings	14.68	2.22
6.	O.H.W.T	0.26	0.04
7.	Solid Waste Management	1.13	0.17
8.	Society offices	1.45	0.22
9.	Disposal Station	0.86	0.13
10.	Roads, Footpaths, Parking & Passages	304.68	46.02
Grand Total		**662.00**	**100.0**

The Detail of plot is as follows and Map is attached an Annexure:

Table 5: Detail of Plots

Category/Statement of Residential Plots			
Sr#	Category	Plot size	Total
1.	50' X 90'	1-kanal	45
2.	35' X 65'	10-marla	41
3.	30' X 60'	8-marla	30
4.	25' X 45'	5-marla	330
5.	22' -5' X 50' -2'	5-marla	6
6.	20' X 45'	4-marla	225

7.	22' -2' X 24' -11'	3-marla	5
8.	Total Residential Plots	682	

2.15 RESTORATION AND REHABILITATION PLAN

The restoration work comprises the removal of temporary construction works. No individual will have to leave the area for this project so there will be no resettlement issues. In order to enhance the environmental features of the site, the indigenous trees will be planted accordingly.

2.16 GOVERNMENT APPROVALS

The project is seeking Environmental Approval from Punjab Environmental Protection Agency (Punjab-EPA) and District Council Multan.

3. DESCRIPTION OF ENVIRONMENT

This chapter provides baseline data (physical, biological and socio-economic parameters) related to the project and study area. The information has been compiled by using primary and secondary data resources. This chapter also refers to the theoretical analysis of the methodology adopted for collection of baseline data. The underlying principles and practices adopted in this regard are also discussed.

3.1 Methodology

The methodology employed to collect the baseline data and information regarding the social structure and various related parameters as discussed in sub-sections below:

3.1.1 Data Collection

The primary data was collected by visiting the project area and its communities in its nearby vicinity. The secondary data regarding physical parameters (topography, geology, seismology, and climate) was obtained by visiting relevant various government departments and their official websites. The biological parameters such as flora and fauna were studied by preparing a floristic list based on visual observation and fauna was studied by using opportunities approach. The species were recorded with reference to their existence in the project area. Information on wildlife fauna species (mammals, amphibians, reptiles, birds, etc.) in the assessment area was compiled based on opportunistic observation, gathering the existing information and consultation with local experts, community members and government and Non-Government Organizations (NGOs). The socioeconomic aspects were studied and analyzed by studying detailed village profile and by conducting household surveys.

3.1.2 Social Survey

The purpose of social survey was to record the present condition of the people living in the project area and to assess the expected project impacts on their life, subsistence systems and socio-cultural conditions. Prior to conducting the field surveys, the following steps were taken:

- Clear boundaries of the project area were identified

- Decided the sampling procedure in order to draw a representative sample size of the target population and households
- Developed the tools for data collection i.e. questionnaires to access the socio-economic status of the area

3.1.3 Sampling Design

Social baseline data of the persons residing in the study area has been estimated and collected through random sampling by using pre-developed questionnaires.

3.1.4 Questionnaires

In order to test the validity and reliability of the proposed questionnaires, they were reviewed to assess whether questions needed to be clarified, changed or re-sequenced and then a final editing of questionnaires was conducted prior to their application in the project area. The sample of socio-economic questionnaires used is attached as Annexure.

3.1.5 Data Editing and Analysis

The filled questionnaires and recorded information were compiled by the same field investigators who were involved in the data collection. This was done immediately after completing the field investigations. Data sets were processed. Analysis of the data and preparation of conclusions in the minimum possible time was done using statistical techniques of data analysis.

3.2 Review of Legal and Administrative Framework

The objective of reviewing legal and administrative framework is to obtain information on all legislation pertaining project development. The Socio-Environment Team of Central Environment Services reviewed the environmental policies, national, international and provincial laws and guidelines relevant to the development of project which helped in systematic identification of impacts.

3.3 Baseline Conditions

This chapter provides baseline data (physical, biological and socio-economic parameters) related to the project and study area

3.4 Physical Environment

Pakistan Can be divided into five broad physiographical regions. These are the mountainous regions of the north, the western highlands and plateaus, the sub-mountains Indus region, the Potohar Plateau, Salt Range, and the Indus Plain. Brief description of these regions are given below:

Region	Characteristics	Location	Height
Northern Mountainous	Hindu Kush Karakoram and Himalayan Mountain Ranges	Northern Part of KPK, Gilgit Agency, Northern Areas and Kashmir.	Rises above 8,000m
Western Highlands and Plateaus	Toba Kakar, Sulaiman, Central Baruhi, Saihan, Central Makran, Makran Coastal and Kirthar Ranges	Mainly in Baluchistan, also parts of Sindh and KPK	Between 1,200 to 3,000 m
Sub-Mountains Indus	Alluvial filled Basins	Plains of Peshawar Kohat and Bannu	Less than 1,000 m
Potohar Plateau and Salt Range	Flat to gently undulating surface, broken by gullies,	Mainly northern parts of Punjab, some parts of KPK	Less than 1,000 m
Indus Plain	Flood plains of the Indus, Jhelum, Chenab Ravi and Sutlej Rivers	Punjab and Sindh	Less than 1,000 m

3.4.1 Topography and soil

Lahore is generally flat and slopes towards south and south-west at an average gradient of 1:3000. It can be divided into two parts i.e. the low-lying area along River Ravi and the comparatively upland area in the east away from Ravi. The low lands are generally inundated by the river water during monsoon floods. River Ravi flows in the

west of Lahore District forming a boundary with Sheikhupura District. The original physiographic features like channels remnants and levees have been destroyed or changed by the construction of urban infrastructure. Flood plains have been confined by construction of embankments (bunds) and spurs. Sub-recent flood plain is 4 to 8 meters higher than the recent flood plain and can be identified at number of places i.e. Shalimar Garden, Moghalpura and Multan Road.

Terrain of the proposed project site is predominantly flat. Lahore district is situated at an average elevation of 210 meters above mean sea level. The alluvial subsoils are of late Pleistocene and were formed by the flood plains of river Ravi. These consist of clay, silt and sand. The thickness of clay increases with distance from the river bed.

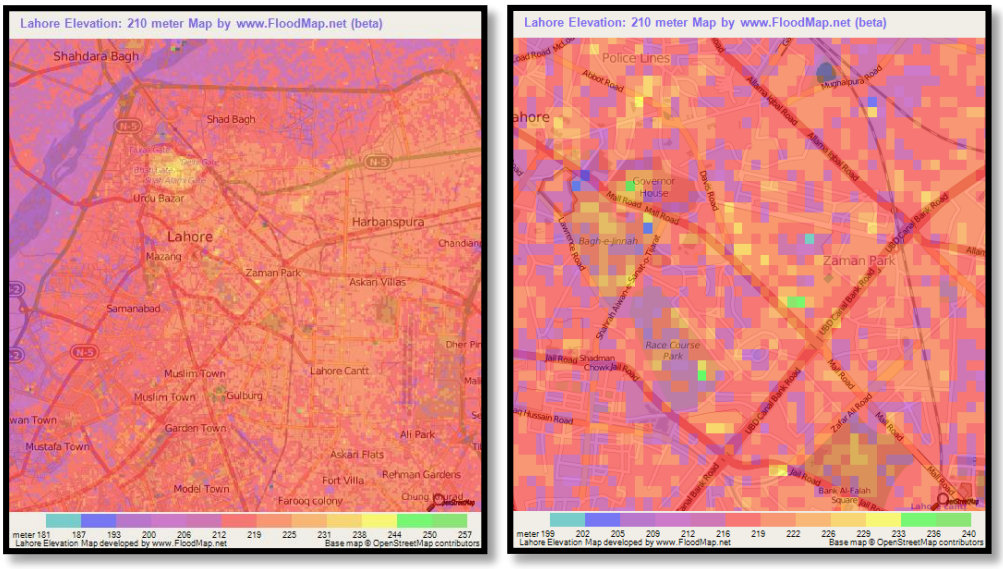

Figure 3: Topography of District Lahore

Lahore plains are most probably underlain by the Potwar stratigraphy, but it would be deeply eroded. Lahore is located just north of the NW-SE running Sargodha high, where the sedimentary rocks may also be truncating against the high. Moreover, very thick alluvial and older fluvial deposits (Recent to Miocene) before older eroded rocks are also encountered. The geotechnical properties and mineralogical composition of the soil, das established during various studies / boring of tube wells for water supply by WASA/LDA confirm that the Lahore soil is composed of silty clay. The major mineral composition for Lahore soil is Quartz, Muscovite and Clinochlore, which shows that the

alluvial deposit received sediments from metamorphic origin. In general, subsurface stratigraphy at the site consists of three basic lithological units as given below:

• Lean Clay/Silty Clay

• Sandy Silt/Silt

• Silty fine Sand/fine Sand

These soils are the alluvial deposits of the recent geologic times. The subsurface stratigraphy is as discussed below:

• The first soil unit of brown silty clay/lean clay forms the topsoil cover at the site at all the locations and generally continues to a depth of 1 .0 m- 3.5m below top of ground. This stratum contains trace fine sand and trace to little concretions at places. It is present in a soft to a stiff state of consistency and has low to medium plasticity.

• The second soil unit of brownish grey sandy silt/silt underlies the upper silty clay/ lean clay stratum. This layer has a thickness of 1.0 to 3.0m and is present in a firm state.

• The third soil unit of brownish grey non-plastic fine silty sand underlies the silt/silty sand stratum. It is present in a loose to medium-dense state.

The lithological distribution of soils consists of slightly cohesive, generally firm to stiff silty clay lean clay from 1.0 to 3.5m depth, followed by firm to stiff sandy silt/silt of 1.0 to 3.0m thickness in turn followed by medium dense silty fine sand. Groundwater is present at a depth of 4.5 to 5.0m below top of ground. The subsurface generally appears suitable for supporting light to medium loads through spread foundations placed at 1.0 to 2.0m depth. Besides, some isolated weak spots are also expected, which will require special measures to be adopted.

3.4.2 Climate

Purposed project site is located in District Lahore and has distinct seasons marked by wide variation in temperature. The coldest month is January in which the mean maximum temperature is 19.4 °C and the mean minimum temperature is 6.6 °C. June

is the hottest month with the mean maximum temperature near 39.8 °C and the mean minimum temperature as 27.4 °C.

The average annual rainfall from 2010-2018 in Lahore works out to be 126.16 mm. Nearly 70% of it received in the form of high intensity showers during the monsoon (July, August, September) and the remaining in winter. The yearly variations are considerable.

The most humid period is in month of February with average humidity of 53.125 % and the least humid period is in the month of May with average humidity of 18.875 %. The average monthly humidity of Lahore region form last 9 years (2010-2018) recorded is 35.25 %.

During cold seasons of the year northern winds prevail and during hot seasons southern winds. Monthly mean velocity of the wind (Knots) taken for the period 2010-2018 is 5.46.

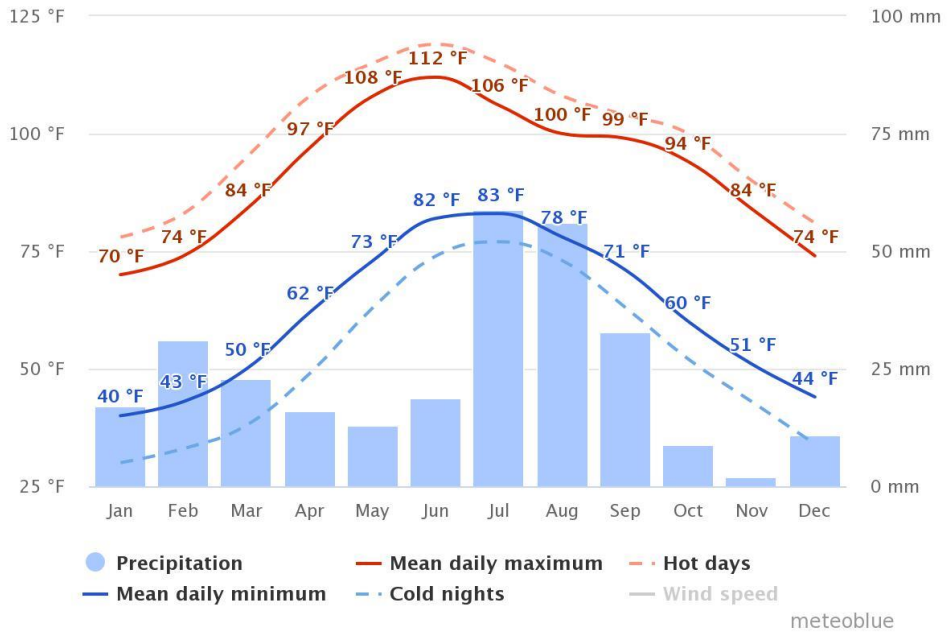

Figure 4: Average temperatures and precipitation

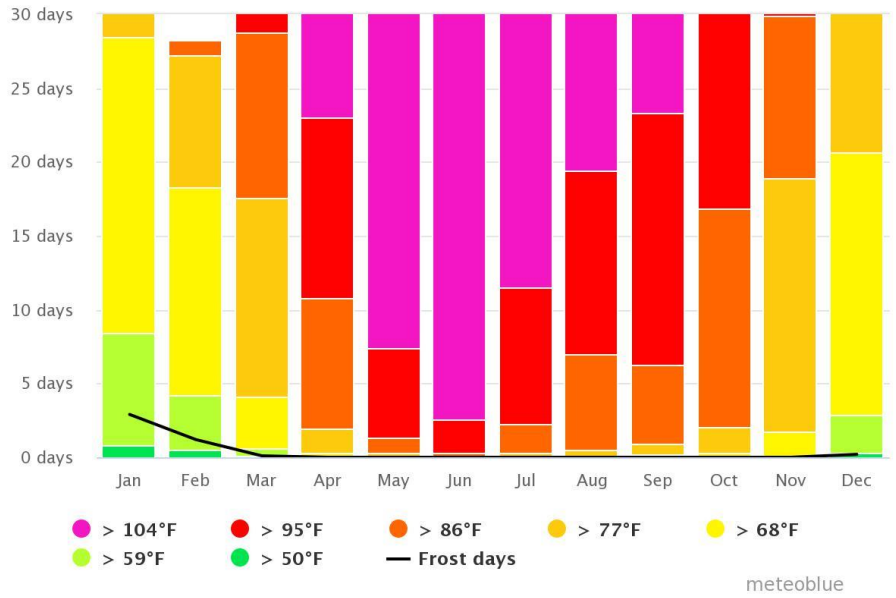

Figure 5: Maximum Temperature of Lahore

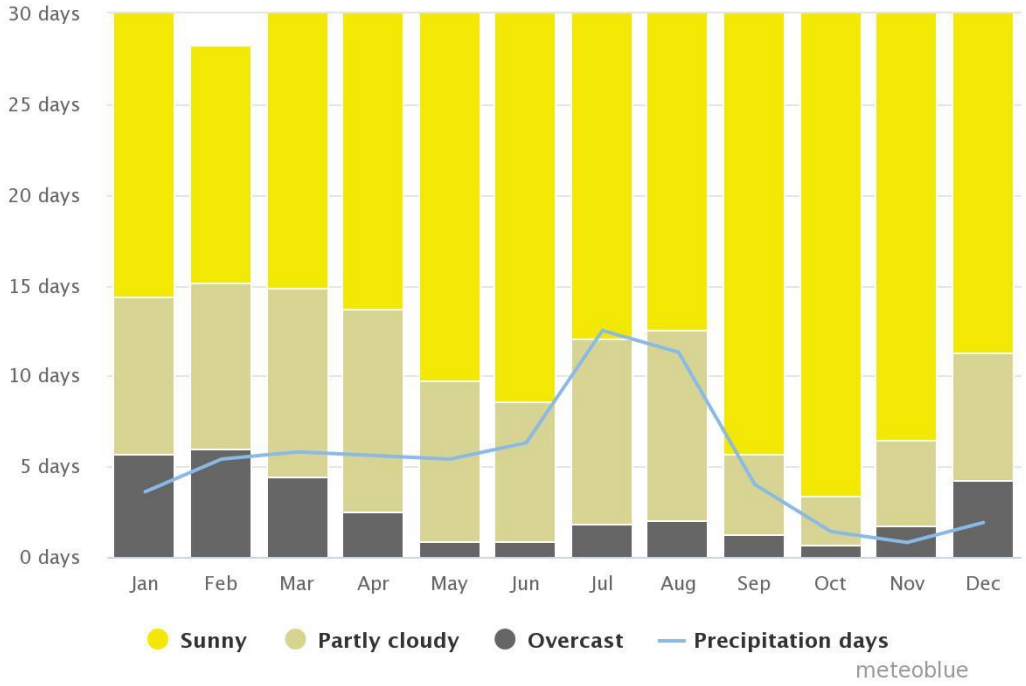

Figure 6: Cloudy, sunny, and precipitation days

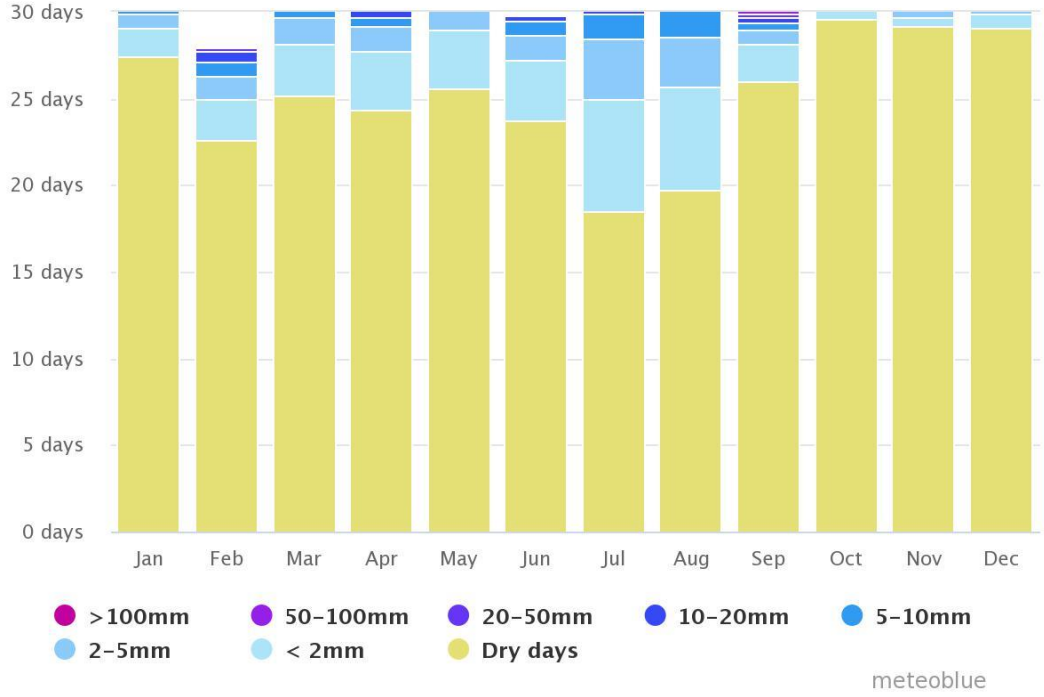

Figure 7: Average Precipitation of Lahore

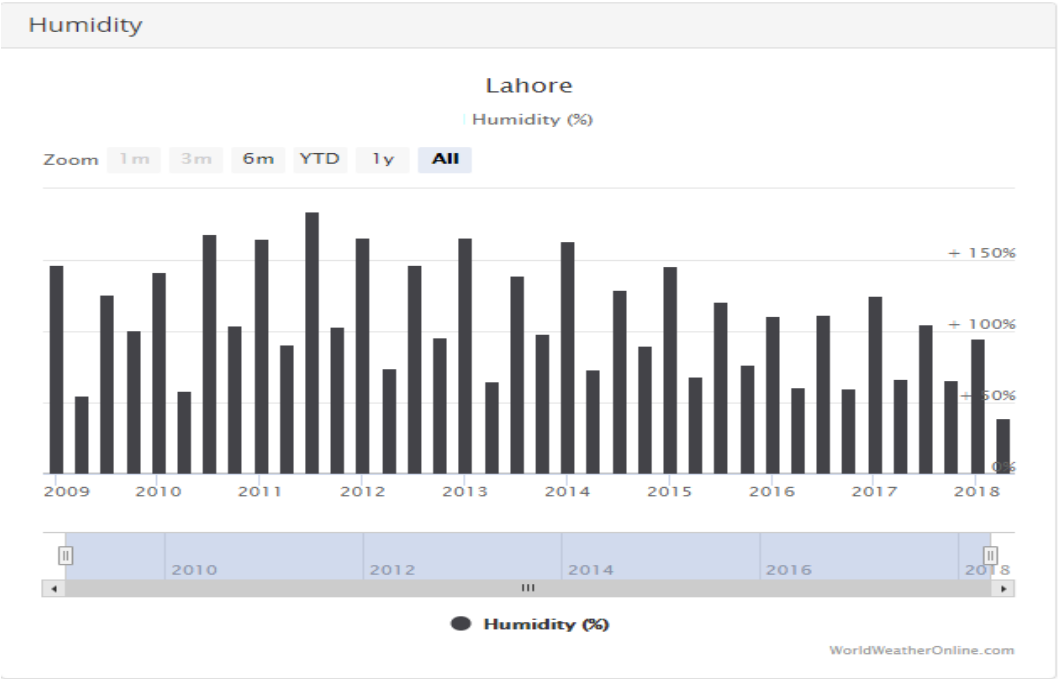

Figure 8: Average Humidity of Lahore Region

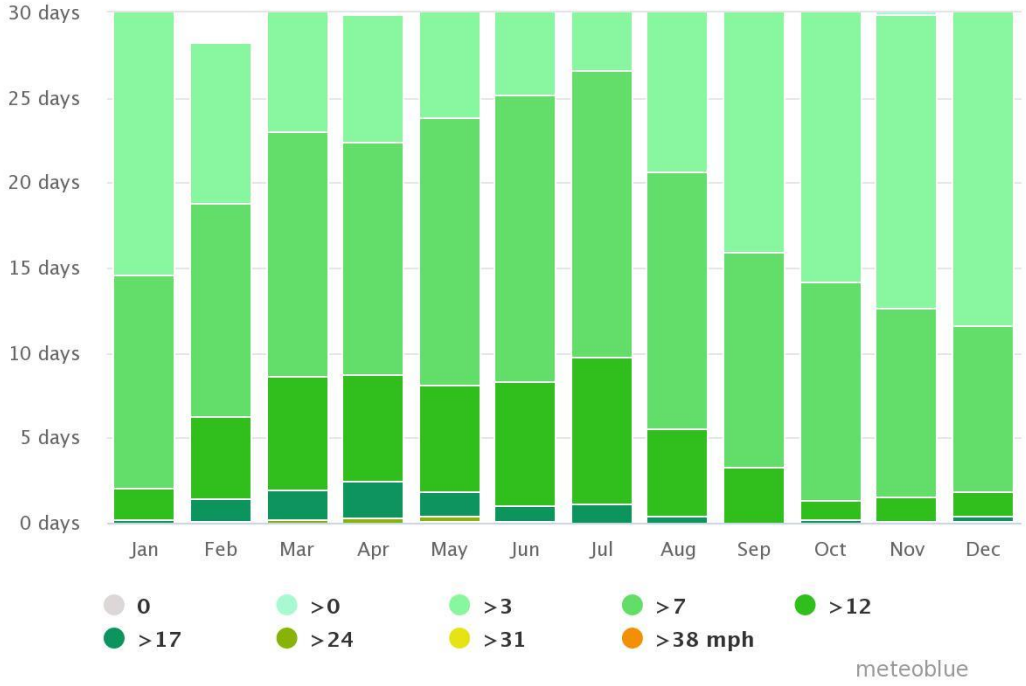

Figure 9: Average and maximum Wind Speed of Lahore Region

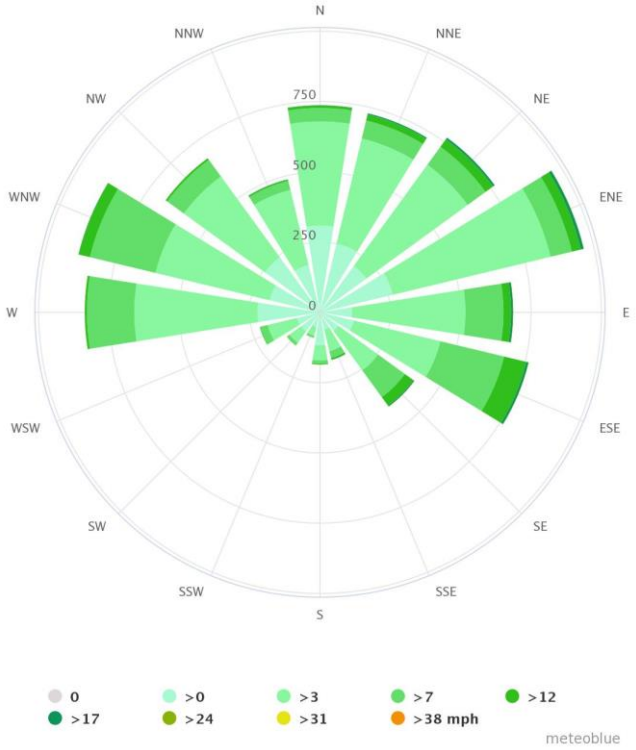

Figure 10: Wind Rose Diagram of Lahore

The wind rose for Lahore shows how many hours per year the wind blows from the indicated direction. Example SW: Wind is blowing from South-West (SW) to North-East (NE).

3.4.3 Hydrology

The aquifer under Lahore area is composed of unconsolidated alluvial Sediments, consisting of sand, silt and clay in different proportions. The chief constituent minerals are quartz, muscovite, biotite and chlorite, in association with a small percentage of heavy minerals. The sediments have been deposited by the present and ancestral tributaries of the Indus River during Pleistocene-Recent age. The sedimentary complex has a thickness of more than 400 meters. The shifting course of the tributaries in the area has impregnated the heterogeneous character to the thick sedimentary alluvium. Therefore, the geological strata have little vertical or lateral continuity. In spite of their heterogeneity, the alluvial sediments constitute a large aquifer, which on regional basis behaves as an unconfined homogeneous aquifer (Greenman et al., 1967). The individual lenses of silt and clay do not impede the flow of groundwater, considering long-term pumping. Lahore aquifer is highly transmissive, with hydraulic conductivity variation between 25 m/day to 70 m/day. In spite of heterogeneous nature of alluvial complex, groundwater occurs under water table conditions.

Regional Flow Pattern and Condition of Groundwater

The regional groundwater flow in the area is from northeast, the Jammu and Kashmir foothills which are at higher elevation, towards the southwest along the general slope of the area. The previous studies and behavior of existing shallow and deep tube wells in the area have shown that in spite of local variation, aquifer overall behaves as a single homogeneous water body and 73 % of the total consists of sand. This condition is during the monsoon season, when the water table is the high and the annual fluctuation is reported not more than 10 feet.

Before the introduction of controlled irrigation system in Punjab, the water table was deep towards the center of Doabs and was shallow along the rivers. After the introduction of controlled irrigation system in the region, water table started rising as a result of leakage/seepage from irrigation canals and infiltration from irrigation applications on crop fields. As a result, the area became water logged until about 1960

when a quasi-equilibrium state was reached, controlled in part, by evapotranspiration and drainage.

3.4.4 Groundwater

Ground water quality is fresh (defined as acceptable in terms of its salinity). Raw water abstracted from the deep tube wells is believed to be essentially bacteria free.

The water quality in the upper 50 meters zone of subsoil is generally brackish. For city's drinking purposes water is abstracted from groundwater aquifer by means of tube wells located throughout the city. The quality of water is generally adequate for direct consumption. About 83% of city population is consuming groundwater for drinking purposes.

Groundwater is available at a depth ranging between 15 to 23m below the natural surface level. Deep groundwater from a depth of about 210m in the vicinity of the Project Area is being extracted for meeting the domestic and commercial water demands in nearby areas. Adequate quantity of good quality groundwater is available below a depth of 50m. Water consumption varies significantly and its variation as of industrial units. Usual water consumption pattern for industrial units and data collected from the prospective industrialist will form basis for total water demand. According to Master Plan-2030 for the city of Lahore, the mean average decline in ground water is about 2.03 feet per year.

3.4.5 Geology / seismology

Lahore lies on the alluvial plain called Bari Doab. Doab is a local word for area between rivers. Bari Doab is a part of the Indo-Gigantic alluvial plain formed by the Indus River and its tributaries. It is bounded by Ravi and Chenab rivers in the northwest and west and by Sutlej River in the southeast. Northeastern boundaries of Doab lies near the foothills of the Himalayan Ranges. The Bari Doab is covered by Quaternary alluvium which overlies semi-consolidated Tertiary rocks or Metamorphic and igneous rocks of Precambrian age. Except for a small area in the northeastern part of Doab where basement rock was encountered no information is available at present regarding the distribution of Tertiary and Precambrian rocks in the Doab.

The project site is situated Mouza Shamky Bhatian & Sultanky, Tehsil Raiwind, Multan Road, District Lahore. The project site is located in Punjab which is a vast plain of alluvial material, deposited by Indus basin and five main rivers crossing the Punjab Plain. Thickness of alluvial deposits is thought to be more than 300 m which are underlain by the basement rocks of the Indian shield. The project site falls in the Punjab plain which shows low to moderate level of seismicity. The project region has also been subjected to severe shaking in the past due to earthquakes in the Himalayas. The epicenters of low to moderate magnitude earthquakes recorded in the Punjab Plain are associated with the subsurface fractures in the basement rocks which are concealed by the thick alluvial deposits. The known main active fault near Lahore is the Main Boundary Thrust (MBT) which passes at a distance of about 180 km towards northeast along the Himalayan front.

The Project Area does not have any valuable minerals. Although, scientific/in depth, investigations haven't been carried out, yet the surveys conducted have failed to discover any minerals worth the name till to- date.

Probabilistic seismic hazard assessment recently carried out for Lahore area as part of the revision of seismic provisions of the Building Code of Pakistan shows that the project area falls in Zone 2A. Seismic zone of Pakistan is shown in figure 4.1. It is therefore recommended that the project structures should be designed to cater the requirements of Zone 2A of Building Code of Pakistan (2007). Based on the evaluation of tectonic setting and seismicity of the project region, the important project structures are designed to withstand a horizontal peak ground acceleration of 0.15g with 10% exceeding probability in 50 year.

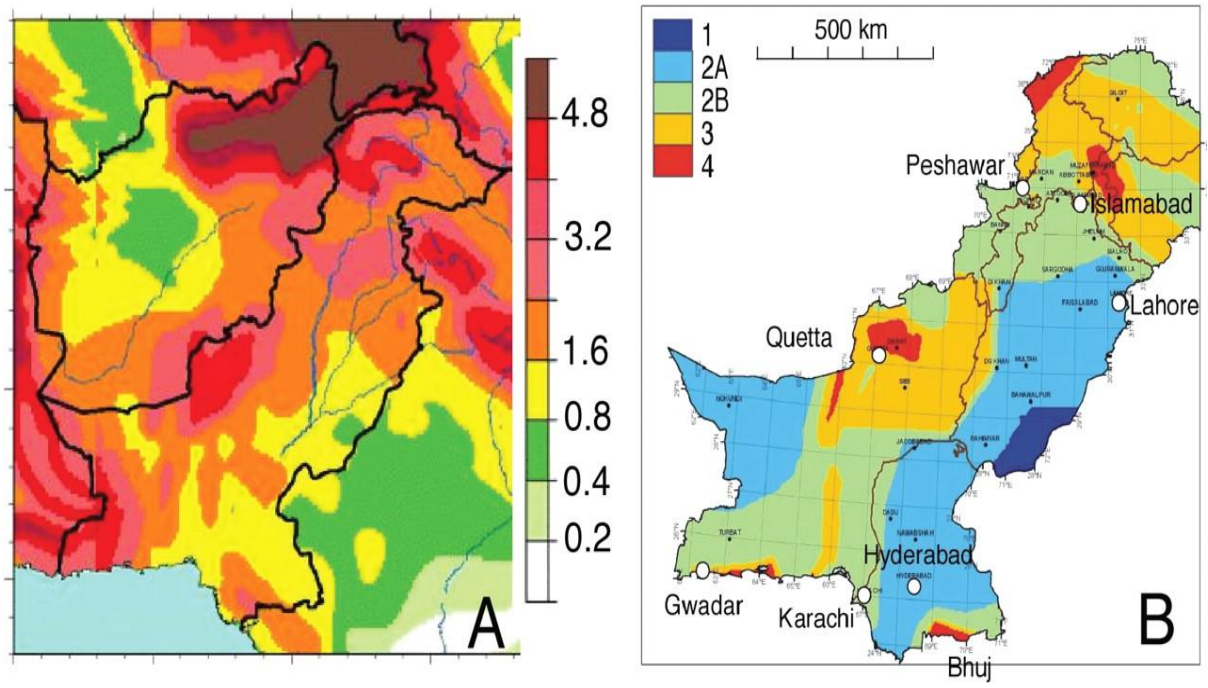

Figure 11: Seismic Zone of Pakistan (Geological Survey of Pakistan)

3.5 Description of the biological environment

The project area neither contain any forest nor falls in protected area or archaeological site and so no jurisdiction on the proposed sire area of the relevant legislations.

3.5.1 Flora

The project area is surrounded by residential land, and does not support rare, endangered or threatened plant species. Plant species present in the site are given in the following table

Sr. No.	Local Name	Biological Name
1.	Kekar	Acacia nilotica L
2.	Sheesham	Dalbergia sissoo roxb
3.	Mango	Mangifera indica L
4.	Phulai	Acacia modesta wall
5.	Amaltas	Cassia fistula L

6.	Dharek	Melia azedarach L
7.	Bohar	Ficus benghalenses L
8.	Pepal	Ficus religiosa L.
9.	Kala toot or mulberry	Morus nigra L.
10.	Eucalyptus	Eucalyptus camaldulensis
11.	Guava	Psidium guajava L.
12.	Jaman	Syzygium cumini L.
13.	Pomegranate	Punica granatum L.
14.	Bair	Ziziphus jujube mill.
15.	Rose	Rosa indica L.
16.	Sumbal	Bombax ceiba L.

Some plants are ornamental like Alastonia, Golden Ficus, green Ficus, Dronta Weeds, and Palms etc. these are the tree species that are generally planted along the margins of fields. Among the above-mentioned tree species mostly are used for landscaping purposes in houses some plants are used as biomass in homes near the selected site.

3.5.2 Fauna

Only few common animals are found near the project site like dogs, cats, rodents like squirrels, rats, mice and bats. Common species of birds found include the common house sparrow, crow, pigeon, dove, yellow and white eyed mynas.

3.6 Socioeconomic Resources and Quality of life values

In order to assess the present socio-economic and socio-cultural conditions of the project area, a survey was conducted. For this purpose, base line data was collected from few commercial and residential areas adjoining to the purposed site. Interviews and social surveys were conducted to assess the present socio-economic and cultural feature of the area.

3.6.1 Population and communities

Mostly community around the purposed project area is the semi-urban. Most of them have their own business. Some of them have private jobs in different industries present in the industrial Area, agriculture and livestock profession. Only a few are government employees. Punjabi is the predominant language being spoken near the purposed project site, representing 55 % of the population, followed by Urdu and Pashto spoken by 40 % and 4.8 %. Sindhi is spoken by 0.2%.

3.6.2 Infrastructure

The project area is situated on Ferozpur Road, Lahore and provides round the clock transport access. All the other areas are connected with metaled roads. Buses, motorcycle rickshaws, motorcycles, vans and pickups provide very convenient mode of transportation throughout the area. All bounded area has electricity provided by LESCO along with telephone and natural gas facilities. Lahore has well developed drainage system which fulfills the requirement of the town in rainy season as well as in dry weather. The project site area will also be provided with the modern facilities like electricity by LESCO, natural gas by Sui Northern gas pipelines limited, phone facilities by Pakistan Telecommunication Company limited, and very well-designed drainage system along with a septic tank for primary treatment of sanitary water before throwing it to public sewerage. No surface water is available to the area and only source of water to the area is groundwater, which is extracted by means of motor turbines, tube wells and hand pumps

3.6.3 Educational institutions

Basic primary level education is available. The private education schools also exist near the project site. The project area has privileged of big colleges and universities.

3.6.4 Transportation

The project area is situated on Ferozpur Road, Lahore which is approx. 70 feet wide and provides round the clock transportation access. Transport services include buses, trucks, vans, cars, pickups, motorcycles, rickshaws, and bicycles. For railway services, one can go to Lahore Railway station from where rail service is available throughout the Pakistan

3.6.5 Power sources and transmission

Electricity services are provided by Lahore electric power company to the area and it shall provide same services to the proposed project as it is the only authority which deals with the electric power sources and their availability to the expected area.

3.6.6 Agricultural and mineral development:

The project area lies in the agricultural zone. Land holdings are very small. Agriculture mainly depends upon canal water. Underground water, where available of irrigation quality, is used for agriculture purpose through tube wells.

3.6.7 Public health

The medical facilities are available near the project site area as few very good hospitals are situated in nearby residential area, whole area is full of clinics and hospitals thus providing very good medical facilities to the people of area.

3.6.8 Archaeological and cultural sites

No Major archaeological sites are observed in the vicinity of proposed project.

3.6.9 Gender analysis

The section describes the importance of role of women in the project area. Responsibilities of women in the area belongs to their household activities like cooking the daily meal, dishwashing, feeding and milking the cattle, cloths washing, bringing up the children as well as working in the fields. In the area, awareness regarding formal education is prescient and approximately every child in the area especially girls are getting education from the educational institutions. This is also because govt. of Punjab has made formal education totally free and also provides free of cost course

books to the students till their matriculation. Majority of the working-class women are teachers in govt. school as well as in private institutions while remaining are doctors and nurses in the hospitals. The female population is found to be 49% of the total population of Lahore district.

3.7 Quality of Life Values

Socio-Economic Questionnaire and Environmental Checklist were used as survey tools by the Central Environmental Services survey team to collect desired information. Most of the respondents had the basic social facilities such as; basic health facility, electricity, water supply, roads, rail, public and private transportation to sustain life. Most of the respondents were working with the agricultural, livestock, doing their own business, shopkeepers and working as the labor in the nearby industries. The common diseases observed in that area were Diarrhea, cough diabetics and heart diseases.

3.7.1 Occupation of Respondents

Majority of the respondents (26%) belongs to the business, 33% have their own business, 10% daily wagers, 13% attached with Govt. employee, 15% shopkeepers and remaining 18% are private employees. During survey, efforts were made to interact with people representing all walks of life. The detailed graphic representation of occupational status is given below:

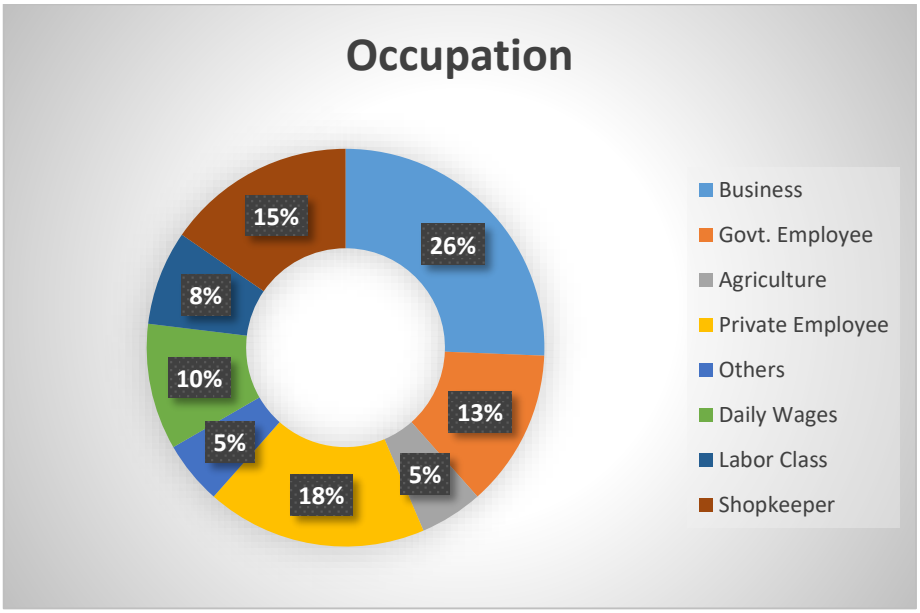

Figure 12: Occupation of Respondents

3.7.2 Personal Income

Based on the sample survey results, as the figure shows that nobody was earning less than 20,000 rupees, 69% of respondents fall within the income range of 20,000 – 25,000, 23% respondents earn 30,001 – 40,000 while only 8% of the respondents earn within the range of 40,001 – 45,000.

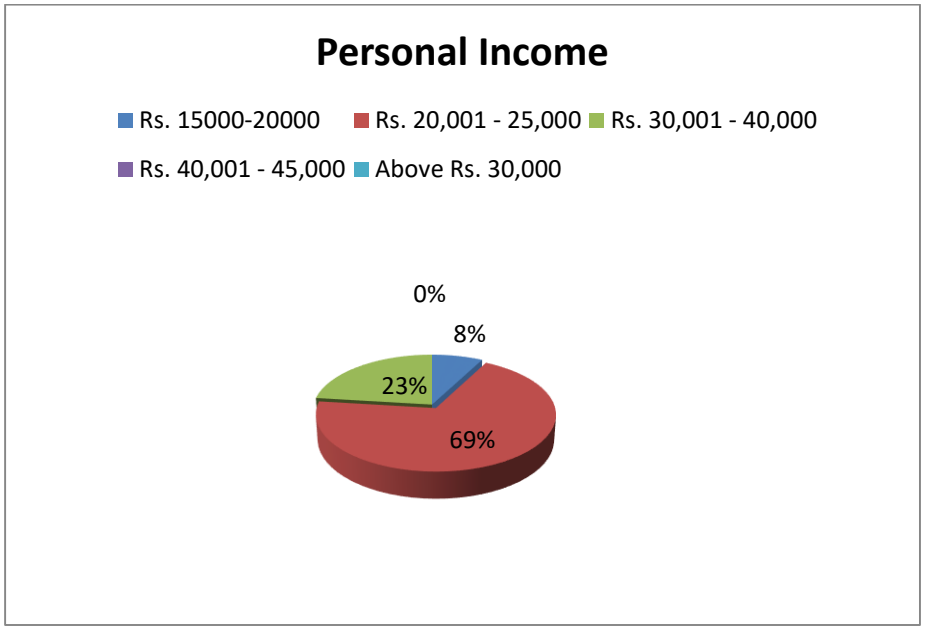

Figure 13: Personal Income

3.7.4 Facilities Available

Facilities available at the houses, shops and factories are depicted here. It shows that electricity, water supply, telecommunication, sewerage, gas supply and every other routine facility is available in study area.

3.7.5 Literacy Rate

From survey results, it was found that 14% of the studied population was illiterate, 7% was up to primary level, 43% studied up to middle level and only 36% of the respondents studied up to higher secondary level.

3.7.6 Common Diseases

According to the survey the common diseases recorded in the project area were, Diabetes, Fever, Hepatitis, Hypertension, stomach problems, Malaria, Typhoid, Nephritis and Diarrhea.

3.8 Lab Reports of Environmental Analysis

Testing of different parameters was done from a certified laboratory named SEAL to check the quality of different environmental parameters. The copy of the lab reports of these parameters (ambient air analysis, water quality analysis and noise) is attached at Annexure of this EIA Report.

3.9 Suitability of Site:

Comprising all assessment of above baseline data there will be no significant ecological/ environmental impact expected in and around the present selected project site, hence it is suitable for the proposed project.

4. POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATIONS

This chapter identifies the potential impacts related with Preconstruction, construction and operation phases of the Project on the physical, ecological and socio-economic domains of the environment. Accordingly, mitigation measures have been proposed to mitigate the negative impacts and to enhance the positive impacts.

4.1 APPROACHES AND METHODOLOGY

During the preparation for the project construction phase the future contractors must be notified and prepared to co-operate with the executing agency, project management, supervising consultants and local population in the mitigation of impacts. Furthermore, the contractor must document and implement the EMP in full and be ready to engage trained environmental management staff to audit the effectiveness and review mitigation measures as the project proceeds. The effective implementation of the EMP will be prepared and must be audited and this will be considered as the most important part of planning. In this regard the proponent must fulfill the requirements of the law and guidance prepared by EPA on the environmental aspects of power projects and the recommendations already made for projects in this EIA and under EIA/IEE regulation and Punjab Environmental Protection Act (amended 2012).

For impact identification, various methodologies are available including the checklists, interaction matrices, networks and overlays. Among these four methods, following two are used in EIA of Shenzhen City:

- Project Interaction Matrix
- Checklists

Project Interaction Matrix

Interaction matrix is a two-dimensional matrix wherein the project actions are placed along one axis (i.e. along y-axis) and on the other axis there are different environmental parameters likely to be affected by the proposed project actions grouped into categories i.e. Physical, Ecological & Socio-economic Environment. Interaction matrix is used in this project due to the following reasons:

- It provides cause-effect relationship between the project actions and resulting consequences impacts.
- It provides nature (+ve or -ve) and weighting of different impacts.
- It provides cumulative impacts of a project.

Matrix grouped project actions into temporal phases. For the impact assessment, project interaction matrix is used by dividing the project action into different phases (Preconstruction, construction and operation). The environmental impacts are divided into three main categories including physical, ecological and socio-economic domains. The environmental impacts of the project actions are identified and weighed into the following categories:

+3 = Extremely Beneficial

+2 = Potentially Positive

+1 = Slightly Positive

0 = Insignificant

-1 = Slightly Negative

-2 = Potentially Negative

-3 = Extremely Negative

The assignment of significance is based on the previous knowledge and professional judgment of EIA team experts. The project impact matrix has been developed and attached in Annexure. It may be noted that the environmental parameters, which are not related to the implementation of the projects, have not been considered in the matrix.

Checklist

The assignment of significance is based on the previous knowledge and professional judgment of EIA team experts. The project Checklist has been developed for "without" and "with mitigation" is attached as Annexure. It may be noted that the environmental

parameters, which are not related to the implementation of the projects, have not been considered in the matrix.

4.2 ENVIRONMENTAL IMPACTS AND THEIR MITIGATION DURING PRE-CONSTRUCTION PHASE

4.2.1 ENVIRONMENTAL IMPACTS REGARDING PROJECT LOCATION

The project is the 662 Kanal for housing scheme which will be constructed at designated residential area in Multan. So, there is no impact regarding project location.

Mitigation

As in the case of project location, there are no negative impacts on the environment, so no mitigation measures will be required.

4.2.2 ENVIRONMENTAL IMPACTS REGARDING PROJECT DESIGN

The design for Shenzhen City has not affected the adjacent residential areas which are present just close to the project site. Shenzhen City has been designed in order to ensure the privacy of neighborhood. Adequate daylight and air in the neighboring entities and impact in this regard shall be insignificant The Shenzhen City is to be designed in a way that it guarantees all compliance with the Punjab Environmental Quality Standards (PEQS) and Building Codes.

4.3 ENVIRONMENTAL IMPACT AND THEIR MITIGATION DURING CONSTRUCTION PHASE

4.3.1 PHYSICAL IMPACTS

Soil contamination

- Soil Construction activities such as excavation, filling and disposal of materials (both solid and liquid) will affect the existing soil conditions in the Project Site and in its nearby surroundings. Spillage from the generator or from moving vehicle will cause contamination of soil at construction sites.
- Construction site will generate about 0.5 kg/person/day solid wastes from site camps and construction debris from construction activities. Although quantity

of waste is much less, inappropriate disposal methods will have a negative impact on the physical environment of the project area.

Mitigation

Good engineering practices will help in controlling soil erosion at construction sites. Following measures will be adopted as per site conditions:

- Soil contamination can be curtailed by reducing the oil spill at project construction areas by well maintaining the construction vehicles as well as generators.
- The Contractor is required to impart proper training to his workforce in the handling and proper disposal of solid waste.
- Proper drainage facility will be provided to avoid the water accumulation, which will minimize the soil contamination.
- Ground shall be leveled to avoid slopes.
- Proper solid waste management plan should be developed by the Contractor and implemented to avoid the litter and any other waste problems.

Contamination of Surface and Groundwater Resources

Sewage and sanitary wastewater generated from the construction site may contaminate groundwater, if not disposed of properly. There is Sewer line /Drain present near the project site so all the sewage and sanitary wastewater will drain in it. The proponent has taken environmental approval for the safe and proper disposal of waste generated.

Mitigation Measures of Impacts on Water Resources

Sewage from construction camp will be disposed off using septic tank which has been designed properly keeping in view the following parameters:

- Soil stratigraphy at site
- Depth of groundwater table
- Discharge of sewage from construction camp

The septic tank has been designed by the Design Consultant according to the relevant standards. The example of the septic tank is shown in Figure below;

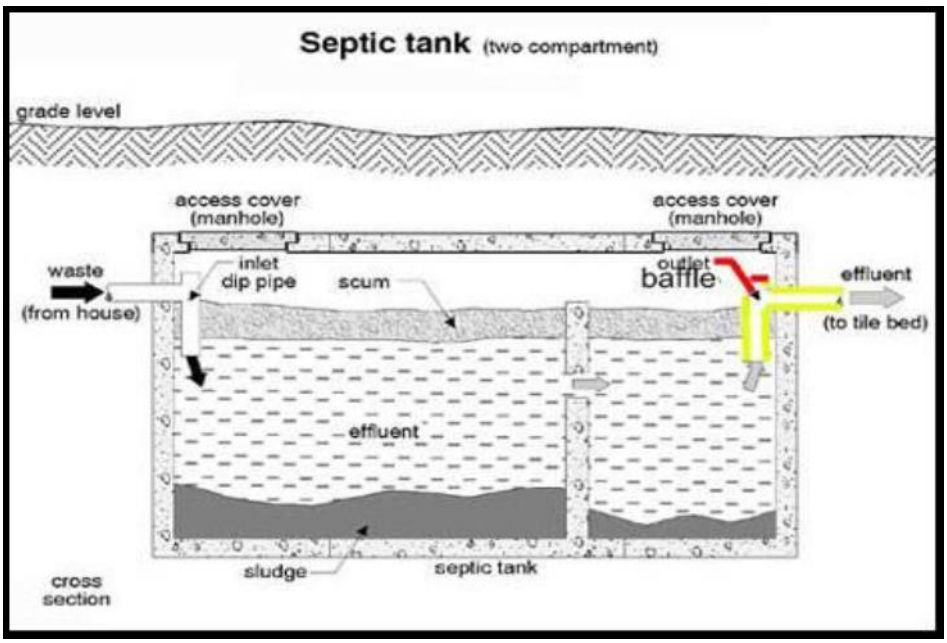

Figure 14: Septic tank

- Avoid accidental spills of oils and lubricants through good practice. Prepare and implement Emergency Response Procedures in case of any spill hazard.
- Construction site effluent drainage should be established in areas with adequate natural drainage channels in order to facilitate flow of the effluents.

Impact on Ambient air quality

Due to the construction activities like excavation, clearing, leveling and compaction with the use of machinery like batching plants, excavators, dump truck and other transport vehicles etc. Most of these are using diesel engines that generate noise and exhaust emissions. The possibility of exhaust emissions increases when old vehicles/plants are utilized for the execution purposes. Generally, the above activity is generating particulate- matter (PM10), smoke, dust, CO and NOx in the ambient air, which is deteriorating the air quality and resulting in impacts on human health, fauna and flora. The movement of heavy machinery and vehicles on the dirt tracks is also causing dust emissions. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface.

Mitigation Measures of Impacts on Ambient Air Quality

- Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM10.
- Equipment and vehicles powered with diesel should be well maintained to minimize particulate emissions.
- Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin.
- The fugitive dust emission will not be a problem because the roads are paved but for the precautionary measure sprinkling of water by water trucks will be done.
- As well as the temporary boundary wall made of wood will be constructed that will act as barrier for air emissions going towards residential area.

Impact on Ambient Noise Levels & Vibration

During the implementation of the project a large amount of equipment and construction machinery will be utilized for construction. The equipment would include excavators, concrete mixer, trucks and other machinery and vehicles. The operation and movement of such equipment will increase the noise and vibration in the Project Area and Neighborhood residential may be disturbed by the noisy activities. The impact will be significant when compared to the without project situation.

Mitigation Measures of Impacts on Noise & Vibration

- For the construction machinery generating noise level in excess of that prescribed in PEQS and WHO limits, Contractor will make arrangements to bring the noise level within applicable limits (including proper tuning of vehicles and mufflers/silencers). Movements of the trucks and other construction machinery causing high noise levels must be restricted at nighttime to avoid disturbance to the nearby locality. Truck drivers should be instructed not to play loud music especially night and stop use of horn.
- As well as the temporary boundary wall made of wood planks will be constructed that will act as barrier.

Disposal of Construction Debris & Garbage

During construction phase of the Project, large quantity of construction waste will produce, the disposal of which, if not managed properly could have negative impacts on the site and surrounding areas. Clearing of shrubs and grass could pose a fire hazard and affect air quality if burned on location. Construction materials including concrete waste, wood, steel, packaging plastics etc. could be dispersed that may result in the blockage of drainage channels if not disposed of at approved disposal sites.

Mitigations

- A site waste management plan should be made the responsibility of the construction contractor to provide for the designation of appropriate waste storage area on the site and a schedule for the timely collection and removal of construction debris to an approved dump site.
- The organic waste produced during site clearing should be mechanically mulched and composted at the site and used for landscaping.
- Arrangements should be made for regular garbage collection and removal of sewage from the construction site.

Traffic annoyance

Due to the movement of large construction vehicle there may be traffic problem.

Mitigation

During the construction phase traffic control measurement will be implemented. All raw materials will be transported to the site at nighttime due to at nighttime traffic flow very low in the project area.

4.3.2 ECOLOGICAL ENVIRONMENT

Impacts on Ecological Environment

- ❖ Impact on Flora

Project area is open there was no tree present on the project site. All the project activities will be done inside the premises of the boundary walls so there will be no effect on outside the boundaries.

- ❖ Disturbance to Fauna:

The associated avifauna with tress will be affected and they will move away to nearby nesting places.

Mitigations

Almost 600 trees of single species are planted at project site which will not cut down during construction phase. In order to enhance the environmental measures of the site the Landscaping plan has been prepared and attached as Annexure. As almost significant amount of open area will be used for the landscaping, so it will enhance the natural features of the area.

4.3.3 SOCIO ECONOMIC ENVIRONMENT

- ❖ Impacts on Local Population

The population residing in and the surroundings of the Project Area will be affected during the construction phase as follows:

- Insecurity problems may arise for the local population due to the Contractor's workers during the construction phase
- Community may face the noise and dust problems during the construction activities.
- Theft problems to the community by the Contractor's workers and vice versa.

Mitigations Measures of Impacts on Local Population/Workforce

- Contractor should select specific timings for heavy machinery operation to cause least disturbance to the population considering their peak movement hours.
- Effective construction controls may be made by the Contractor to avoid inconvenience to the population due to noise, smoke and fugitive dust.
- Haul-trucks carrying concrete, aggregate and sand fill materials will be kept covered with tarpaulin to help contain the construction materials being transported to the specific site.
- The Contractor should warn the workers not to involve in any theft activities and if anyone would involve in such type of activities, he will have to pay heavy penalty and would be handed over to police. Similarly, at the time of hiring

labour/workers, Contractor has to ensure that the workers should be of good repute/character.

❖ Impacts on Public Health and Safety Hazard

- Construction activities, particularly excavation and movement of haul trucks and machinery may prove dangerous for the safety of the workers as well as for local residents.
- Contractor's staff while working on height, transoms, etc. may slip and get injured. Similarly, working at excavated areas may also cause injuries due to the failure of side slopes of excavation.
- The storage of all solid waste shall be practiced preventing the attraction, harborage or breeding of insects or rodents, and to eliminate conditions harmful to public health or which create safety hazards, odors, unsightliness or public nuisance.

Mitigation Measures of Impacts on Public Health and Safety Hazards

- Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the workplace. Compliance with the safety precautions for construction workers as per International Labor Organization (ILO) Convention No. 62 will be ensured by the Contractor.
- Heath safety procedure is also prepared and will be implemented. Training of workers in the construction safety procedures, environmental awareness, and equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.
- Fire Safety System Layouts is attached in Annexure.

4.4 ENVIRONMENTAL IMPACTS AND MITIGATIONS MEASURES DURING THE PROJECT OPERATION

4.4.1 GROUND WATER RESOURCE

During the operational phase the ground water will be used although during the construction phase groundwater will be used. The quantity of water used during operational phase is given as under-:

Total Water Usage during operational phase: 1 cusec per day approximately

The quantities of required water from groundwater usage will ultimate impact on level of ground water resource which may reduce with the passage of time.

Mitigation

In order to reduce the impact on ground water resource following measures will be adopted.

- There will be proper lining and engineered structure to avoid the leakage.
- The water conservation will be adopted in washrooms that will be installed water saving gadgets and eco-devices.

4.4.2 AIR EMISSIONS

There will be no air emission generated as no such process involved the air emission which will be expected during the operation will be dust particles and gasses emitting from vehicles and houses kitchens.

Mitigation

- Water sprinkling will be done for dust emission.
- Regular monitoring on all emission sources should be done and measures will be taken if found non-compliance with PEQS

4.4.3 SOLID WASTE

Daily solid waste generation during operational phase will be 1 ton/day consisted of municipal as well as food waste. The waste is generated by households and from commercial points.

Mitigation

Shenzhen City management will Purchase Solid Waste collection vehicles for carrying waste from site on daily basis.

- The large waste bins will be placed at suitable places at all visitor areas.
- The waste will be collected from shop to shop and from the bins placed by the workers of waste management team.

4.4.4 WASTEWATER

Daily wastewater generation during operational phase will be 0.80 cusec per day from households.

Mitigation

- The wastewater will be the municipal in nature and will be passed from septic tank before the final disposal in specified drain system.
- The extra treatment will be done by increasing the bacterial activity in septic tanks through the anaerobic and sludge degradation bacteria.

4.4.5 SECURITY ISSUE

There is need for vigilant security presence in and around the Shenzhen City round the clock on a permanent basis to guard against theft and terrorist activities. The security concerns will have to be addressed adequately. Any threat to the security should be dealt with as a major challenge.

Mitigation

A comprehensive Security Plan is developed and implemented for the Shenzhen City which includes construction of a security check post on the main entrance gate consisting of security guards. The aim of the security is to check out the in and out movements of vehicles and to monitor all the security related issues. The walk though gates will also be installed for checking of the visitors. In addition to this the security guards regularly monitor in and around the whole park to ensure proper security. Moreover, the security cameras will be installed at critical places inside and outside the walk and shop park. The security cameras are operated from the common control room.

4.4.6 EFFECT ON FLORA

There will be no effect on flora.

Mitigation

So, there will be no mitigatory measures are required. Anyhow native plants will be planted in abundance within Shenzhen City. The plantation will enhance the environmental features of the project.

4.4.7 EFFECT ON FAUNA

There will be no effect on fauna.

Mitigation

So, there will be no mitigatory measures are required for them. But use of native trees will welcome the local and migratory birds for nesting and shelter.

4.4.8 ASSESSING IMPACTS

Planning for environmental assessment depends upon reliably predicting project impacts on resources and managing those impacts to achieve the greatest gain or the smallest loss. The basis of the prediction is the knowledge of the proposed project and of local resources with which it is expected to interact. Two types of information are, therefore, needed: a comprehensive description of all resources likely to be affected by each of the project components, and an understanding of the project component itself. The baseline information given in the previous section includes all resources, natural and human and all aspects of those resources that may be expected to be touched, directly or indirectly, by the project. Conversely, project information will include all aspects of construction or operation that might affect the environment. Following are the probes which should consider before assessing the impacts.

What is the problem?

The proposed project is of Mix use Development. The nature of the land is open land having native vegetation such as Neem, Kikar, Safeda and wild grass. The study area is fertile, leveled and agricultural land. In addition, to the noise and fugitive dust emissions during the development phase solid waste management and disposal issues may arise along with wastewater disposal issues. The major impact associated with the operation of project includes the management of the solid waste generated during the processing, wastewater management and air pollution due to the emission of particulate matter from generators and vehicles.

When problem will occur and when it should be addressed?

The impacts from the establishment of project will occur during the operation due to the development involved of housing scheme and the people residing in the project area. These issues included; noise generation, fugitive dust emissions, solid waste management, wastewater disposal, top-soil removal, Health and Safety issues and change in the geographic features of the area. These all problems should be addressed on-site where they are being generated, to avoid the residual or adverse impacts.

Where problem should be addressed?

The problem will be generated from site development and operation of the unit. So, it should be addressed on source i.e. at site within the same time frame.

How the problem should be addressed?

Proper mitigations measures will be provided according to the nature of the impacts/problems. For example, against dust emissions sprinkling of water may be done on regular basis, for solid waste proper solid waste management and disposal practices may be adopted, to manage liquid waste proper treatment may be made before discharging into the receiving body. The change landscape is estimated to be quite minor and the removed topsoil may be used to reclaim the disturbed areas.

4.4.9 APPROACH TO ASSESSMENT

Various components of the project will interact with local resources in different ways. Therefore, it is useful to divide the project into units small enough that the interactions may be examined individually as well as collectively. The main construction components of the project are Excavations, Concrete, Mixing, Elevation, Finishing and installation of entertainment facilities. Each of these is in effect a project itself. Various aspects of each component are treated separately. They are examined both in terms of construction period and much longer period of project operation. Some component of the project has positive and some have negative impact on environment and on the different factors like socio-economy of the community.

Negative impact

This residential, entertainment as well as commercial development has no potential negative impacts on environment as well on the socio-economic feature of community. Anyhow it has some impacts which have discussed as well as their mitigatory measures have well defined in the previous section.

Positive impacts

The positive impacts of the project are given as under-:

- Majority of people perceive that development of the housing scheme would cause high positive impacts on them and their communities.
- They have high expectations and hopes from the proposed project and its management.
- They co-relate their positive attitude towards the housing scheme with many socio-economic opportunities and benefits.
- People believe that the development of housing scheme will open up an employment opportunity for local people. These employment opportunities will follow a chain of indirect benefits i.e. the young people of these communities will get employment and business opportunities.
- This trend will enhance family protection, socialization and emotional satisfaction of people.
- This project will provide many opportunities for the wage earners and for those people want to settle their own business.

4.4.10 RISK ASSESSMENT

Risk assessment is done for construction phase which will describe the potential impacts/hazards so that the precautions/control may adopt accordingly.

Risk Magnitude/ severity	Assigned Values	Probability/ Likelihood	Assigned Values
Low	1	Highly Unlikely	1
Medium	2	Unlikely	2

High	3	Possible	3
Extreme	4	Likely	4
Catastrophic	5	Very likely	5

Table 6: Risk assessment during construction and operational phase of Shenzhen City

Hazard	Source	Duration Hours/day	Severity S	Likelihood L	Risk amount S*L
Noise	Generators and excavation	8	2	4	8
Dust	Excavation and transportation of construction materials	8	3	4	12
Vibration	Excavation	8	2	3	6
Falling objects	Construction activities	8	4	2	8
Ergonomics	No proper posture for Work	8	3	3	9
Workload	Continues work	8	2	3	6

Temperature	Sunlight during summer	8	3	4	12
Fire	Flammable materials, electrical short circuit	8	3	4	12
Work at height	----	During work	3	4	12
Air pollution	Vehicles and generator	During their working	3	5	15

Likelihood → / Severity ↓	1	2	3	4	5
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Green color boxes (1-5): Low risk and unlikely to cause health impact.

Yellow color boxes (6-12): Noticeable risk. It has potential to cause medium impacts.

Red color boxes (15-25): High risk & cause high level health impacts.

4.4.11 CONTROLS

All most all the risks which can occur in this project during both construction and operational phase does not fall in high risk area. But there is still need of controls which are given below:

- Generator should put at such place where its noise does not disturb the community as well as the workers during construction.
- New technology generator should be used and its proper maintenance to avoid the air emission.
- Regular tuning of construction vehicles and generators.
- To avoid the dust water should sprinkle after specific duration.
- PPE should be provided to workers.
- Job rotation to avoid work pressure.
- Proper holdings, controls and use of PPEs for safe work at height.

4.4.12 POTENTIAL ENVIRONMENTAL ENHANCEMENT MEASURES

Besides the concrete measures to be adopted as described above, the quality of environment will further be enhanced through the running of project in complete accordance with the 5RS Principles- Reduce, Reuse, Recycle, Refurbish and Retrofit. Good housekeeping practices will be the order of the day. Extensive tree plantation will be done.

5. ENVIRONMENTAL MANAGEMENT PLAN

5.1 ENVIRONMENTAL MANAGEMENT PLAN

This Chapter provides an overall approach for managing and monitoring the environmental issues and describes the institutional framework and reporting mechanism to implement the Environmental Management Plan (EMP) for the construction of Shenzhen City. The EMP has been prepared with the following objectives:

- Provide the details of the project impacts along with the proposed mitigation measures, and a corresponding implementation schedule.
- Define the roles and responsibilities of the project proponent, contractor, and supervisory consultants in order to effectively communicate environmental issues among them.
- Frame a monitoring mechanism, reporting frequency, auditing mechanism and identifying monitoring parameters to ensure that all the mitigation measures are completely and effectively implemented.
- Define the requirements necessary for documenting compliance with EMP and communicating it to all the concerned regulatory agencies.

5.2 STRUCTURE OF EMP

The EMP has been divided into the following sections:

- Review of regulatory requirements and applicable standards
- Mitigation Management Matrix (MMM)
- Institutional Arrangements for Implementing the EMP
- Roles and Responsibilities of the different agencies.
- Environmental Monitoring Plan
- Training program

5.3 REGULATORY REQUIREMENTS AND APPLICABLE STANDARDS

The main law and legislation concerned with the environment is Pakistan Environmental Protection Act (PEPA) 1997. This Act is a fairly comprehensive legislation and provides for protection, conservation, rehabilitation and improvement of the environment.

The salient features of the law are:

- No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal EPA or Provincial EPAs an EIA and has obtained NOC.
- Establishment and Formation of the Pakistan Environmental Protection Council (PEPC).
- Powers and Functions of the Federal and Provincial Environmental Protection Agencies.
- Prohibition of certain discharges or emissions.
- NEQS for wastewater, air emissions and noise.
- Empowers Government to issue notices and to enforce them for the protection of the environment.

The proposed project related environmental laws/guidelines are as follows:

- Pakistan Environmental Protection Agency Regulations, 2000 for Review of IEE and EIA
- Pakistan Environmental Impact Assessment Procedures
- Guidelines for Public Consultation
- NEQS
- Sectoral Guidelines for Environmental Reports, Major Roads, October 1997

5.4 PROPOSED MONITORING PROGRAM TO ASSESS PERFORMANCE OR OUTPUT OF EMP

This identifies the environmental impacts of multipurpose project during the construction and operation stages and establishes the linkages between the environmental and social impacts, mitigation strategy and the agencies responsible for execution. The following entities need to be identified:

- The mitigation measures recommended in EIA.
- The person/organization directly responsible for adhering to or executing the required mitigation measures.
- The person/organization responsible for ensuring and monitoring adherence to the mitigation measures.

- The parameters which will be monitored to ensure compliance with the mitigation measures.
- The timing at which the mitigation or monitoring has to be carried out.

Table 6: Environment Management Plan

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods	Environmental Budget
			Execution	Monitoring		
Construction phase						
Physical Environment						
1	Soil erosion may take place in the project as a result of excavation. Soil contamination may take place due to the generated solid waste at project site in addition to oil spillage from generator or vehicles.	▪ Good engineering practices should be adopted by Contractors, which will help to control soil erosion at the construction sites. ▪ Soil contamination can be curtailed by reducing the oil spill from generator and other machinery at project construction areas, proper solid waste management. ▪ The Contractor is required to impart proper training to	CC	SC and Housing Scheme Management	▪ Equipment maintenance. ▪ Placement of solid waste storage containers at project site. ▪ Collection and disposal by Housing Scheme Management	50,000/-

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods	Environmental Budget
			Execution	Monitoring		
		his workforce in the storage and handling of obnoxious materials, like oil, diesel and petrol that can potentially cause soil contamination.				
2	Sewage will be generated from the construction site. This may contaminate surface and groundwater, if not disposed of properly	▪ Septic tank and artificial drainage pipe should be developed and attached to natural drainage. ▪ Additional Bacteria will be dose in the septic tank in order to degrade the waste and sludge	CC	SC and Housing Scheme Management	▪ Septic tank ▪ Monitoring will be done by a third party.	50,000/-
3	Generation of noise and exhaust	▪ Tuning of vehicles should be	CC	SC and Housing	▪ Maintenance of Vehicles ▪ Water Sprinkling	30,000/-

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods	Environmental Budget
			Execution	Monitoring		
	emission due to construction activities like excavation, clearing, leveling and compaction	made mandatory to reduce the emissions of NOx, SOx, CO and PM10. ▪ Water Sprinkling on roads ▪ Equipment and vehicles should be well maintained to minimize particulate emissions. ▪ Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials		Scheme Management	▪ Filled Vehicles covered with tarpaulin	

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods	Environmental Budget
			Execution	Monitoring		
		and during storage at site, with tarpaulin.				
Ecological Environment						
3	There will be no tree affected with the implementation of the project. All project activities will be done under the premises of the boundary walls so there will be no effect on outside the boundaries.	Approximately 600 trees are planted within the housing scheme which will not cut down during construction phase In order to enhance the environmental measures of the site the significant number of indigenous trees will be planted. Landscaping plan has been prepared and attached as Annex-I.	CC	SC and Housing Scheme Management	Plantation of trees	500,000/-
Social Environment						
4	People will face the noise and dust	▪ Effective construction controls may be			▪ Sprinkling of water in dust	--

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods	Environmental Budget
			Execution	Monitoring		
	problems during the construction phase especially for the nearby residents	made by the Contractor to avoid inconvenience to the population due to noise, smoke and fugitive dust. ▪ The site will be closed with wooden planks which reduce the dust and the noise levels going towards the residents ▪ Temporarily, the Contractor should select specific timings for heavy machinery operation so as to cause least disturbance to the population considering their peak movement hours.	CC	SC and Housing Scheme Management	affected areas as per schedule ▪ Timing of vehicle movement to be noted.	

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods	Environmental Budget
			Execution	Monitoring		
5	Construction activities, particularly excavation and movement of haul trucks and machinery may prove dangerous for safety of the workers as well as for the residents. Contractor's staff while working on the high-rise columns, transoms, etc. may slip and get injured.	• Contractor will ensure the provision of medicines, first aid kits, emergency vehicles, etc. at the workplace. • Training of workers in the construction safety procedures, environmental awareness, equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper and sustained usage.	CC	SC and Housing Scheme Management	Instruct Staff of the Contractor to strictly follow the HSE policies of the company	--
Operational phase						
Physical Environment						

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods	Environmental Budget
			Execution	Monitoring		
1	1 cubic meter per day of the ground water will be used. The groundwater usage will ultimately impact on level of ground water resource which may reduce with the passage of time.	• There will be proper lining and engineered structure to avoid the leakage. • The water conservation will be adopted in washrooms, by installation of water saving gadgets and eco-devices. • The wastewater will be the municipal in nature and will be treated through WWTP before the final disposal in main sewer line drain.	Housing Scheme Management	Monitoring will be done by third party as per directed by EPA	Regular monitoring	50,000/-
	The solid waste generation during operational phase will be 1 ton per day if	• The large waste bins will be placed at all the floors • The waste will be collected from each floor and	Housing Scheme Management	Monitoring will be done by third party as per directed by EPA	Regular Monitoring of Solid waste collection	50,000/-

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/Monitoring methods	Environmental Budget
			Execution	Monitoring		
	not managed cause the aesthetic problem with spread of diseases.	from the bins placed by the workers of waste management team.				
Social/ Ecological Environment						
2	The construction of this residential cum commercial and entertainment complex will increase the social life of the community.	• Proper maintaining the Multi-purpose Building to ensure the increasing lifestyle of the community.	Housing Scheme Management	Housing Scheme Management	Monitoring to be conducted to make sure that proposed plan is working and Plantation of plants And	300,000

Table 7: Mitigation management matrix

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
Construction phase					
Physical Environment					
1	Soil erosion may take place in the project as a result of excavation. Soil contamination may take place due to the generated solid waste at project site in addition to oil spillage from generator or vehicles.	▪ Good engineering practices should be adopted by Contractors, which will help to control soil erosion at the construction sites. ▪ Soil contamination can be curtailed by reducing the oil spill from generator and other	CC	SC and Shenzhen City	▪ Equipment maintenance. ▪ Placement of solid waste storage containers at project site. ▪ Collection and disposal by Shenzhen City

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
		machinery at project construction areas, proper solid waste management. ▪ The Contractor is required to impart proper training to his workforce in the storage and handling of obnoxious materials, like oil, diesel and petrol that can potentially cause soil contamination.			

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
2	Sewage is generated from the construction site. This may contaminate surface and groundwater, if not disposed of properly	▪ Septic tank and artificial drainage pipe should be developed and attached to natural drainage. ▪ Additional Bacteria will be dose in the septic tank in order to degrade the waste and sludge	CC	SC and Shenzhen City Management	▪ Septic tank

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
3	Generation of noise and exhaust emission due to construction activities like excavation, clearing, leveling and compaction	▪ Tuning of vehicles should be made mandatory to reduce the emissions of NOx, SOx, CO and PM10. ▪ Water Sprinkling on roads ▪ Equipment and vehicles should be well maintained to minimize particulate emissions.	CC	SC and Shenzhen City Management	▪ Maintenance of Vehicles ▪ Water Sprinkling ▪ Filled Vehicles covered with tarpaulin

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
		▪ Haul-trucks carrying, earth, sand, aggregate and other materials should be kept covered during transportation of materials and during storage at site, with tarpaulin.			

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
Ecological Environment					
1	There will be no tree will be affected with the implementation of the project. All project activities will be done under the premises of the boundary walls so there will be no effect on outside the boundaries.	Approximately 600 trees are planted within the housing scheme which will not cut down during construction phase In order to enhance the environmental measures of the site the significant number of indigenous trees will be planted. Landscaping plan has been prepared and attached as Annex-I.	CC	SC and Shenzhen City Management	Plantation of trees

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
Social Environment					
1	People will face the noise and dust problems during the construction phase especially for the nearby residents	▪ Effective construction controls may be made by the Contractor to avoid inconvenience to the population due to noise, smoke and fugitive dust. ▪ The site will be closed with wooden planks which reduce the dust and the noise levels going	CC	SC and Shenzhen City Management	▪ Sprinkling of water in dust affected areas as per schedule ▪ Timing of vehicle movement to be noted.

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
		towards the residents ▪ Temporarily, the Contractor should select specific timings for heavy machinery operation so as to cause least disturbance to the population considering their peak movement hours.			
2	Construction activities, particularly excavation	• Contractor will ensure the provision of medicines,			

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
	and movement of haul trucks and machinery may prove dangerous for safety of the workers as well as for the residents. Contractor's staff while working on the high-rise columns, transoms, etc. may slip and get injured.	first aid kits, emergency vehicles, etc. at the workplace. • Training of workers in the construction safety procedures, environmental awareness, equipping all construction workers with safety boots, helmets, gloves, ear plugs, and protective masks, and monitoring their proper	CC	SC and Shenzhen City Management	Instruct Staff of the Contractor to strictly follow the HSE policies of the company

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
		and sustained usage.			
Operational phase					
Physical Environment					
1	1 cubic meter per day of the ground water will be used. The groundwater usage will ultimate impact on level of ground water resource which may reduce with the passage of time.	• There will be proper lining and engineered structure to avoid the leakage. • The water conservation will be adopted in washrooms that will be installed water saving gadgets and eco-devices.	Shenzhen City Management	Monitoring will be done by third party as per directed by EPA	Plantation of plants

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
	The solid waste generation during operational phase will be 1 ton per day if not managed cause the aesthetic problem with spread of diseases. The 1 cubic meter per day from different activities in walk and shop park	• The large waste bins will be placed at all the floors • The waste will be collected from each floor and from the bins placed by the workers of waste management team. • The wastewater will be the municipal in nature and will be passed from septic tank before the final	Shenzhen City Management	Monitoring will be done by third party as per directed by EPA	Regular Monitoring of Solid waste collection

Sr. no.	Anticipated impacts	Mitigation measures	Responsibility		Actions/Monitoring parameters/ Monitoring methods
			Execution	Monitoring	
		disposal in main sewer line drain.			
Social Environment					
1	The construction of this residential cum commercial and entertainment complex will increase the social life of the community.	• Proper maintaining the Multi-purpose Building to ensure the increasing lifestyle of the community.	Shenzhen City Management	Shenzhen City Management	Monitoring to be conducted to make sure that proposed plan is working

5.5 INSTITUTIONAL ARRANGEMENTS FOR IMPLEMENTATION OF EMP

The main institutions involved in the implementation and management of EMP will be as follows:

- Supervisory Consultants (SC)

- Construction Contractor (CC)
- Punjab Environmental Protection Agency (Punjab-EPA)
- Shenzhen City

5.6 ROLES AND RESPONSIBILITIES

The key organizations will have the following roles and responsibility during the construction and operation stages:

5.6.1 CONSTRUCTION STAGE

During the construction stage, Construction Contractor (CC) will be mainly responsible for the execution of the mitigation measures. Supervisory Consultants (SC) will be responsible for the monitoring of the compliance with top management as defined in mitigation management matrix.

5.6.2 OPERATION STAGE

During the operational stage of the project, role of CC and SC will gradually decrease. During this phase of the project, implementation of recommendations of EMP and its supervision will be the responsibility of Shenzhen City Management and Punjab-EPA as defined in mitigation management matrix.

5.7 ENVIRONMENTAL MONITORING PLAN

5.7.1 OBJECTIVES

The objectives of the environmental monitoring during the construction and operation stages are as follows:

- To check compliance with the requirements of the EMP by monitoring activities of the project contractors. This will be called Activity Monitoring.
- To monitor actual impacts of the project activities on physical, ecological and socioeconomic receptors of the Project Area so that any impacts not anticipated in the EMP or impacts which exceed the levels anticipated in the EMP can be identified and appropriate mitigation measures can be adopted in time. This objective will be achieved through effects monitoring.

To achieve these objectives, the following monitoring program will be implemented.

5.7.2 MONITORING STRATEGY

Activity Monitoring

Activity monitoring will be carried out to ensure compliance with the requirements of the EMP.

The mitigation management matrix will be used as a management and monitoring tool. Activity monitoring will be the responsibility of all organizations involved in the operation, i.e. top management of multi-purpose building, Project Consultants and the Contractors and hence it will be done at three levels:

- Activity Monitoring by Shenzhen City management
- Activity Monitoring by Consultant's field monitors
- Activity Monitoring by the Contractor's officers

The Contractors will report compliance with the MMM to SC and Shenzhen City management for verification.

Effects Monitoring

Effects monitoring will be the responsibility of Shenzhen City management. Monitoring requirements have been outlined in the EMP. However, a detailed monitoring program is attached. The monitoring program describes in detail the resources and methodology that will be adopted for the purpose of Effects Monitoring.

Physical Environment will target at identifying project impacts on:

- Water
- Air

Ecological Environment

Floral surveys will be conducted to determine the effects of different project activities on Flora. The recommended effects monitoring protocol for Flora are provided.

Socio-economic Environment

Effects on the socio-economic environment will be monitored by the consultants who will conduct survey both during construction and operation stage. The surveys will be structured to ascertain the level of impacts during the course of the project and the implementation of mitigation measures prescribed in the EMP such as health and safety of communities.

Table 8: Recommended Activity Monitoring Protocol for Physical, Ecological and Social Environment

Parameter/Receptor	Location	Monitoring Mechanism	Monitoring and Reporting Frequency
Water Quality	▪ **Near the project area** ▪ **Concrete preparation plants** ▪ **Fuel (Petrol. Oil and Grease) products storages**	**Discrete grab sampling and laboratory testing of water samples.**	▪ **Sampling and laboratory testing should be done on Monthly basis during the construction and annually during the operational stage.** ▪ **Outlet and drains from the mechanical repair units should include testing.**
Dust Emissions	▪ **Construction site**	**Visual checks**	▪ **Daily visual monitoring during routine monitoring by activity monitors and reported on a monthly basis during the construction period.**

Parameter/Receptor	Location	Monitoring Mechanism	Monitoring and Reporting Frequency
Noise Levels	▪ Construction site ▪ Nearby area due to track movement	Noise meter	▪ On fortnight basis throughout the construction period. ▪ Quarterly during the operational stage.
Stack emissions and Ambient Air	Silencers of heavy machinery, trucks and other vehicles. Stack monitoring of generator. Construction site Ambient Air	Monitoring of ambient air quality in ppb.	▪ Monthly monitoring of air pollution parameters including PM, NO_X, SO_X, CO, Hydrocarbons during the construction period, and annually during the operation stage only for ambient air
Ecological Environment			
Plants disruption	As plants are present at site so it will be monitored around the Project Area during the construction phase	Plants	▪ Weekly during routine monitoring and reported on monthly basis during the construction period, and once in a year monitoring and reporting during the operation period.

Parameter/Receptor	Location	Monitoring Mechanism	Monitoring and Reporting Frequency
Socio-cultural Environment			
Inconvenience to community	All around the Project Area	Consultations with community to get feedback about inconvenience due to the construction activities to perform their daily routine chores.	▪ Monthly monitoring and reporting during the construction period.

Table 9: Recommended Effects Monitoring Protocol

Parameter/Receptor	Location	Monitoring Mechanism	Monitoring and Reporting Frequency
Water Quality	▪ Sampling from the points located at a greater distance from the construction sites to ensure that	▪ Sampling and laboratory testing of wastewater from WASA drainage system relative away from project site	▪ Sampling and laboratory testing should be done on monthly basis during the construction stage and annually during the

	they show the influence on a wider range of receiving body.		**operation stage.**
Air Quality	▪ **Existing residential near the project site.**	▪ **Ambient air quality monitoring in ppb.**	▪ **Monthly air quality monitoring for NOX, SOX, CO, PM10 during the construction stage. Once a year during the operation stage.**

5.8 MATERIAL TRANSPORTATION PLAN (MTP)

Material Transportation Plan will be prepared which specifies the routes for material transportation for construction of this multipurpose Complex. These routes have been established in such a way that there is minimum hindrance or disturbance to the local communities and flow of traffic. HSE arrangements and proper documentation have been planned in order to achieve the above objectives as follows:

- Material Transportation HSE Arrangements
- Transportation timings should preferably be at nighttime to minimize the traffic conflicts.
- Filled trucks should be covered with tarpaulin to avoid fugitive dust and should be visually inspected for proper loading, sealing and decontamination.

- Vehicles should have passed an annual inspection and carry the fitness certificate.
- The truck drivers will be strictly instructed not to play music and do not use horns at nighttime to minimize disturbances.

Material Transportation Documentation

A field logbook will be maintained for the documentation. This logbook will additionally serve to document observations, personnel onsite, equipment arrival, and departure times, a truck exit inspection checklist and other project information.

Field logbooks will document where, when, how, and from whom any vital project information is obtained. Logbook entries will be completed and accurate enough to permit reconstruction of field activities. Logbooks will be bound with consecutively numbered pages. Each page will be dated and the time of entry notice. All entries will be legible, written in black ink, and signed by the individual making the entries. Language will be factual, objective, and free of personal opinions or inappropriate terminology. If an error is made, corrections will be made by crossing a line through the error and entering the correct information. Correction will be dated and initialed. No entries will be obliterated or otherwise rendered unreadable.

Entries in the field logbook will include at a minimum the following for each field work date:

- Site name and address
- Recorder's name
- Time of site arrival/entry on site and time of site departure
- A summary of any onsite meetings
- Description of transport vehicle(s)
- Quantity of excavated soils in truckloads (approximate percentage of full load)
- Names of waste transporters and proposed disposal facilities
- Quantity of import fill material in truckloads
- Levels of safety protection

The HSE officer of the Contractor will communicate HSE requirements and tailgate safety meetings to all drivers and on-site workers. He will provide information related to contaminant descriptions, and requirements for the containment and cleanup of an accidental release along with basic safety requirements, name of personnel in-charge, contact information and a map and directions to the nearest hospital.

5.8.1 ENVIRONMENTAL MANAGEMENT AND MONITORING PROGRAM

In this section, the mitigation measures that are required, for construction and operation of project, to reduce residual impact to acceptable levels and achieve the expected outcomes of the project, are discussed. The Environmental Management program is based on the type, extent and duration of the identified environmental impacts for construction and operation of project.

It is important that the recommendations and mitigation measures are carried out according to the spirit of the environmental assessment process and in line with the guidelines. The impact prediction has played a vital role in reconfirming that typical mitigation measures and approaches will achieve the necessary environmental controls based on the feasibility and detailed design assumptions available at this stage.

5.8.2 ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION PHASE

In order to facilitate the implementation of the EMP, during construction phase the contractor must co-operate with consultant and proponent and mitigates the impacts. Furthermore, the contractor must be primed through the contract documentation and ready to implement all the mitigation measures. Proponent will make provision to recruit, engage retain and replace trained environmental management staff and these staff should audit the effectiveness and review mitigation measures as the subprojects are rolled out. Proponent will also need to confirm that contractors and their suppliers have complied with all statutory requirements and have appropriate and valid licenses and permits for all powered mechanical equipment and to operate in line with local authority conditions.

5.8.3 ENVIRONMENTAL MANAGEMENT DURING OPERATIONAL PHASE

In order to achieve good compliance with environmental assessment principles during operation the environmental staff must be appointed included fire fighters as well as environmental engineers to monitor the environmental aspects, to ensure compliance with the statutory obligations under the PEPA. It is recommended that the project management unit (PMU) should engage directly with EPA to address all environmental aspects in the detailed design and contracting stages. The environmental staff will cover the implementation of environmental mitigation measures in the project packages.

5.8.4 PROPOSED EMP REPORTING AND REVIEWING PROCEDURES

The monitoring program is always a basis of information in identifying environmental and socio-economic impacts for use in informed decision-making. During the study socio -environmental issues as well as mitigation measures during planning phase have been identified. Some area, however, will require monitoring during construction and operation of the project. It, therefore, becomes necessary to include a monitoring program as part of the project. The land resources would require monitoring. In particular landscaping of the area to be used for spoil disposal would require monitoring during project construction and project operation phase. Water resources monitoring will include the ground water and wastewater produce from the site. This will involve both quantitative and qualitative aspects of water resources.

Development projects bring social change in their wake. Much of this is beneficial, particularly that which promotes economic and social development. But there is always another side to development: of wage earners, families, or skill groups left behind by new methods of production, of micro-economics destroyed by new technologies, or the disintegration of village communities by population growth and a capitalizing economy. Some of this can be foreseen in a general way. Much of it would occur, even in the project area, whether or not Project is built. It seems clear that longer a project is in place, the more difficult it becomes to separate the social effects of that project from the wider processes of social change already at work in a region. Monitoring of social impacts may therefore be of value for similar project in future.

- The monitoring staff will be consisting of environmental engineers and environmental analysts. Their responsibilities will be:
- To ensure all statutory environmental submissions under PEPA and other environmentally related legislation are thoroughly implemented.
- To ensure all environmental requirements and mitigation measures from the environmental assessment of project.
- To execute any additional EIA requirements needed due to fine tuning of the projects and that environmental performance targets are included in the contracts prior to project commencement;
- To ensure all environmental requirements and mitigation measures from the EIAs and environmental performance criteria are incorporated in the project.
- Work with management (consultants), supervising consultant and contractors to manage and monitor the implementation of the project EMP.

5.8.5 HEALTH AND SAFETY PLAN

Shenzhen City will make every effort to provide a safe, healthy work environment. All employers, supervisors and workers must be dedicated to the continuing objective of reducing risk of injury.

Supervisors will be held accountable for the health and safety of workers under their supervision. Supervisors are subject to various duties in the workplace, including the duty to ensure that machinery and equipment are safe and that workers work in compliance with established safe work practices and procedures.

Every worker must protect his or her own health and safety by working in compliance with the law and with safe work practices and procedures established by the employer. Workers will receive information, training and competent supervision in their specific work tasks to protect their health and safety.

It is in the best interest of all parties to consider health and safety in every activity. Commitment to health and safety must form an integral part of this organization, from the president to the workers.

5.8.6 INSTITUTIONAL CAPACITY

The main institutions involved in environmental management and monitoring program will be as follows:

- Shenzhen City
- Supervisory Consultants (SC)
- Construction Contractor (CC)
- Punjab Environmental Protection Agency (Punjab-EPA)

These key organizations will have the following roles and responsibility during the construction and operation stages:

5.8.7 CONSTRUCTION STAGE

During the construction stage, Construction Contractor (CC) will be mainly responsible for the execution of the mitigation measures. Supervisory Consultants (SC) will be responsible for the monitoring of the compliance of environmental management plan (EMP) and NEQS defined by EPD.

5.8.8 OPERATION STAGE

During the operational stage of the project, role of CC and SC will gradually decrease. During this phase of the project, implementation of recommendations of EMP and its supervision will be the responsibility of monitoring team coordinating with top management.

5.8.9 SUMMARY OF IMPACT AND THEIR MITIGATION MEASURES

Sr. No.	***Anticipated Impacts***
Construction phase	
Physical Environment	
1.	▪ Dust may take place in the project areas as a result of excavation.

Sr. No.	*Anticipated Impacts*
	▪ Soil contamination may take place due to the generated solid waste at site in addition to oil spillage through generators.
2.	Sewage is generated from the construction camps. This may contaminate surface and groundwater, if not disposed of properly
3.	▪ A Number of machinery and equipment is in operation for the construction of this multipurpose complex like Rigs, excavators, dumping trucks, Mobile concrete mixer and elevators generating noise, particulate matter (PM10), smoke, dust, CO, and NOx in the ambient air which may deteriorate the air quality and cause impacts on human health, fauna and flora. ▪ Due to movement of trucks and other vehicles noise and vibration may increases and residents of the nearby settlements may get affected.
Ecological Environment	
1.	▪ Cutting of trees and clearing of grasses and shrubs.
Social Environment	
1.	▪ The project construction will not harm any private structures. As it is a residential area, so this housing scheme will play a role to increase the facilities.
2.	▪ Construction activities, particularly excavation and movement of haul trucks and machinery may prove dangerous for safety of the workers as well as for the residents. ▪ Contractor's staff while working on the high-rise columns, transoms, etc. may slip and get injured.
	Operational Phase
	Physical Environment

Sr. No.	*Anticipated Impacts*
1.	▪ 1 cusec per day of water will be used. This may impact the ground water resource which may reduce with passage of time
	▪ Air Emission is emitted from the stacks of generators. Stack emissions of generators will produce gasses like NOx, SOx, CO2, PM and CO. These gasses will cause air pollution if not properly managed or mitigated. ▪ There will be noise of generators during the operation.
	Daily solid waste generation during operational phase will be 1 ton/day consisted of municipal as well as food waste. The waste is generated mostly by households.
	Daily wastewater generation during operational phase will be 0.80 cusec from different activities by residents.
Ecology	
	Trees shall be planted inside Shenzhen City at different locations. For Noise reduction and visual barrier neem and date trees will be planted on boundary walls. The plantation will enhance the environmental features of the project The Use of native trees will welcome the local and migratory birds for nesting and shelter.

5.9 MITIGATION AND IMPACT ASSESSMENT

5.9.1 IMPACT AND THEIR MITIGATIONS DURING CONSTRUCTION PHASE

The most likely environmental problems to occur during construction phase could due to:

- Construction machinery,

- Compaction of soil activity,
- Leveling of land,
- Moving vehicles,
- Construction of building and associated civil work.
- The problems which are associated with these activities are:
- Gaseous emission of SO2, NOx and CO, hydrocarbons etc
- Particulate Matter (PM)
- Noise
- Effluent
- The mitigations use to avoid these impacts are:
- Vehicles transporting lose construction material (clay, sand etc) to be covered with tarpaulins.
- Routine service and maintenance of vehicles and machines to reduce engine emissions.
- During periods with abnormal wind speeds, in particular during dry weather conditions, workers on the construction site should be provided with adequate inhalation and eyes protection gears. In case particulates in air hamper a clear view over the site completely, so that safety is impaired, the construction should be interrupted until weather conditions improve.
- Spraying exposed soil with water to reduce PM10 emissions and particulate matter deposition. Water to be applied at a rate to maintain a moist surface, but not create surface water runoff or erosion conditions.
- During construction, water would be supplied from the water storage facility already provided at the work site which is very closely present to the project site.
- Potable drinking water for construction workers would be provided.
- Solid wastes resulting from the construction activity after segregation of usable or recyclable material will be disposed of properly to avoid any threat to environment.

- Power mechanical equipment like bulldozers, air compressors, concrete pumps, excavators, concrete mixers, and heavy cairns etc. shall only be used with low sound power, whenever possible.
- The building machinery equipment shall be well maintained and serviced regularly during construction phase.
- Silencers or mufflers on construction equipment shall be used.

5.9.2 IMPACT AND THEIR MITIGATIONS DURING OPERATIONAL PHASE

The major impacts of operational phase are:

- Air Pollution
- Noise
- Surface water
- The mitigation will be used to avoid the impacts are:
- Continuous monitoring of ambient air for SO2, NOx, CO and PM shall be carried.
- Continues monitoring of the standby generator shall be carried out.
- Septic tank will be made for disposal of wastewater
- A noise measurement campaign during full operation at operation start should be implemented to verify that the actual noise levels are in line with NEQS.

What are the hazards?	When will the risk occur?	Who might be harmed and how?	What will the actions do take?	Responsible Person
Buried services	During construction	Plant operator and any worker in the vicinity	Proper training and provision of PPEs	Safety Officer
Worker fall into excavation	During construction	Worker in the vicinity Serious injuries	Physical barriers on excavation edges	Operator and supervisor

What are the hazards?	When will the risk occur?	Who might be harmed and how?	What will the actions do take?	Responsible Person
Ground contamination	During construction & operational phase	Worker working there during construction and operational phase	Provision of good site welfare facilities, septic tank to prevent ground contamination	Supervising consultants
Inhalation of gases	During construction	Workers	Provision of PPE & use of new technology generators	Supervising consultants and top management
Water contamination	During construction & operation phase	Worker, nearby community	Proper drainage of wastewater, installation of underground septic tank	Supervising consultants and Building's management team
Noise	During construction & operation phase	Worker, nearby community	Generator will put in the close canopy; new technology will be used	Supervising consultants and Building's management team

5.9.3 OBJECTIVE OF MITIGATORY MEASURES

Mitigation is the stage of the EIA process when measures are identified to avoid, minimize or remedy impacts. These measures are implemented as part of the process of impact management, together with any necessary adjustments to respond to unforeseen impacts. Both elements are integral to ensuring that the EIA process leads to practical action to offset the adverse environmental impacts of proposed developments. The migratory measures are designed to minimize the environmental impacts of the project.

5.9.4 EQUIPMENT MAINTENANCE DETAIL

Maintenance and washing of all heavy mobile machinery & vehicles should be carried out at adequate service stations. Regular maintenance of all vehicles and machines to be used on site will be mandatory. It should be noted that the project footprint is small and therefore the number of construction vehicles to visit the project site will also be very less in number as compared to the large-scale project. Maintenance and re-fueling (if necessary) of any construction equipment shall be done at a decent distance from the excavation area and only be undertaken on sealed area. Any re-fueling must be handled carefully taking particular attention to avoid any spilling of any fuel.

5.9.5 ENVIRONMENTAL BUDGET AND SCHEDULE FOR IMPLEMENTATION

Environmental monitoring cost related to the mitigation measures of environmental parameters related to the location of construction site and activities, borrow materials, etc. will be the sole responsibility of the Contractor and he will take care of cost implications. Tentative annual monitoring cost as per environmental monitoring plan is given in Table below.

Table 10: Cost Breakup of Environmental Budget

Sr. #	Phase	Item	Cost per Year (Rs.)
1	Construction	Monitoring and Laboratory Testing	1,00,000

		Tree plantation	1,00,000
2	Operation	Monitoring and Laboratory Testing	50,000
		Implementation of horticultural Plan	1,50,000

Table 11: Monitoring Schedule of Implementation during Construction Phase

Parameter	Frequency	Remarks	Responsibility
Solid waste	Fortnight	Visual check to access the disposal methods	Contractor and supervisor
Particulate matters	Monthly	Instrumental measurement	Contractor and supervisor, Reporting to EPA
Exhaust gases	Monthly	Instrumental measurement	Contractor and supervisor, Reporting to EPA
Ground water quality and wastewater	Annually	Monitoring of water and wastewater parameters	Contractor and supervisor, Reporting to EPA
Noise and vibration	Monthly	Measurement of noise and vibration due to construction activities and vehicle movement	Contractor and supervisor, Reporting to EPA
Health and safety	Monthly	Monitoring of health and safety of workers	Contractor and supervisor

Table 12: Schedule of monitoring during the operational phase

Parameters	Frequency	Remarks	Responsibility
Air Quality	**Annually**	**Ambient air quality**	**Administration of project and Reporting to EPA**
Noise	**Biannually**	**Noise by activities in the multi-purpose building**	**Administration**
Surface and ground water	**Annually**	**Monitoring of water and wastewater parameters defined by EPA**	**Administration and Reporting to EPA**
Solid waste	**Annually**	**Waste generation**	**Administration of the project**

5.9.6 SITE SELECTION

The site is selected on the basis of prohibition area, environmental sensitivity, competent to the surrounding and suitability.

The site is not present in the prohibited area. The area is as well not situated in the environmental sensitive area as this area does not fall in the high seismic zone, not near the river as there are very low chances of flood and not extremely polluted area. The site is competent and suitable for this type of complex as this area is in the commercial zone.

5.9.7 IMPACT SIGNIFICANCE

Impacts significance is defined based on its acceptance ecologically, socially as well as on the basis of environmental standards that either it is according to the environmental standards or not.

5.9.8 ECOLOGICAL IMPORTANCE

The impact of this housing scheme has least ecological risk. Few of the trees on site are affected due to the implementation of the project. However, before the construction phase 600 trees of 6 feet are planted at project site which will enhance the environmental feature of the project. Moreover, use of native trees will welcome the local and migratory birds for nesting and shelter.

5.9.9 SOCIAL IMPORTANCE

Development projects bring social change in their wake. Much of this is beneficial, particularly that which promotes economic and social development. Another side to development as it provides the opportunities for wage earners and skill groups of local community as well as for the outsiders. It seems clear that this commercial cum residential and entertainment complex has positive impacts on the social life of the area.

During the construction stage in case of any compliant, it can be note down by the site representative. The site representative will maintain a register of complaints received from the local communities and measures will be taken to mitigate these concerns. They will report the status of complaints in his monthly report to top management, for information and further action.

5.10 EQUIPMENT MAINTENANCE DETAILS

All Construction vehicles, Earth moving equipment, Construction equipment and Material handling equipment will be maintained in accordance with the Maintenance Scheduling for Mechanical Equipment (Facilities Instructions, Standards, and Techniques Volume 4-1A – Revised 2009), U.S. Department of the Interior Bureau of Reclamation.

The contractor will make the detail plan for maintenance schedule of their machinery before the construction to be started and will be submitted to the consultant. The contractor will do the continuous follow-up and regular checks will ensure on all the construction machinery equipment's.

5.11 TRAINING PROGRAMS

Environmental training for construction period will form part of the environmental management system. The training will be directed towards all personnel for general environmental awareness.

5.11.1 OBJECTIVES

The key objective of the training program is to ensure that the requirements of the EMP are clearly understood and followed throughout the Project.

5.11.2 ROLES AND RESPONSIBILITIES

SC will be responsible for conducting environmental training to all the Project personnel on potential environmental issues of the Project through Contractor, who will be responsible to arrange training and ensure the presence of targeted staff. SC will prepare a Project specific training manual for this purpose. Contractors on their part will be required to provide induction training/briefing to all their staff at the time of their recruitment and before the start of any activity in the Project Area. This will be followed by training arranged by the SC to all the targeted staff.

5.11.3 TRAINING LOG

A training log will be maintained by the SC. The training log will include;

- Topic
- Date, time and location
- Trainer
- Participant

6. STAKEHOLDER'S CONSULTATION

Public consultation refers to the process by which the concerns of local affected persons and others who have plausible stake in impacts assessment of the project or activity are ascertained with a view to taking into account all the material concerns in the project or activity design as appropriate. According to the IEE and EIA Review Regulations, 2022 public consultation is mandatory for any socio-environmental study. For this purpose, assessment survey and public consultation sessions held with different stakeholder groups that may be impacted. The consultation process was carried out in accordance with the guidelines laid by EPA, Punjab. The objectives of this process were to:

- Share information with stakeholders on proposed project installation and operation.
- To access the impacts on the physical, biological, and socio-economic environment.
- Understand stakeholder concerns regarding various aspects of the project.
- Understand the perceptions, assessment of social impacts and concerns of the communities of the project area.
- Find out the awareness level and situation of acceptability to identify any issues for the implementation of said project.
- To invite people to express their views about the positive/negative impacts on their life styles and environment.

This report includes all the comments, which were taken into account in preparing the definitive development concept for the installation of the proposed unit.

6.1 Consultation mechanism

Primary stakeholders were consulted during informal and formal meetings. The consultation process was carried out in the Urdu language. During these meetings a simple, non-technical, description of the project was given, with an overview of the project's likely human and environmental impact. This was followed by an open discussion allowing participants to voice their concerns and opinions. In addition to providing communities with information on the proposed project, their feedback was

documented during the primary stakeholder consultation. The issues and suggestions raised were recorded in field notes for analysis, and interpretation.

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

Secondary stakeholder consultations were more formal as they involved government representatives and local organizations, consulted during face-to-face meetings. They were briefed on the EIA process, the project design, and the potential negative and positive impact of the project on the area's environment and communities. It was important not to raise community expectations unnecessarily or unrealistically during the stakeholder consultation meetings inorder to avoid undue conflict with community's leaders or local administrators. The issues recorded in the consultation process were examined, validated, and addressed in the EIA report. This section involves communication of possible impacts and concerns with

- Proponents Environmental Management Team
- The responsible authority
- Other departments and agencies
- Environmental Practitioners and experts
- Affected and wider community

6.2 Proponent's environmental management team

For constructional phase the socio-environmental team of the consultant, consulted regarding establishment of Al-Haram City, Phase-I with stakeholders and anticipated impacts were discussed. Concerns of locals, Environmental Practitioners & experts and Government departments were discussed and asked to consider them while constructing above-said project. Locals will be preferred for employment after providing proper training. Mitigations measures mentioned in EMP will be truly

implemented. While for operational phase a team consisted of project manager, HSE officer and operation manager will be hired once the project starts its operations.

6.3 The responsible authority

Overall responsibility for implementation of EMP will be that of project proponent. He will appoint an HSE/Project Manager of relevant qualification. HSE/Project Manager will act as Environmental Manager and will manage the all HSE condition at the PEQS.

6.4 The other departments and agencies

Different Government departments were consulted regarding establishment of proposed project. Government officer were consulted by the socio-environmental team of the consultants and concerned details about the project were noted down through personal interviews, group meetings, etc., in their offices.

6.5 Environmental practitioners and exerts

Consultation with Environmental Practitioners and experts was done, and following comments and suggestions were observed.

Table 17: Consultation with environmental practitioners and experts

Name	Qualification	Comments/suggestions
Dr. Sabiha Khurram	Ph.D. Environmental Sciences	Following comments are summarized: ▪ Latest technology must be preferred ▪ Regular monitoring should be conducted
Ms. Nusrat Ehsan	Ph.D. (scholar) Environmental Sciences	▪ She said that current project must be installed as: ▪ Quality residential land will be available ▪ Good household practices must be practiced

Mr. Danial Zaib	BS Environmental Sciences	He said that: ▪ Locals should be preferred for employment. ▪ Proper mitigation measures must be adopted while construction and operation of this project

6.6 Affected and wider community

Social survey was conducted to consult with local community. Their concerns were noticed and discussed with proponent and their team. Majority was in favor of project their details are attached along with EIA report (In Appendices at pg. 80).

7. CONCLUSION

7.1 CONCLUSION

The project aims in construction of Shenzhen City" at Mouza Shamky Bhatian & Sultanky, Tehsil Raiwind, Multan Road, District Lahore. According to the "Punjab Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000" the project falls in schedule II. Accordingly, this EIA has been prepared for issuance of NOC/EA by the EPA, Government of the Punjab, Lahore before initiation of the project on ground.

7.2 CONSTRUCTION PHASE

The potential impacts during construction stage are summarized below. Majority of these impacts are of temporary nature and can be mitigated as described below:

1) The construction camp will result in generation of solid waste. It is estimated that about 10 to 15 labors will have employed at construction site, which will be generating about 150 Kg of solid waste from camp site (i.e. @ 0.5 Kg of solid waste per capita per day generation rate). This waste can contaminate the surface, ground water and soil. Proper solid waste management plan should be developed by the Contractor and implemented to avoid the littering and any other waste problems. Adequate number of solid waste containers should be placed at various locations for ease in storage and collection/disposal of solid waste by Shenzhen City Waste Management team.
2) Soil Construction activities such as excavation, filling, development of road, construction camps may affect the existing soil conditions in the Project Area. In addition, such work is likely to lead to changes in the existing drainage pattern and may have a significant adverse impact on the environment that can be mitigated by good engineering practices. The proper drainage facility will be provided at the camp areas to avoid the water accumulation, which will minimize the soil contamination
3) Soil contamination may take place due to the generated solid waste at project site in addition to oil spillage at site which can be curtailed by reducing the oil spill at project construction areas, proper solid waste management.
4) During construction stage, dust problem can affect the health of the community belonging to nearby residential areas. However, proper mitigation measures will remedy the impacts and in order to avoid dust problems during the construction stage, contractor should sprinkle water at least twice a day during the construction activities.
5) Construction machinery using diesel engines will generate noise and exhaust emissions. Generally, the above machinery will generate particulate matter (PM10), smoke, dust, CO and NOx in the ambient air, which can deteriorate the air quality and result in impacts on human health and nearby fauna and flora. The movement of heavy machinery and vehicles on the dirt tracks can also cause fugitive dust emissions. Periodic tuning of vehicles should be made mandatory to reduce the emissions of NOx, CO, Hydrocarbons (HC) and PM10.

6) Some trees are planted on site which will not cut down during construction. Further the indigenous trees will be planted as per landscaping plan at the site.

7.3 OPERATION STAGE

The project during its operational phase will definitely have long term positive and beneficial impacts, which include the following:

- There are no sensitive elements/segments of environment around the project site.
- Noise level, wastewater will remain well within the prescribed limits of the PEQs.
- EMP as recommended in this EIA Report is to be put in place during operations of the project.
- In accordance with EMP the monthly and annual monitoring of environmental parameters by a third-party environmental laboratory also certifies that the project will run in accordance with legal requirements.

Based on the EIA report, it can be concluded that the project will give the residential and commercial facility and job opportunities for local and outsider that comes to Multan for livelihood. Further, the implementation of the environmental mitigation measures, monitoring proper and compliance of the environmental standards/legislations will make the Project environmentally more sustainable.

7.4 RECOMMENDATION

Based on the facts summarized as above, the project merits for issuing Environmental Approval by the Environmental Protection Agency, Government of Punjab.

LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
BOD	Bio-chemical Oxygen Demand
CDM	Clean Development Mechanism
CO	Carbon Monoxide
COD	Chemical Oxygen Demand
Cusec	Cubic foot/feet per second
EIA	Environmental Impact Assessment
EMMP Plan	Environmental Management and Monitoring
EPA	Environment Protection Agency
gm	Gram
IEE	Initial Environmental Examination
MEPCO	Multan Electric Power Company
m	Meter
MW	Mega Watt
NO2	Nitrogen Dioxide
NOC	No Objection Certificate
PEPA	Pakistan Environmental Protection Act
PEQS	Punjab Environmental Quality Standards
PM	Particulate Matter
SO_2	Sulfur Dioxide
SWM	Solid Waste Management
TORs	Terms of Reference
WASA	Water and Sanitation Agency
WHO	World Health Organization

GLOSSARY

Agency	A business or organization providing a particular service on behalf of another business, person, or group.
Amenities	A desirable or useful feature or facility of a building or place
Climate	The weather conditions prevailing in an area in general or over a long period.
Commercial	Making or intended to make a profit
Consultant	A person who provides professional advice or services to companies for fee.
Construction Waste	Waste generated from the buildings and construction industry and includes material like bricks, concrete, tiles, debris, ceramics and more.
Convention	An agreement between states covering particular matters, especially one less formal than a treaty.
Crew	A group of people who work closely together
Demographic	A single vital or social statistic of a human population, as the number of births or deaths.
Ecology	The branch of biology that deals with the relations of organisms to one another and to their physical surroundings.
Endangered species	A species of animal or plant that is seriously at risk of extinction.
Environment	Relationship of natural world (human beings, animals and plants) with physical surroundings (air, land, water).
Excavation	Excavation is the act or process of digging, especially when something specifics being removed from the ground. Archaeologists use excavation to find artifacts and fossils.
Framework	A framework is a real or conceptual structure intended to serve as a support or guide for the building of something that expands the structure into something useful.

Impact	The action of one object coming forcibly into contact with another.
Municipal Wastewater	Municipal wastewater means wastewater discharged to a POTW or a Semi-Public or Private treatment facility containing majority domestic wastewater
Nature	The phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, as opposed to humans or human creations.
Proponent	A person who advocates a theory, proposal, or course of action.
Policy	A policy is a deliberate system of principles to guide decision and achieve rational outcomes.
Rehabilitation	To restore to a condition of good health, ability to work, or the like.
Resettlement	The settlement of people in a different place.
Residential	Designed for people to live in.
Sanitation	Conditions relating to public health, especially the provision of clean drinking water and adequate sewage disposal.
Stakeholder	A stakeholder is a party that has an interest in a company and can either affect or be affected by the business. The primary stakeholders in a typical corporation are its investors, employees and customers.
Topography	Topography is the study of the shape and features of the surface of the Earth and other observable astronomical objects including planets, moons, and asteroids.

LIST OF STAKEHOLDERS' CONSULTED

Sr No.	Interviewer's Name	Contact
1.	MUHAMMAD IRFAN	34101-8754734-1
2.	AHMAD	34101-7035024-1
3.	BABAR BUTT	34601-3184932-1
4.	AZAM JAVED	34101-3118065-9
5.	MUHAMMAD IDREES	34101-2626672-1
6.	AHSAN IQBAL	34101-7304213-5
7.	MUHAMMAD DILAWAR	31201-7314614-9
8.	UMAR FAROOQ	14201-9275846-5
9.	HAMMAD WAHEED	36302-4205109-3
10.	JAMSHAID YOUSAF	34101-7683748-9
11.	MUHAMMAD JUNAID	34101-3402766-3
12.	MUZAMMAL AMIN	34101-2240239-9
13.	MUZAMMIL AKBAR	34101-8171975-5
14.	ISHTIAQ RASHEED	34101-6266509-9
15.	MUHAMMAD NOUMAN KHAN	34101-9621287-7
16.	MUHAMMAD SUFYAN	34101-0775011-5
17.	IFTIKHAR ALI	35404-7212533-9
18.	MUHAMMAD KHALID MAHMOOD	34101-1992191-3
19.	CH. MUHAMMAD YOUSAF	35401-6595576-7

The survey in the study area following concerns of the local community were noted:

- Wastewater should be properly treated prior to final disposal in nearby drain.
- Solid waste should be managed effectively by adopting the standard practices of the area.
- Cleanliness of the area should be ensured.
- An effective EMMP should be designed and enforced with true spirit.
- Health of the workers should be ensured.
- Plantation should be carried out at extensive scale.
- Construction activity should be carried out during day hours.

20.	ZAKA ULLAH	34104-2235142-7	▪ Noisy activities should be confined. ▪ Workers should be hired from local community. ▪ PPE's must be provided to workers ▪ Indigenous trees around the facility should be planted. ▪ Removal of shrubs and bushes should be avoided to the extent possible.
21.	ZEESHAN MUJAHID	34101-4175822-3	
22.	ALI RAZA	34101-1054833-1	
23.	SUFIAN AHMAD	34101-7432307-9	
24.	MUBASHAR KHALID	34101-2733211-5	
25.	FALAK SHER	34101-5490755-3	

SOURCES OF DATA

- https://www.pmd.gov.pk/en/
- http://www.agripunjab.gov.pk/=
- http://www.weather-and-climate.com/
- **Bajwa, I. U., Ahmad, I. J. A. Z., & Khan, Z. A. R. E. E. N. (2000). Urban housing development in Pakistan: A case study of Lahore Metropolitan Area. In Journal of Pakistan Engineering Congress (pp. 65-73).**
- **Malik, S., & Wahid, J. (2014). Rapid urbanization: Problems and challenges for adequate housing in Pakistan.**
- **Hasan, A., & Arif, H. (2018). Pakistan: the causes and repercussions of the housing crisis.**
- **Khan, I. (2007). Development and the Phenomena of Housing Societies in Pakistan.**
- **Field Surveys**
- **Public Consultations**

TERMS OF REFERENCE (TORS)

ENVIRONMENTAL IMPACT ASSESSMENT OF SHENZHEN CITY LOCATED AT PLOT MOUZA SHAMKY BHATIAN & SULTANKY, TEHSIL RAIWIND, MULTAN ROAD, DISTRICT LAHORE.

1.1 PROJECT PROPONENT:

Saad Nazir S/O Nazir Ahmed choudry

1.2 SCOPE OF WORK: CONSULTANT

Mr. Saad Nazir intends to establish a Housing Scheme at Lahore.

1.3 SPECIFIC OBJECTIVES:

The EIA shall be carried out with an objective of identifying environmental impacts during change in Land use of the Master Plan. The specific objectives will be as follows:

- Identification of impacts on physical environment including land, water, and air and suggesting mitigation measures.
- Identification of impacts on biological environment including flora, fauna and natural habitat and suggesting mitigation measures.
- Identification of impacts on socio-economic environment in the vicinity of the proposed landfill site and suggesting mitigation measure.
- Mitigation measures for potential impacts (Physical, Biological and Socio-environmental)
- Environmental Management and Monitoring Plan/ Contingency Measures

1.4 THE EIA SHALL COVER FOLLOWING MAIN AREAS:

- Background of the project – Justification
- Objectives
- Site locations and mappings
- Complete description of the proposed sites
- Collection, analysis and presentation of baseline data
- Identification of significant environmental issues
- Assessment of direct, indirect and cumulative impacts on environment

- Mitigation measures to minimize predicted adverse impacts
- Assessment of public perception about proposed project
- Meeting with the stakeholders and their perception
- Review of the relevant Policies, Legislation and Regulations
- Monitoring plan
- Conclusions

1.5 MAJOR TASKS:

The consultant shall be responsible for undertaking the following tasks in EIA study.

1.5.1 Collection and collation of Secondary Information:

Prior to the start of field activities, available secondary data and reports will be reviewed in detail.

1.5.2 Analysis of Alternative:

Suitable site alternative will be suggested, if required, by the review of relevant maps, available secondary data and legal review.

1.5.3 Location Alternative:

Alternative site will be suggested, if required, by using relevant maps and GPS during area visits.

1.5.4 Management and Operational Alternatives:

Management and operational alternatives will be suggested, if required, by the review of institutional set-ups of departments relevant to the project.

1.5.5 Design Alternatives:

Design alternatives will be suggested, if required, by the review of current design layout.

1.5.6 Review of Relevant Environmental Laws:

The Consultants will carefully review the national/local authority laws, Pakistan Environmental Protection Act 1997, Forest Act 1930, Land Acquisition Act 1874 etc. and international regulations like World Bank Operational Policy, Cites Act etc. for conducting EIA study. This approach will eliminate any chances of the rejection of the project by the concerned EPA due to the consideration of all the concerned laws during the preparation of the EIA report.

1.5.7 Collection of existing Environmental setting/baseline Data:

Based on the desk study and reconnaissance survey, checklist and questionnaires / Performa's will be prepared for the baseline surveys. Consultants will proceed to the site and the collection of primary data /database on the environmental aspects will be done, which includes the following:

1.5.8 Physical resources:

Physiographic, topography and soils, atmosphere, climate, hydrology, surface water, ground water, geology, seismology etc including environmental monitoring and testing.

1.5.9 Environmental Monitoring:

In case of the absence of updated data, one-time limited environmental monitoring will be conducted in order to assess and analyze the existing level of particulate and gaseous emissions, potable water and liquid from any existing sources lying within the Study Area.

The environmental monitoring and testing will be carried out through EPA approved Environmental Laboratory.

1.5.10 Ecological resources:

Identification of the number of tree species present in the project area, as well as, determination of tree density and area covered by them. Tree counting and their identification along with other vegetation and crops, if any, will be done by making field visits, and by the review of the available literature relevant to the study. Information about the flora and fauna of the area will be collected. Information of the type of the livestock in the area will be noted along with their density.

1.5.11 Socio-economic survey:

Data on social and cultural conditions of the study area will be collected. Determination of the population density in the study area will be done by the review of district census report. The social survey also includes Land acquisition survey (if required) and Identification of vulnerable people/groups i.e. Project Affected People, if any. Data about population density, Infrastructure (electricity, sanitation/ drainage facilities, mode of transportation), health and education

status will be collected. Data collection about number of schools and hospitals in the area, if any; no. of graveyards in the area, if any; no. of recreational and commercial areas, if any; availability of utilities; and strata of socio-economic group of people dominant in the area will be kept in focus during baseline study.

1.5.12 Evaluation / Identification of Potential Impacts:

Prediction and assessment of the proposed Project's likely negative impacts during the construction and operational stages will be carried out by conducting the field visits of project and study area. The impacts will be discussed in three sectors with reference to the following parameters:

1.5.13 Physical environment:

Under physical environment, impacts on following areas will be measured.

- **Land resources:** Evaluation of the environmental effects of the project on land use in the immediate vicinity of the project (i.e. within the identified boundaries of the project) will be done, e.g. Agriculture, Archaeological, Historical and Cultural monuments
- **Water resources:** Precipitation, surface water resources, ground water resources.
- **Air quality:** levels of air pollutants like particulate matter, CO and other parameters and their adverse impacts, if any, on the surrounding environment will be determined to evaluate its effects.
- **Noise levels** will be evaluated for the construction and operational phase of the project

1.5.14 Ecological environment:

Impacts on ecological environment may include

- Impacts on fauna of area, livestock and migratory birds (if any)
- Reserved forests, if any.
- Relocation/resettlement issues etc.
- Impacts on flora

1.5.15 Socio-economic Impacts:

- Impacts on livelihood of Project Affected Persons (PAPs) (if any): Questionnaires will be developed and prepared and filled during the field visits to know about the public perception of the study area.
- Impacts on social settings of the project area.
- Relocation/ resettlement issues
- Impacts of the project on local property values and insurance rates will be taken in to consideration.
- Disruption archaeological, historic, religious, and unique natural values in the project area if any

1.5.16 Suggested Mitigation/contingency Measures:

After the identification of the adverse environmental impacts, necessary mitigation measures would be proposed. Mitigation plans will be proposed based on the intensity of each impact. For instance, if the impact is low enough, it may be ignored; if the impact is high, specific mitigation measures will be recommended/suggested and if the impact is medium, it may need some mitigation measures or simply be monitored/managed properly in order to ensure that it remains within the acceptable limits.

1.5.17 Environmental Management Plan (EMP):

An Environmental Management Plan (EMP) will be developed. EMP will propose a plan of action that will indicate the responsibilities and required measures to minimize the negative environmental effects of the project at different stages.

Under the EMP, institutional set up will be studied and the required enhancement, which is deemed necessary for effective management and monitoring of the environmental activities, will be proposed. The EMP will address the following aspects:

- Organizational structure and responsibilities;
- Mitigation Plan;
- Environmental Monitoring Plan;
- Communication and documentation;
- Training of Staff;

- Environmental Cost;

1.5.18 Stakeholder participation and consultation:

Consultation is required at least during two stages of the EIA process as follows:

- During the process of the EIA Study and report preparation, the public is consulted through meetings, seminars, or workshops. Proponents will hold public meetings and/or open houses in local communities to describe the details of the project and to receive feedback on potential issues, interests or concerns related to the project. Engagement may also include informal discussions with landowners and nearby residents and meetings with community associations, businesses, municipal councils, regional planning agencies, public interest group's communities.
- Once the draft EIA report has been prepared & submitted then public hearing is required. The consultants shall fully assist the Client in the public hearing, including furnishing the replies/information to the questions/issues raised during the hearing.

1.5.19 Deliverables Consultant:

1. Complete Draft EIA report featuring all the development sites. The EIA report shall be completed in respect of baseline data, detail socio and environmental impact assessment, Environmental Management Plan and Alternatives considered.
2. Final EIA Report to be submitted after receiving comments from Clients.

1.6 Time Duration:

The time duration for completion of whole study is 2 months.

1.7 SCOPE OF WORK; Client:

The client has following scope of Work

1. Give all data related to the current and proposed Land use of the sites.
2. Give all the detail maps of the sites.
3. Give coordinates of all the sites
4. Give detail description of the area.
5. Land use Study for the sites.

6. Arrange Stakeholders consultation along with Consultants
7. Submission of EIA report in EPA and its follow-up until award of NOC.

PROJECT TEAM AND RESPONSIBILITIES

Name of expert	Position held	Highest Qualification	TERM OF REFERENCES
Kamal Ahmed Cheema	Chief Environmentalist	M. Phil. Environmental Economics, PIDE, Islamabad	Mr. Kamal would be responsible for: ❖ Environmental Assessment & Management. ❖ Supervision of monitoring team for air water noise and soil analysis. ❖ Preparation of technical EMP
Mr. Shahzaib Ahmed	Social Scientist	M. Phil Development Studies, PIDE, Islamabad.	Mr. Shahzaib would be responsible for: ❖ Detailed social survey of project sites ❖ Social impact assessment
Arslan Iqbal	Environmentalist-2	MPhil Environmental Sciences, UOL	Mr. Arslan would be responsible for: ❖ Biodiversity assessment ❖ Detailed flora fauna survey of project sites ❖ Identification of threaten and endangered species ❖ Project impacts on flora and fauna ❖ Detailed social survey of project sites ❖ Social impact assessment ❖ Consultation with stakeholders
Amna Hafeez	Environmentalist-3	M.Sc Mountain Conservation and Watershed Management,	Ms. Amna would be responsible for: ❖ Report writing ❖ Field surveys and consultation with stakeholders

		University of the Punjab	❖ Preparation of Environment monitoring plan ❖ Preparation of technical EMP ❖ Identification of sensitive receptors ❖ Capacity building & training ❖ Conducting and monitoring of health assessment surveys ❖ Environment health risk assessment and management ❖ Detailed survey of project sites ❖ Environmental Assessment ❖ Social Assessment
Huda Ashfaq	Environmentalist-4	M.Phil Environmental Science, UVAS, Lahore.	Ms. Huda would be responsible for: ❖ Detailed flora and fauna survey of project sites ❖ Socio-Economic survey & analysis ❖ Report Writing
Saba Nazir	Environmentalist-5	M.Phil. Environmental Science, UOL, Lahore.	Ms. Saba would be responsible for: ❖ Site Monitoring ❖ Socio-Economic survey & analysis ❖ Risk Assessment (OHS & EMP)