



GOVERNMENT OF BALOCHISTAN

QUETTA DEVELOPMENT PACKAGE

Clearing / Aligning of Sariab Road



ENVIRONMENTAL IMPACT ASSESMENT

MARCH, 2018



NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LIMITED
ENVIRONMENTAL AND PUBLIC HEALTH ENGINEERING DIVISION
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LIST OF ABBREVIATIONS

AIC	Artificial Insemination Center
BMP	Best Management Plan
BEPA	Balochistan Environmental Protection Agency
CC	Construction Contractor
CDM	Clean Development Mechanism
CHQ	Children Hospital Quetta
CMH	Combined Military Hospital
DG	Directorate General
DIL	Disease Investigation Laboratory
EC	Environmental Committee
EMP	Environmental Management Plan
EIA	Environmental Impact Assessment
BEPA	Baluchistan Environmental Protection Agency
BMP	Best Management Practice
IEE	Initial Environmental Examination
GOP	Government of Pakistan
GRC	Governance Risk and Compliance
HBL	Habib Bank Limited
MDGs	Millennium Development Goals
NBP	National Bank of Punjab
NCS	National Conservation Strategy
NEP	National Environmental Policy
NEQS	National Environmental Quality Standards
NESPAK	National Engineering Services Pakistan Private Limited
NOC	No Objection Certificate
PEPA	Pakistan Environmental Protection Act
PEPC	Pakistan Environmental Protection Council
PGA	Peak Ground Acceleration
PSC	Project Supervision Consultant
PTV	Pakistan Television

QDA	Quetta Development Authority
QDP	Quetta Development Package
SC	Supervision Consultant
TAP	Technical Assistance Program
USEPA	United states Environmental Protection Agency
ROW	Right of way
WB	World Bank
WHO	World Health Organization

GLOSSARY

Air quality standard	Air quality limiting values and objectives.
Baseline	Existing environmental conditions present on, or near a site, against which future changes can be measured or predicted.
Biodiversity	The variety of life in the world or in a particular habitat or ecosystem.
Climate	The climate can be described simply as the 'average weather', typically looked at over a period of 30 years. It can include temperature, rainfall, snow cover, or any other weather characteristic.
Conservation	The preservation or enhancement of a species or building/structure.
Construction plant	Portable construction machinery and equipment.
Construction worksites	Sites where the construction of the various elements of the Proposed Scheme is undertaken.
Cutting	A linear excavation of soil or rock to make way for a new railway or road.
Decibel(s)	A unit used to express relative differences in sound power or intensity. There is a million to one ratio in sound pressure (measured in Pascal (Pa)) between the quietest audible sound and the loudest tolerable sound. The decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement because of this wide range.
Earthworks	The removal or placement of soils and rocks such as in cuttings, embankments and environmental mitigation, including the in-situ improvement of soils/rocks to achieve desired properties.
Effect	Used throughout this IEE report to refer to the consequence of an impact to the receiving environment (see also: 'impact').
Effluent	Liquid waste or sewage.
Heavy metals	A loosely defined term which refers to a group of metal and metalloids, many of which are toxic to some degree.

Impact	Used throughout this IEE Report to refer to changes to the environment those have the potential to occur as a result of the construction and/or operation of the Proposed Scheme.
Inorganic (contaminant)	Contaminants comprised primarily of metals, metal compounds, certain minerals, acids and alkalis.
Mitigation	The measures put forward to prevent, reduce and where possible, offset any adverse effects on the environment.
Receptor	A component of the natural or built environment (such as a human being, water, air, a building or a species) affected by an impact of the construction and/or operation of a proposed development.
Screening	The first stage in an environmental impact assessment. It is used to determine if further assessment is necessary.
Soil erosion	The detachment and movement of soil by the action of water and/or wind.
Surface water	Waters including rivers, lakes, reservoirs, canals, streams, ditches, coastal
Topography	The natural or artificial features, level and surface form of the ground surface.

EXECUTIVE SUMMARY

Introduction

Government of Balochistan under PM directive package intends to execute a project of clearing/aligning of Sariab road. The prime objective of EIA is to integrate the environmental concerns and negative impacts arising from a proposed project could be envisaged, eliminated or mitigated.

According to the Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations 2000, the proposed project falls under category D (Transport) of Schedule II, which requires EIA before commencement of construction. This document presents the findings of Environmental Impact Assessment (EIA) for Clearing / Aligning of Sariab Road

Policy, Legal & Administrative Framework

The Government of Pakistan (GOP) has promulgated laws/acts, regulations and standards for the protection, conservation, rehabilitation and improvement of the environment. The relevant regulations and standards are Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, (2000); National Environmental Quality Standards (1993 and 2000); Sectoral Guidelines (1997); Building Code of Pakistan; Pakistan Penal Code (1860) and Hazardous Substance Rules 2003. The applicable plans and policies are National Environmental Policy (2005) (NEP); Biodiversity Action Plan; National Water Policy; National Drinking Water Policy and Operational Strategy for CDM, 2006.

Description of the Project

Sariab road is included in some of major roads of Quetta facing severe traffic congestion. Clearing / Aligning of Sariab road is an inevitable solution for traffic problem in this area. The proposed project will reduce the travelling time and provide direct access to other local roads.

The project is located in urban area of Quetta city. Sariab road starts from the intersection of link Hazar Ganji road passes through Sabzal road, Brewery road and ends at Spinny road.

The project is expected to be completed in twelve (12) months with the cost of Rs. 2891.046 Million. A 10 meters wide strip of land will be required on both side of road with the total length of 10.6 Km.

Environmental Baseline

The project lies in Quetta district. The general characteristics of the area is mountainous. The elevation of project area ranges from 1600 to 1700 meters. The soil of the Project area is

sparsely covered with the vegetation and is shallow Loamy Gravelly and rock outcrops of plateaux.

The province of Balochistan is a water-starved and land-rich region in Pakistan. There are about 73 small or large rivers and streams constituting the three hydrological basins.

The climate of the Project area is generally dry and cold. It lies outside the range of the monsoon currents. The rainfall is irregular and scanty, which varies from year to year.

Quetta lies in the active seismic zone IV; therefore, earthquakes hit the area from time to time. The history has no any significant and relentless effects of the flood.

Groundwater is the main source of water in project area which is being used for domestic purpose as well as for irrigation of agriculture land. The depth to water table varies between the range of 900-1000 ft. At present, the source of recharge to groundwater is only rainfall, which is about 1 inches per year.

A variety of species of flora are found in the hills and their surroundings. *Artemisia maritima* is the most prevalent followed by *cymbopogon*, *chrysopogon*, *nepeta juncea* and *astragalus stocksii*. The common wild beasts are the hyena, wolf, fox, and jackal. Zarghun and Takatu Mountain contain sheep and markhor. The most common game birds are Chikor and Sisi.

Socio Economic Characteristics

Agriculture

The soil of the center of the valley is good, but the district is mostly barani. However, with the coming of grid electricity the tube wells have replaced the old karez system and mechanization of farming has been introduced.

Irrigation

The major sources of irrigation during the last quarter of the 19th century were karezes. The construction of karezes and its maintenance was an expensive affair. Now a day's tube well becomes the major source of irrigation. Following irrigation schemes have been initiated in Quetta district.

- Flood irrigation
- Perennial Irrigation schemes
- Small delay action dams and flood protection work

Public Consultation and Information Disclosure

Engagement of stakeholders and disclosure is an integral part of project's environmental and social assessment. The engagement with stakeholders was carried out as per the guidelines of Environmental Protection Agency (EPA). The methods used for public consultation with project stakeholders in order to ascertain their stakes regarding project implementation were interview survey, general/public meetings, rapid participatory appraisal and on-site meetings.

Different categories of interested parties including project staff and local communities were consulted to predict the nature and scale of risks, challenges and impacts of project perceived by them.

The major concerns were difficulty in access to village, noise and dust, increased travelling time and preference to locals for job opportunities.

Anticipated Environmental Impacts & Mitigation Measures

The major environmental impacts associated with the proposed project during pre-construction, construction and operation stage will be change in topography, soil erosion & contamination, land acquisition, air & noise pollution, seismic hazard, ecological impacts, disruption of public utilities, health & safety issues, surface & groundwater contamination, disposal of mucking materials, and traffic management. The proper mitigation measures are being followed during construction & operational phase in order to overcome environmental impact associated with the proposed project.

Environmental Management Plan

Recommended mitigation measures to control potential adverse impacts are described in the Environmental Management Plan (EMP). EMP shall become the part of construction contract agreement and shall be strictly enforced during the implementation of the proposed project.

EMP provides frame work to implement recommended mitigation measures. It also defines roles and responsibilities to implement mitigation measures. EMP also outlines training and monitoring plans. The estimated cost of environmental management including monitoring and training is 3.3 Million Rupees

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INTRODUCTION

1.1 Project Background

Quetta, located in North-Western Balochistan near Pakistan-Afghanistan border is the ninth largest city of Pakistan. The city lies on Bolan Pass route and is the only gateway from Central Asia to South Asia having a total area of 2,656 Sq. km. Quetta is the provincial capital of Balochistan. People from every corner of Balochistan have shifted to Quetta because of availability of educational and health facilities. Sariab road is considered to be one of busy travelling route of Quetta which results people have facing traffic congestion problem and increase vulnerability to road accident. The main objective of the proposed project is to alleviate congestion on the arterials carrying traffic to city center, to improve the operation of critical intersections in the city and to reduce overall travel time along city network. These projects will be able to contribute in the socio-economic development of city as the project will help in the revival of local economy, it will bring more population into the stream of benefits, which in turn will change the social appearance of people around this, in addition to the time saving.

Government of Balochistan under PM directive package intends to execute a project of clearing/aligning of Sariab Road.

This document presents the findings of Environmental Impact Assessment (EIA) of Clearing / Aligning of Sariab Road.

1.2 Need for EIA Study of the Proposed Project

EIA is mandatory according to the Balochistan Environmental Protection Act, 2012. Section 15 (1) of the Balochistan Environmental Protection Act states that:

“No proponent of a project of public and private sector shall commence construction or operation unless he has filed an Initial Environmental Examination with the Government Agency designated by Balochistan Environmental Protection Agency, as the case may be, or, where the project is likely to cause adverse environmental effects; an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof”.

According to the Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations 2000, the proposed project falls under category D (Transport) of Schedule II, which requires EIA before commencement of construction.

1.3 Nature, Size and Location of the Project

The project involves Clearing / Aligning of Sariab Road under Quetta Development Department to alleviate the traffic congestion issues in the project area and vicinity. The total length of proposed project is 10.6 Km. The project is located in urban area of Quetta city. Sariab road starts from the intersection of link Hazar Ganji Road passing through Sabzal Road, Brewery Road and ends at Spinny Road.

1.4 Scope of Study

The scope of this EIA Study aims at collection and scrutinizing of data related to physical, biological and socio-economic environment of the project area and to prepare the baseline environmental profile. It also aims at the identification, prediction and evaluation of the possible environmental impacts of the proposed project on its immediate surroundings on both short and long-term bases. Based on the nature and scale of those impacts, appropriate mitigation measures are proposed in this EIA Report.

1.5 Purpose of EIA Report

The purpose of this EIA Report is to assess significant adverse environmental and social impacts and to suggest mitigation and remedial measures to make the project environmental friendly and sustainable during the construction and operational stages of the project and to initiate the process of NOC from the concerned EPA.

1.6 The Proponent and Consultant

a) Proponent Contact/Address

Planning & Development Department,
Block – 6, Balochistan Civil Secretariat,
Sahara e Zargoan, Quetta, Balochistan
Tel: 081-9202582

b) Consultant Contact/Address

National Engineering Services Pakistan Private Limited (NESPAK)
EPHE Division, NESPAK House
1-C, Block – N, Model Town Extension, Lahore
Tel: 042-99090000

1.7 Study Team

A multidisciplinary team was formulated to conduct the study. The team comprises the following persons.

Mr. Ramzan Javed : Team Leader/ Environmental Expert

Ms. Uzma Rafique	:	Senior Environmentalist
Malik Pervaiz Akhtar	:	Senior Sociologist
Syed Zeeshan Abbas	:	Environmental Engineer
Mr. Abdul Manan	:	Chemical Engineer

1.9 Methodology

The following methodology was adopted for carrying out the EIA study of the proposed project:

a) Orientation

Meetings and discussions were held among the members of the EIA Consulting Team. This activity was aimed at achieving a common ground of understanding of various issues of the study.

b) Planning for Data Collection

Subsequent to the concept clarification and understanding obtained in the preceding step, a detailed data acquisition plan was developed for the internal use of the EIA consulting team. The plan identified specific data requirements and their sources; determined time schedules and responsibilities for their collection; and indicated the logistics and facilitation needs for the execution of the data acquisition plan.

c) Data Collection

In this step, primary and secondary data were gathered through field observations, concerned departments and published materials to establish baseline of physical, biological and socio-economic environmental conditions.

- Site Reconnaissance
- Analysis of Maps and Plans
- Literature Review
- Meetings with Concerned department

d) Physical Environment

Information was gathered on the existing physical environment, particularly as related to geology, topography, soils, hydrology and drainage, water quality, air quality, climate, seismology and noise.

e) Biological Environment

The status of the flora and fauna of the study area were determined by a review of literature of the area, and an assessment of both terrestrial and aquatic environments.

Flora

The vegetative communities were identified and classified into community types. Identification was carried out of dominant tree species, assessment of stage of growth (mature or sapling) and assessment of canopy cover.

Fauna

Information on fauna was gathered from existing literature on reported species as well as observations in the field.

f) Socio-Cultural Environment

The consultants utilized a combination of literature, field investigations, census report, meetings, through public consultation and interviews to describe the existing social environment and assessment of the potential impact of the construction of the proposed plant. Data was gathered on the following aspects of the social environment:

- Land use and Municipal Status
- Demographics
- Livelihoods
- Community Facilities
- Solid Waste Management
- Proposed Developments
- Archaeological and Cultural Heritage
- Identification and Evaluation of Environmental Impacts

The impacts of the proposed project on the physical, biological and socio-economic environments prevalent in the project area were visualized at the design, construction and operational phases.

g) Mitigation Measures and Implementation Arrangements

The Adequate mitigation measures and implementation framework were proposed so that the proponent could incorporate them beforehand in the design phase.

1.10 Structure of the Report

Section 1 “**Introduction**” briefly presents the project background, objectives, methodology and need of the EIA study.

Section 2 “**Policy, Legal and Administrative Framework**” comprises policy guidelines, statutory obligations and roles of institutions concerning EIA study of the proposed Project.

Section 3 “**Description of Project**” furnishes information about the studied alternatives, location of the proposed project, cost and size of the project, its major components and alternatives considered for the proposed project to select at the preferred alternative for detailed environmental assessment.

Section 4 “**Environmental Baseline**” describes physical, biological and socio-economic conditions prevalent in the project area.

Section 5 “**Public Consultation**” identifies the main stakeholders and their concerns raised through scoping sessions, and deals with the measures to mitigate the social impacts.

Section 6 “**Anticipated Environmental Impacts and Mitigation Measures**” identifies and evaluates impacts of the project activities during the construction and operation stages and recommends with the measures proposed to mitigate potential environmental impacts of the road project.

Section 7 “**Environmental Management and Monitoring Plan**” outlines institutional arrangements for the implementation of the proposed mitigation measures, training needs of the staff for implementation of the mitigation measures, monitoring requirements, monitoring cost etc.

SECTION – 2

POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

This section provides an overview of the policy framework and national legislation that applies to the proposed project. The project is expected to comply with all national legislation related to environment in Pakistan, and to obtain all the regulatory clearances required.

2.1 National Policy and Legal Framework

EPA agency is responsible which is administered by Ministry of Climate change.

The Pakistan National Conservation Strategy (NCS) that was approved by the federal cabinet in March 1992 is the principal policy document on environmental issues in the country (EUAD/IUCN, 1992). The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. The core areas that are relevant in the context of the proposed project are pollution prevention and abatement, restoration of rangelands, increasing energy efficiency, conserving biodiversity, supporting forestry and plantations, and the preservation of cultural heritage.

Prior to the adoption of the 18th Constitutional Amendment, the Pakistan Environmental Protection Act (PEPA) 1997 was the governing law for environmental conservation in the country. Under PEPA 1997 the Pakistan Environmental Protection Council (PEPC) and Pak EPA were primarily responsible for administering PEPA 1997. Post the adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved and the provinces have been empowered for environmental protection and conservation. Subsequently, the Balochistan government amended PEPA 1997 as Balochistan Environmental Protection Act 2012, and the Balochistan Environment Protection Agency (EPA) Balochistan is responsible for ensuring the implementation of the Act in Balochistan's territorial jurisdiction. Balochistan EPA is also required to ensure compliance with the NEQS and establish monitoring and evaluation systems.

2.2 Regulations for Environmental Assessment, Pakistan EPA

Under Section 12 (and subsequent amendment) of the PEPA (1997), a project falling under any category specified in Schedule II of the IEE/EIA Regulations 2000, requires the proponent of the project to file an EIA with the concerned provincial EPA. Projects falling under any category specified in Schedule II require the proponent to file an EIA with the provincial agency, which is responsible for its review and accordance of approval or request any additional information deemed necessary.

2.3 Regulatory Clearances, Balochistan EPA

In accordance with provincial regulatory requirements, an IEE/EIA in compliance with the Balochistan Environmental Protection Act, 2012 will be marked cleared by EPA and No Objection Certificate (NOC) will be issued for it.

2.4 Guidelines for Environmental Assessment, Pakistan EPA

The Pak-EPA has published a set of environmental guidelines for conducting environmental assessments and the environmental management of different types of development projects. The guidelines that are relevant to the proposed project are listed below:

- Guidelines for the Preparation and Review of Environmental Reports, Pakistan, EPA 1997;

2.5 National Environmental Quality Standards (NEQS) 2000

The National Environmental Quality Standards (NEQS), 2000, specify the following standards:

- Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea (three separate sets of numbers);
- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources;
- Maximum allowable concentration of pollutants (two parameters) in gaseous emissions from vehicle exhaust and noise emission from vehicles;
- Maximum allowable noise levels from vehicles;

These standards apply to the gaseous emissions and liquid effluents discharged by

batching plants, campsites and construction machinery. The standards for vehicles will apply during the construction as well as operation phase of the project. Standards for ambient air quality and noise have also been prescribed.

2.5.1 Air Quality Standards

In pursuance of the statutory requirement under clause (e) of sub-section (1) of section (6) of the Pakistan Environmental Protection Act, 1997(XXXIV of 1997), the Pakistan Environmental Protection Agency with prior approval of the Pakistan Environmental Protection Council, has published the NEQS for Ambient Air in 2010. USEPA standards along with NEQS effective from January, 2013 are given in **Table 2.1**.

Table2.1: Ambient Air Quality Standards

Sr. #	Pollutant	NEQS		USEPA	
		Time-Weighted average	Concentration standard	Time weighted average	Concentration standard
1	SO ₂	Annual average	80 µg/m ³	Annual arithmetic mean	80 µg/m ³ , (0.030 ppm)
		24 hours	120 µg/m ³	24-hours average	365 µg/m ³ , 0.50 ppm
2	NO	Annual average	40 µg/m ³	-	-
		24 hours	40 µg/m ³	-	-
3	NO ₂	Annual average	40 µg/m ³	Annual arithmetic mean	100 µg/m ³ , (0.053 ppm)
		24 hours	80 µg/m ³		
4	O ₃	1 hour	130 µg/m ³		235 µg/m ³ , (0.12 ppm)
		-	-	8-hours average	157 µg/m ³ , (0.08 ppm)
5	Suspended Particulate Matters (SPM)	Annual average	360µg/m ³	-	-
		24 hours	500 µg/m ³	-	-

Sr. #	Pollutant	NEQS		USEPA	
		Time-Weighted average	Concentration standard	Time weighted average	Concentration standard
6	PM ₁₀	Annual average	120 µg/m ³	Annual arithmetic mean	50 µg/m ³
		24 hours	150 µg/m ³	24-hours average	150 µg/m ³
7	PM _{2.5}	Annual average	15 µg/m ³	Annual arithmetic mean	15 µg/m ³
		24 hours	35 µg/m ³	24-hours average	65 µg/m ³
		1 hour	15 µg/m ³	-	-
8	Lead	Annual average	1 µg/m ³	Quarterly average	1.5 µg/m ³
		24 hours	1.5 µg/m ³		
9	CO	8 hours	5 mg/m ³	8-hours Average	10 mg/m ³ , (9 ppm)
		1 hour	10 mg/m ³	1-hour average	40 mg/m ³ , (35 ppm)

2.5.2 Noise Quality Standards

In pursuance of the statutory requirement under clause (c) of sub-section (1) of section (6) of the Pakistan Environmental Protection Act, 1997(XXXIV of 1997), the Pakistan Environmental Protection Agency with prior approval of the Pakistan Environmental Protection Council, has published the NEQS for Noise (2010). These standards are established for the four different categories which include residential area, commercial area, industrial area and silent zone. These standards vary according to the day and night timing, day time hours are 6:00 am to 10:00 pm and night time hours are 10:00 pm to 6:00 am. USEPA standards and World Bank guidelines along with National Environmental Quality Standards for Noise effective from January, 2012 are used for bench marking purpose and given in **Table 2.2**.

Table 2.2: Noise Quality Standards

#	Category of Area	NEQS		WB guidelines		USEPA Standards	
		Day Time	Night Time	Day Time	Night Time	Indoor	Outdoor
1	Residential Area	55	45	55	45	45	55
2	Commercial Area	65	55	70	70	70	70
3	Industrial Area	75	65	70	70	70	70
4	Silence Zone	50	45	-	-	-	-

2.5.3 Drinking Water Quality Standards

In pursuance of the statutory requirement under clause (c) of sub-section (1) of section (6) of the Pakistan Environmental Protection Act, 1997(XXXIV of 1997), the Pakistan Environmental Protection Agency with prior approval of the Pakistan Environmental Protection Council, has published the National Standards for Drinking Water Quality (2010).

Table 2.3 presents the National Standards for drinking water quality. Drinking water quality guidelines issued by WHO and USEPA have also been used as benchmark.

Table 2.3: Drinking Water Quality Standards

#	Parameters	Concentration Standards		
		NEQS (mg/l)	WHO (mg/l)	USEPA (mg/l)
Chemical Parameters				
1	Aluminum (Al)	≤ 0.2	0.2	0.05-0.02
2	Ammonium (NH ₃)	-	1.5	NS
3	Antimony (Sb)	≤ 0.005	0.005	0.006
4	Arsenic (As)	≤ 0.05	0.01	0.05
5	Barium (Ba)	0.7	0.7	2.0
6	Boron (B)	0.3	0.3	NS
7	Cadmium (Cd)	0.01	0.003	0.005

#	Parameters	Concentration Standards		
		NEQS (mg/l)	WHO (mg/l)	USEPA (mg/l)
8	Chloride (Cl)	< 250	250	250
9	Chromium (Cr)	≤ 0.05	0.05	0.1
10	Copper (Cu)	2	1-2	1.0
11	Cyanide (CN)	≤ 0.05	0.07	0.2
12	Fluoride (F)	≤ 1.5	1.5	2.0-4.0
13	Iron (Fe)	-	0.3	0.3
14	Lead (Pb)	≤ 0.05	0.01	0.015
15	Manganese (Mn)	≤ 0.5	0.1-0.5	0.05
16	Mercury (Hg)	≤ 0.001	0.001	0.002
17	Molybdenum (Mo)	-	0.07	NS
18	Nickel (Ni)	≤ 0.02	0.02	0.1
19	Nitrate (NO ₃)	≤ 50	NS	10.0 as N
20	Nitrite (NO ₂)	≤ 3	NS	10.0 as N
21	Selenium (Se)	0.01	0.01	0.05
22	Silver (Ag)	-	NS	0.1
23	Sodium (Na)	-	200	200
24	Sulphate (So ₃)	-	250	250
25	Residual Chlorine	0.2-0.5	-	-
26	Zinc (Zn)	5.0	3.0	5.0
Physical Parameters				
27	Color	≤ 15 TCU	15 cu	15 cu
28	Taste	Non-Objectionable/ Acceptable	-	-
29	Odour	Non-Objectionable/ Acceptable	N S	3 TON
30	Turbidity	< 5 NTU	5 NTU	0.5-5.0 NTU
31	Total hardness	< 500 mg/l	-	-
32	TDS	< 1000	1000	500
33	pH	6.5-8.5	6.5-8.5	6.5-8.5
Biological Parameters				

#	Parameters	Concentration Standards		
		NEQS (mg/l)	WHO (mg/l)	USEPA (mg/l)
34	E-Coli	Must not be detectable in any 100 ml sample	0	0
35	Total Coliforms	Must not be detectable in any 100 ml sample	0	0

2.5.4 Effluent Standards

National standards have been developed for the discharge of municipal effluents into inland water bodies. Irrigation of crops with treated effluent would be according to National standards. A significant amount of agriculture depends on these bodies for their water supply. The NEQS values for discharge into inland waters are given below in **Table 2.4**.

Table 2.4: National Standards for Discharge of Municipal Effluents into Inland Waters and Sewage Treatment

Sr. #	Parameters	Discharge into Inland Waters	Discharge into Sewage Treatment
		NEQS (mg/l)	NEQS (mg/l)
1	Temperature	$\leq 3^{\circ}\text{C}$	$\leq 3^{\circ}\text{C}$
2	pH value (H^+)	6-9	6-9
3	Biochemical Oxygen Demand (BOD_5)	80	250
4	Chemical Oxygen Demand (COD)	150	400
5	Total Suspended Solids (TSS)	200	400
6	Total Dissolved Solids (TDS)	3500	3500
7	Oil & Grease	10	10
8	Phenolic Compounds (as Phenols)	0.1	0.3
9	Chloride (as Cl^-)	1000	1000
10	Fluoride (as F^-)	10	10
11	Cyanide (as CN^-)	1.0	1.0
12	Anionic detergents (as MBAS)	20	20
13	Sulphate (as SO_4^{2-})	600	1000
14	Sulphide (as S^{2-})	1.0	1.0

Sr. #	Parameters	Discharge into Inland Waters	Discharge into Sewage Treatment
		NEQS (mg/l)	NEQS (mg/l)
15	Ammonia (NH ₃)	40	40
16	Pesticides	0.15	0.15
17	Cadmium	0.1	0.1
18	Chromium (trivalent and hexavalent)	1.0	1.0
19	Cooper	1.0	1.0
20	Lead	0.5	0.5
21	Mercury	0.01	0.01
22	Selenium	0.5	0.5
23	Nickel	1.0	1.0
24	Silver	1.0	1.0
25	Total toxic metals	2.0	2.0
26	Zinc	5.0	5.0
27	Arsenic	1.0	1.0
28	Barium	1.5	1.5
29	Iron	8.0	8.0
30	Manganese	1.5	1.5
31	Boron	6.0	6.0
32	Chlorine	1.0	1.0

2.6 Administrative Framework

2.6.1 Quetta Development Authority

The implementing agency of the proposed project is Quetta Development Authority (QDA). It is responsible for ensuring that the project complies with the laws and regulations controlling the environmental concerns of infrastructure development, and that all pre-construction requisites, such as permits and clearances are met.

2.6.2 Environmental Protection Agency, Baluchistan

Pakistan Environmental Protection Council is the apex inter-ministerial and multi-stakeholders decision-making body, which is headed by Chief Minister. While Pakistan Environmental Protection Agency is meant for the enforcement of environmental laws in Pakistan. They have delegated powers to provincial environmental protection agencies

for review, approval and monitoring of environmental examination/assessment projects. As regards the proposed Project, EPA Balochistan will be responsible for reviewing the report, issuing No Objection Certificate (NOC) and overall/broad based monitoring of the proposed project activities.

2.7 Other Environment Related Legislations

Table 2.5 gives a summary of all legislations, guidelines, conventions and corporate requirements:

Table 2.5: Environmental Legislations

Sr. No.	Legislation/Guideline	Description
Acts		
1	Balochistan Environmental Protection Act, 2012	Post the adoption of the 18 th Constitutional in 2011, the subject of environment was devolved and the provinces have been empowered for environmental protection and conservation. Subsequently, the Balochistan government amended PEPA 1997 as Balochistan Environmental Protection Act 2012, and Balochistan EPD is responsible for ensuring the implementation of provisions of the Act in Balochistan's territorial jurisdiction. Balochistan EPD is also required to ensure compliance with the NEQS/PEQS and establish monitoring and evaluation systems.
2	Pakistan Environmental Protection Act (PEPA) 1997	Basic legislative tool empowering the Government of Pakistan to frame and enforce regulations for the protection of environment. The PEPA 1997 is broadly applicable to air, water, soil, marine and noise pollution, and handling of hazardous wastes. Penalties have been prescribed for those contravening provisions of the Act. Under section 12 of the PEPA 1997, no project involving construction activities or any change in the physical environment can be undertaken unless an IEE or EIA is conducted and a report submitted to the federal or provincial EPA.

3	Land Acquisition Act, 1894 Including Later Amendments	The Land Acquisition Act, 1894, is a “law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be paid on account of such acquisition”. The exercise of the power of acquisition has been limited to public purposes. The principles laid down for the determination of compensation, as clarified by judicial pronouncements made from time to time, reflect the anxiety of the law-giver to compensate those who have been deprived of property, adequately. The land needed for the construction of road will be acquired under normal conditions based on prevailing market prices or negotiated prices between QDA and the owners of land. Section 17(4) of the LAA will not be used in the absence of an emergency. Instead, the land will be purchased under willing-seller willing-buyer deal at agreed upon market rates and the seller will have the option not to sell the land, in case an acceptable deal for both the parties is not reached.
4	Canal and Drainage Act (1873)	This Act prohibits corruption or fouling of water in canals (defined to include channels, tube wells, reservoirs and watercourses), or obstruction of drainage.
5	Protection of Trees and Brushwood Act, 1949	This Act prohibits cutting or lopping of trees and brushwood without permission of the Forest Department. The Forest Department will be approached for permission to cut trees along the road alignment.
6	Antiquities Act 1975	The protection of cultural resources in Pakistan is ensured by the Antiquities Act of 1975. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments etc. The act is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area, which may contain articles of

		archaeological significance. NOC would be requested from DG Archeological Department for construction within 200 feet of cultural heritage sites.
Regulations, Standards and Guidelines		
7	Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, (2000)	The Regulation classifies projects on the basis of expected degree of adverse environmental impacts and lists them in two separate schedules. Schedule I lists projects that may not have significant environmental impacts and therefore require an IEE. Schedule II lists projects of potentially significant environmental impacts requiring preparation of an EIA. The Regulations also require that all projects located in environmentally sensitive areas require preparation of an EIA. It also lists Projects not requiring either an EIA or an IEE.
8	National Environmental Quality Standards	The NEQS specify standards for industrial and municipal effluents, gaseous emissions, ambient air requirements and emission levels for Sulfur dioxide and Nitrogen oxide, vehicular emissions and noise levels. The PEPA specifies the imposition of a pollution charge in case of non-compliance with the NEQS. The standards were last revised in 2012.
9	Sectoral Guidelines (1997)	Pakistan Environmental Assessment Procedure deals with general guidelines as well as the sectoral guidelines for the environmental assessment studies. "Sectoral guidelines for construction of Roads" are used as a reference in this document.
10	Building Code of Pakistan	The provision of Building Code of Pakistan shall apply for engineering design of disposal station and related components. The construction in violation of the Building code shall be deemed as violation of professional engineering work. Moreover, a certificate for the proposed action will be obtained from Provincial Building Control Authority.
11	Guidelines for Solid	Guidelines for Solid Waste Management have been issued as

	Waste Management (2005)	a draft by the Pakistan Environmental Protection Agency in coordination with JICA and UNDP. These guidelines explain the waste generation, discharge and composition. These guidelines should strictly be followed for safe handling and disposal of waste generated during construction and operational stages of the project.
12	Pakistan Penal Code (1860)	It authorizes fines, imprisonment or both for voluntary corruption or fouling of public springs or reservoirs so as to make them less fit for ordinary use.
13	Hazardous Substance Rules 2003	Hazardous Substance Rules, 2003 deals with handling, storage, transportation and health & safety procedures to be followed in the workplace. These rules deal with generation and handling of any kind of hazardous substance (solid, liquid & gas) as listed in Schedule I of the rules. These Rules provide Safety plan, waste management plan, transportation of hazardous materials procedures as well as reporting mechanism in case of any accident. Under these rules a license has to be taken from Federal/Provincial Agency for handling and transportation of hazardous material (Schedule II of Rules). This rule will be applicable in case of handling of sludge from disposal stations and treatment plant. The contractor for handling hazardous waste shall be the licensed contractor. Contravene to any of these rules may cause cancellation of the license by Federal/Provincial Agency as the case may be.
14	The Forest Act (1927)/Addendum	The Forest Act 1927 is designed to protect forest areas. The law prohibits grazing hunting, quarrying, clearing for the purpose of cultivation, removing forest produce, and felling or looping trees in forest or protected areas. Section 26 of the act prohibits the clearing of land, felling trees, cultivation, grazing livestock, trespassing, mining and collecting forest reserves along with setting traps or snares and poisoning of water. Any person who contravene shall be liable with punishment set by the law. However, after Forest Ordinance

		<p>Amendment (2016) in sec 27 and 34-A of the Forest Act 1927 a sub-section (3) has been inserted according to which the government after approval from the provincial cabinet declares reserved forest as no more reserved and can acquire the forest land for purpose of projects of national importance. The forest act also allows the concerned authorities to regulate privately owned forests and land under certain conditions such as protection from floods or landslides, safeguarding roads, bridges and railways and preservation of public health (Sec 55). There is no forest land involved in case of Clearing/Aligning of Sariab road. However, during construction felling of few trees will be required. For felling of trees, the permit has to be taken from Assistant Commissioner of the area. For felling of every single tree, ten (10) trees will be planted to compensate each uprooted plant.</p>
15	Factories Act, 1934	<p>This law governs the employment of labor, working hours, working conditions and facilities to be provided in the workplace. The Act deals primarily with matters related to labor relations, their working conditions and their health and safety in the working place. Section 14 to 33 of the act specifically covers all the issues related to working environment of laborers including ventilation (sec14), drinking water conditions for workers (sec19), precautions against fire hazards (sec22) or any other hazardous operation within the working area (sec33) under this act This will be applicable during the construction and operational stages of the project. Contravention to any of the provision of this act will lead to penalty against the concerned person.</p>
Policies and Plans		
16	National Environmental Policy (2005) (NEP)	<p>NEP is the primary policy of Government of Pakistan addressing environmental issues. The broad Goal of NEP is, “to protect, conserve and restore Pakistan’s environment in</p>

		order to improve the quality of life of the citizens through sustainable development”. The NEP identifies a set of sectoral and cross-sectoral guidelines to achieve its goal of sustainable development. It also suggests various policy instruments to overcome the environmental problems throughout the country.
17	Biodiversity Action Plan	The plan recognizes EIA as an effective tool for identifying and assessing the effects of a proposed operation on biodiversity
18	National Water Policy	The National Water Policy Aims at efficient management and conservation of existing water resources, optimal development of potential water resources, steps to minimize time and cost overruns in completion of water sector projects, equitable water distribution in various areas and canal commands, measures to reverse rapidly declining groundwater levels in low-recharge areas, increased groundwater exploitation in high-recharge areas, effective drainage interventions to maximize crop production, improved flood control and protective measures, steps to ensure acceptable and safe quality of water, minimization of salt build-up and other environmental hazards in irrigated areas, institutional reforms to make the managing organizations more dynamic and responsive. This policy is in draft stage.
19	National Drinking Water Policy	The National Drinking Water Policy provides a framework for addressing the key issues and challenges facing Pakistan in the provision of safe drinking water to the people. Drinking water is the constitutional responsibility of the provincial governments and the specific provision function has been devolved to specially created agencies in cities, Town and Tehsil Municipal Administrations under the Local Government Ordinance 2001.

20	Operational Strategy for CDM, 2006	The Operational Strategy for CDM has been developed to fulfill the requirements of establishing a Designated National Authority (DNA) and ensuring transparent, participatory and effective management of CDM process in the country. The strategy describes the functions and powers of the DNA and the national approval process. It builds on preliminary studies for initial projects including Asia Least Cost Greenhouse Gases Abatement Strategy (ALGAS) and Pakistan's Initial Communication on Climate Change which provides a general framework for operating CDM in Pakistan.
INTERNATIONAL CONVENTIONS		
21	The Convention on Conservation of Migratory Species of Wild Animals, (1981.21)	The Convention requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. The parties are also required to promote or cooperate with other countries in matters of research on migratory species. There are no endangered species of plant life or animal life in the vicinity of the Project.
22	Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973)	The convention requires Pakistan to impose strict regulation (including penalization, confiscation of the specimen) regarding trade of all species threatened with extinction or that may become so, in order not to endanger their survival further.
23	International Union for Conservation of Nature and Natural Resources Red List (2000)	Lists wildlife species experiencing various levels of threats internationally.
24	Ramsar Convention on Wetlands of International Importance 1971	The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The convention is an international treaty for the conservation and sustainable utilization of wetlands It is

		the only global environmental treaty that deals with a particular ecosystem.
25	Millennium Development Goals (MDGs)	<p>The Millennium Development Goals (MDGs) were adopted in the General Assembly of the United Nations in the year 2000 by all the countries of world and the world's leading developmental institutions. The MGDs are as follows:</p> <ul style="list-style-type: none"> • Eradicate Extreme Hunger and Poverty • Achieve Universal Primary Education • Promote Gender Equality and Empower Women • Reduce Child Mortality • Improve Maternal Health • Combat HIV/AIDS Malaria and Other Diseases • Ensure Environmental Sustainability • Develop A Global Partnership for Development
26	Basel Convention	<p>The Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and Their Disposal is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). It does not, however, address the movement of radioactive waste. The Convention is also intended to minimize the amount and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate.</p>

SECTION – 3 DESCRIPTION OF THE PROJECT

3.1 Rationale of the Project

Being provincial capital and centre of economic and service activities, Quetta City attracts traffic from all over the country. Currently private transport is the major means of mobility comprising Mazda, Toyota Hiace, and Suzuki Wagons plying on various routes. Quetta is facing diverse range of challenging issues regarding transportation and mobility. Quetta's roads have become congested with traffic due to poor traffic planning and management. A lot of time is wasted during traffic blocks especially during peak hours.

Sariab Road is included in some of major roads of Quetta facing severe traffic congestion. Clearing / Aligning of Sariab road is an inevitable solution for traffic problem in this area. The proposed project will reduce the travelling time and provide direct access to other local roads.

3.2 Objectives of the Proposed Project

The major objectives of the proposed project are:

- To alleviate congestion on the Sabzal Road that is carrying traffic to various areas of the city;
- To improve the operation of critical intersections on the road; and
- To reduce overall travel time along city network.

3.3 Location of the Project Area

The project is located in urban area of Quetta city. Sariab Road starts from the intersection of link Hazar Ganji Road passes through Sabzal Road, Brewery Road and ends at Spinny Road. Location map of the proposed project area is shown in **Figure 3.1**

3.4 Project Administrative Jurisdiction

The proposed project lies in Quetta District which is under the general charge of Deputy Commissioner.

3.5 Project Implementation Schedule

The project is expected to be completed in twelve (12) Months.

3.6 Cost of the Project

The estimated capital cost of the proposed project is **Rs. 2891.046 Million**.

3.7 Land Acquisition

The land acquired on either side of road will be 10 m. The land to be acquired includes residential area, commercial and government buildings.

3.8 Components of the Project

The project involves Clearing / Aligning of Sariab Road. Total length of the proposed road is 10.6 Km. The existing ROW is 23.0 m and after the proposed project ROW will be 43.3 m. Typical cross-sections are shown in **Figure 3.2**.

3.9 Construction Materials

The materials used in construction of the proposed project would include cement, sand, aggregates, reinforced cement concrete frame (RCC Frame), brick infill, brick cladding coarse aggregates (crush), fine aggregates (sand), water, asphalt, reinforcement, cement etc.



Figure 3.1: Location map of Project Area

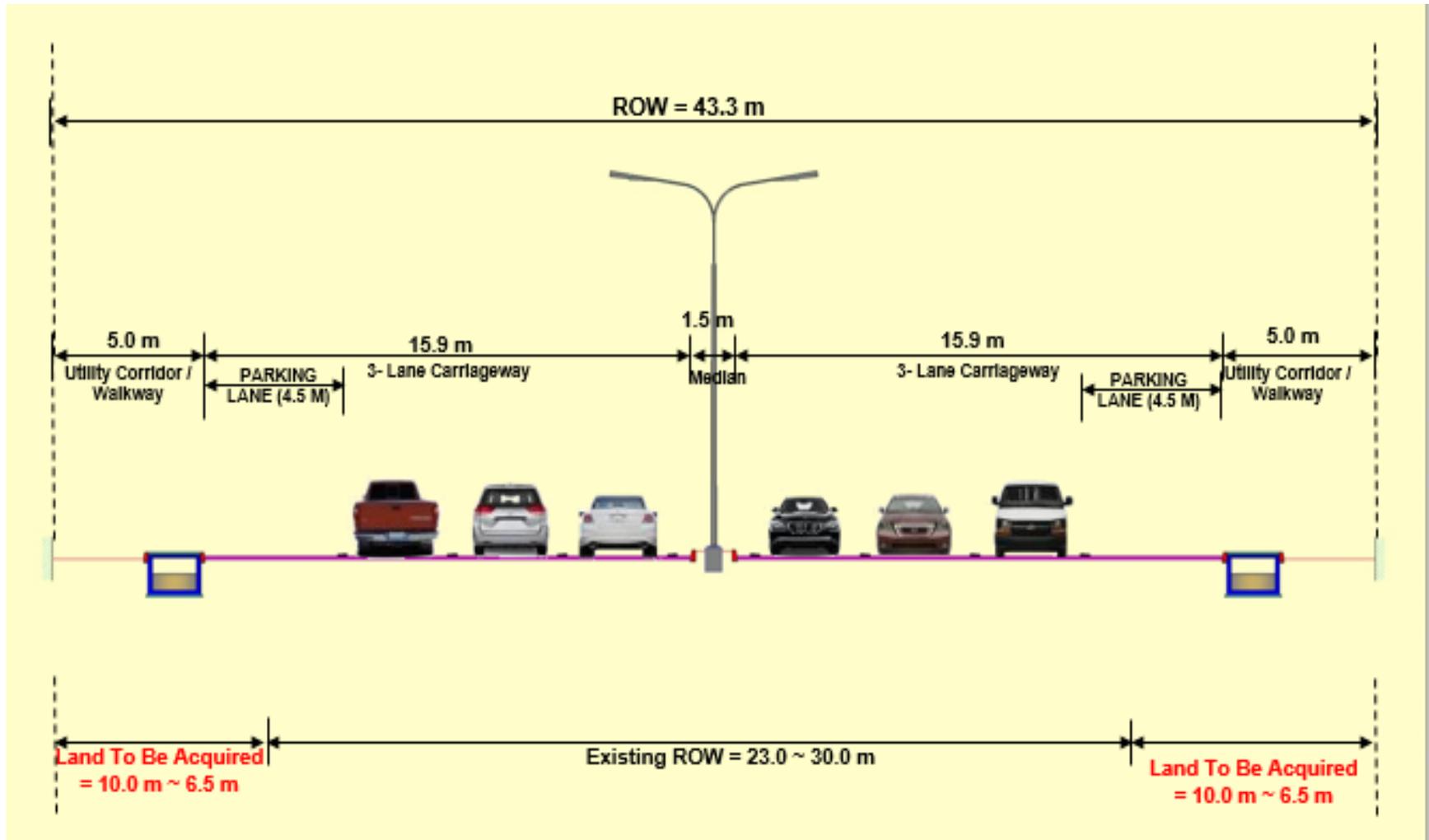


Figure 3.2: Typical Cross Section of Sariab Road

3.10 Construction Camps

Camp sites will be selected keeping in view the availability of adequate area for establishing camp sites, including parking areas for machinery, stores and workshops, access to communication and local markets, and an appropriate distance from sensitive areas in the vicinity. Final locations will be selected by the contractor in consent with Supervision Consultant after approval from Quetta Development Authority.

3.11 Manpower Requirements

Man power demand estimation is an essential component to facilitate deployment of manpower. Total man power required for proposed project is 150 including 50 skilled and 100 unskilled labours. The detail of administrative & technical man power requirement is listed below:

- Administrative arrangements for implementation of project.

Manager Admin	1 Nos.
Office Engineer	1 Nos.

- The manpower requirements by skills during execution and operation of the project be provided.

Soil Engineer	1 Nos.
Design Engineer	3 Nos.
Civil Engineers	4 Nos.
Electrical Engineer	1 Nos.
Mechanical Engineer	1 Nos.

3.12 Expected Equipment for Construction

The list of the machinery and the equipment expected to be used for the proposed project is provided in **Table 3.1**.

Table 3.1: Machinery and Equipment Requirement for the Proposed Project

Type of Machinery and Equipment	Type of Machinery and Equipment
Dump Truck	Self-Propelled Pneumatic Roller
Front End Loader	Asphalt Distributor
Dozer	Batching Plant
Grader	Concrete Transit Truck
Vibratory Roller	Concrete Pump
Water Tankers	Excavator
Generators	Water Pumps
Three Wheel Rollers	Cranes
Tandem Roller	Vibrators
Asphalt Plant	
Paver	

SECTION – 4

ENVIRONMENTAL BASELINE

This section covers a comprehensive description of the project area, including regional resources which are expected to be directly and indirectly affected by the proposed project. The existing environmental conditions around the proposed project area have been considered with respect to bio-physical, and socio-economic aspects. A site visit was conducted to survey the field area and to collect primary data related to environmental conditions.

4.1 Physical Resources

4.1.1 Topography

The general characteristics of the area is mountainous. The mountains are intersected by long narrow valleys consisting of flat alluvial plain with heavy pebbly slopes rising on either side. The general elevation of the District is about 1200 to 3500 meters above mean sea level, while the elevation of project area ranges from 1600 to 1700 meters. **Figure 4.1** shows the topography of the project area.

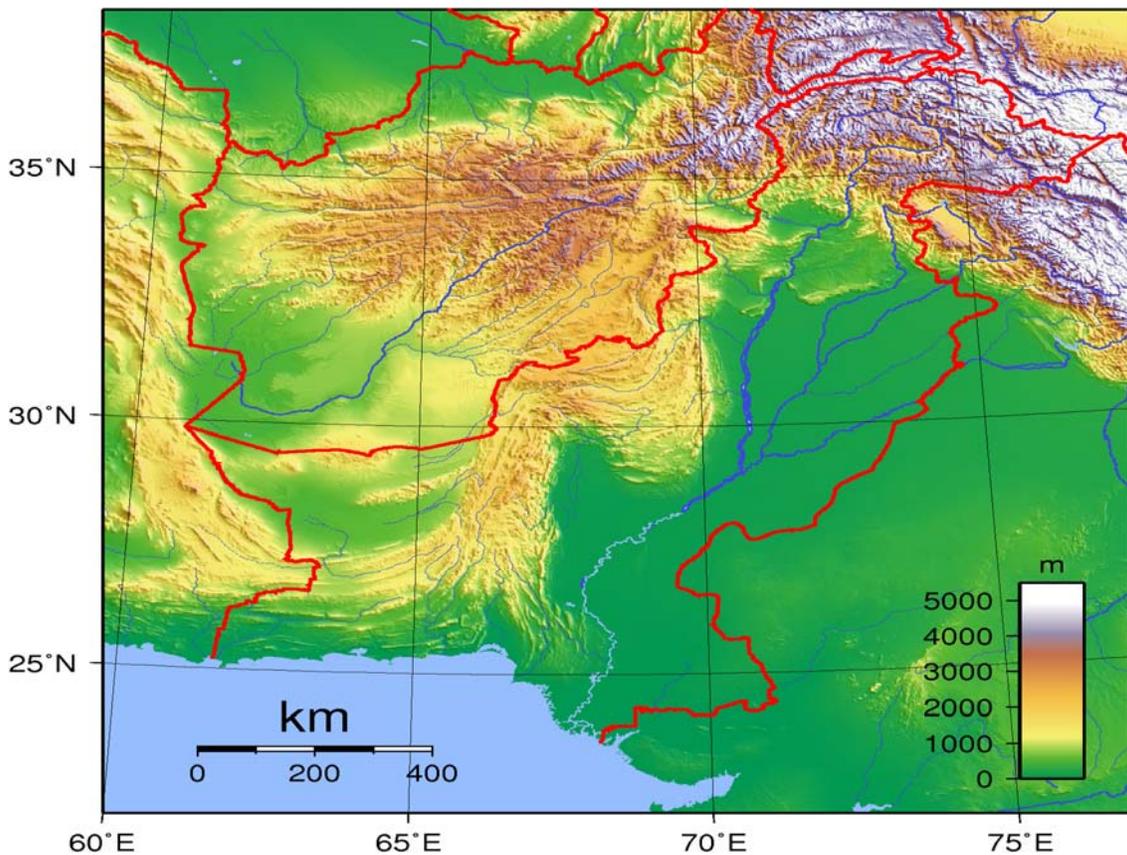


Figure 4.1: Topography of the Project Area

4.1.2 Geography & Soil

Quetta is located in a densely populated portion of the Sulaiman Mountains in the north-east of the province. It is situated in a river valley near the Bolan Pass, which has been used as the route of choice from the coast to Central Asia, entering through Afghanistan's Kandahar region.

The soil of the project area is sparsely covered with the vegetation. The soil of the center of the valley is good, but for the District is mostly barani. The soil of the project area is shallow Loamy Gravelly and rock outcrops of plateaux.

The central part of the Quetta valley is covered by a soil that ranges from sandy loam to silt loam. This type of soil is good for crop production. At the margin of the valley near foothills, the soil consists of sandy loam, mixed with pebbles and rock fragments and is suitable for vegetation.

4.1.3 Rivers and Streams

The province of Balochistan is a water-starved and land-rich region in Pakistan. Besides streams, other sources are at the risk of over exploitation. Balochistan can be divided into three hydrological regions the Nari Basin, the Kharan closed Basin and the Mekran Coast consisting of 73 small or large rivers and streams constituting the three hydrological basins. Only about 30% of this potential of rivers and streams are utilized through different schemes. The important rivers in Balochistan are Zhob, Nari, Bolan, Pishin, Lora, Mula, Hub, Porali, Hingol, Rakshan and Dasht¹.

4.1.4 Climate

The climate of the project area is generally dry and cold. It lies outside the range of the monsoon currents. The rainfall is irregular and scanty. In the spring and summer seasons, there is very little rainfall. The heaviest rainfall/snow falls occur in January and February. Sometimes there has been snowfall even in March. The summer season is moderate and less hot. July is the hottest month with mean maximum temperature of 36 °C and 20 °C respectively. Winter season is severe and dry and persist from October to March. January is the coldest month with mean maximum and minimum temperature of about 11 °C and -3 °C respectively. Month wise 30 years mean temperature, precipitation and relative humidity recorded at Quetta Samungli station is given in the **Table 4.1**.

¹ Water Potential of Balochistan. Retrieved January 12, 2018, from <http://www.waterinfo.net.pk/?q=node%2F77>

Table 4.1: Month wise 30 years Mean Temperature, Precipitation and Relative humidity recorded at Quetta (Samungli) Station

Month	Mean Temperature		Precipitation (mm)	Relative Humidity (%)
	Maximum	Minimum		
January	10.79	-3.36	56.74	65.76
February	12.92	-0.87	48.98	64.85
March	18.68	3.44	55.01	57.30
April	24.84	8.30	28.26	48.45
May	30.42	11.51	5.96	36.82
June	35.25	15.93	1.08	31.43
July	35.90	19.86	12.71	40.53
August	34.84	17.87	12.07	39.97
September	31.36	10.90	0.29	36.28
October	25.46	3.84	3.90	36.27
November	19.18	-0.88	5.27	45.83
December	13.33	-3.18	30.45	59.46
Annual	24.42	6.95	260.75	46.91

Source: Normal for the period 1961-90 data processing Centre, Pakistan Meteorological Department Karachi

4.1.5 Natural Hazard Vulnerability

The proposed project site is susceptible to seismic hazard due to its geographical location

a) Seismology

Quetta lies in the active seismic region. The worst earthquakes hit the city in May 1935, when a large part of Quetta was destroyed. The project area is located in Seismic Zone-IV, where zone-IV represents seismic factor ground acceleration $>0.32g$. **Figure 4.2** shows the seismic zoning map of Pakistan indicating that project area is falling under Seismic Zone-IV.

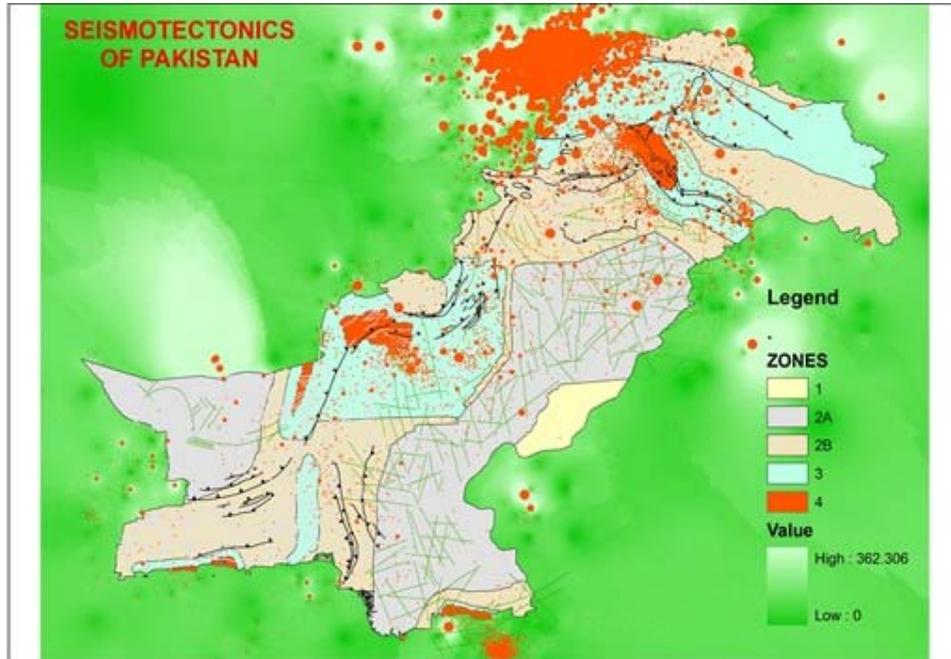


Figure 4.2: Seismic Zoning Map of Pakistan

b) Floods

Two Union councils of district Quetta are under the threat of flood and settlements on banks of nullah which flows through city. The history has no significant and relentless effects of the flood. However, during 2007 cyclone in coastal areas and rain in other parts of the province was affected badly the district badly and trade links were cut off.

4.1.6 Air Quality

The ambient air quality monitoring in the project area is being carried out and the report will be updated after completion of monitoring. However, previous studies were conducted in August, 2011. The sampling was conducted for 24 hours. The results of laboratory analysis of ambient air quality parameters are given in **Table 4.2**.

Table 4.2 Ambient Air Quality Analysis (August, 2011)

Sr. No.	Parameters	Obtained Concentration						Duration	NEQS	USEPA Standards
		Soryab Phattak		Malli Bagh		Sabzal Road				
1	Carbon Monoxide (CO)	2.21 ppm	2.48 mg/m ³	0.663 ppm	1.72 mg/m ³	0.4419 ppm	1.16 mg/m ³	24 Hours	5 mg/m ³	35 ppm (1-Hour Average)
2	Sulfur Dioxide	0.0237 ppm	60.84 µg/m ³	0.0302 ppm	78.38 µg/m ³	0.0167 ppm	43.75 µg/m ³		120 µg/m ³	0.14 ppm (24-Hour)

	(SO ₂)								Average)
3	Nitrogen Dioxide (NO ₂)	0.00087 ppm	2.24 µg/m ³	0.00207 ppm	5.38 µg/m ³	0.00075 ppm	1.96 µg/m ³	80 µg/m ³	0.053 ppm (Annual Arithmetic Mean)
4	Particulate Matter (PM ₁₀)	-	65.97 µg/m ³	-	47.60 µg/m ³	-	34.54 µg/m ³	250 µg/m ³	150 µg/m ³ (24 Hours Average)

Source: SGS Lab Test Result, 2011

The values of CO, SO₂, NO₂ and PM₁₀ were within permissible limits of USEPA and NEQS. However, due to increase in the traffic with the passage of time, it is estimated that average values of CO, SO₂, NO₂ and PM₁₀ would have been increased.

4.1.7 Groundwater

Groundwater is the main source of water in project area which is being used for domestic purpose as well as for irrigation of agriculture land. The depth to water table varies between the range of 900-1000 ft. At present, the source of recharge to groundwater is only rainfall, which is about 1 inches per year. The groundwater quality monitoring in the project area is being carried out and the report will be updated after completion of monitoring. However, previous studies were conducted in August, 2011. The groundwater samples were analyzed for chemical and microbiological parameters. **Table 4.3** shows groundwater analysis.

Table 4.3: Groundwater Analysis

Sr. No.	Parameters	Unit	Test Results			WHO Guidelines	NEQS
			Malli Bagh Tubewell	Killi Kabir Tubewell (Shahbaz Town)	Filter Plant Outlet, Satellite Town		
A. Chemical Parameters							
1	pH	-	7.73	7.79	8.13	6.5-8.5	6.5-8.5
2	Total Dissolved Solids (TDS)	mg/l	318	532	298	1000	1000
3	Total Hardness as CaCO ₃	mg/l	163.14	211.94	173.13	500	500
4	Chloride	mg/l	43.23	97.03	45.87	250	250
5	Nitrates	mg/l	2.25	4.34	5.19	50	50
6	Fluoride	mg/l	0.93	0.84	0.76	1.5	1.5
7	Sodium	mg/l	24	59	22	200	-
8	Arsenic (As)	mg/l	0.05	0.05	0.05	0.01	≤0.05
9	Iron	mg/l	0.325	0.037	0.1	0.3	-
10	Lead (Pb)	mg/l	<0.01	<0.01	<0.01	0.01	≤0.05
11	Mercury (Hg)	mg/l	<0.001	<0.001	<0.001	0.001	≤0.001
B. Microbiological Parameters							
1	Total Colony Count	Cfu/ml	180	4032	450	<500 Cfu/ml	0/100 ml
2	Total Coliforms	Cfu/100ml	16	25	TNTC	0/100 ml	0/100 ml
3	Fecal Coliforms (E.Coli.)	Cfu/100ml	Absent	Absent	Absent	0/100 ml	0/100 ml

Source: SGS Lab Test Result, 2011

The groundwater analysis results reveal that water is contaminated with total coliforms.

4.1.8 Waste Water

The wastewater has been extensively used for irrigation of crops in project area. The wastewater quality monitoring in the project area is being carried out and the report will be updated after completion of monitoring. However, previous studies were conducted in August, 2011. **Table 4.4** shows wastewater analysis.

Table 4.4: Wastewater Analysis

Sr. No.	Parameters	Unit	Test Results			NEQS
			Sabzal Road Treatment Plant	Sumangli Road STP Inlet	Balochistan University STP Inlet	
1	Temperature (during sample collection)	°C	25	29	25	≤30
2	pH	-	7.40	7.25	7.56	6 – 9
3	Total Dissolved Solids (TDS)	mg/l	1266	916	966	3500
4	Total Suspended Solids (TSS)	mg/l	124	88	21	200
5	Chemical Oxygen Demand (COD)	mg/l	474	330	298	150
6	Biochemical Oxygen Demand (BOD ₅)	mg/l	214	153	140	80
7	Oil & grease	mg/l	20.0	8.0	27.5	10
8	Chloride (Cl)	mg/l	215.23	129.67	141.13	1000
9	Sulfate (SO ₄)	mg/l	112.39	12.76	44.85	600
10	Sulfide (S)	mg/l	20.74	17.02	21.91	1.0
11	Fluoride (F)	mg/l	1.02	0.09	1.40	10
12	Ammonia (NH ₃)	mg/l	5.13	4.87	4.58	40
13	Cyanide (CN)	mg/l	<0.01	<0.01	<0.01	1.0
14	Phenolic Compounds	mg/l	0.02	0.017	0.022	0.1
15	Anionic Detergents	mg/l	2.12	1.99	2.08	20
16	Arsenic (As)	mg/l	0.10	0.08	0.10	1.0
17	Barium (Ba)	mg/l	<0.5	<0.5	<0.5	1.5
18	Boron (B)	mg/l	0.199	0.129	0.214	6.0
19	Chromium (Cr)	mg/l	<0.02	<0.02	<0.02	1.0
20	Cadmium (Cd)	mg/l	<0.03	<0.03	<0.03	0.1
21	Copper (Cu)	mg/l	0.025	<0.02	<0.02	1.0
22	Iron (Fe)	mg/l	1.4	1.8	0.68	8.0
23	Lead (Pb)	mg/l	0.025	0.025	0.025	0.5
24	Manganese (Mn)	mg/l	0.075	0.1	<0.05	1.5
25	Mercury (Hg)	mg/l	<0.001	<0.001	<0.001	0.01
26	Nickel (Ni)	mg/l	0.05	0.025	0.062	1.0
27	Selenium (Se)	mg/l	0.041	0.02	0.006	0.5
28	Silver (Ag)	mg/l	<1.0	<1.0	<1.0	1.0
29	Zinc (Zn)	mg/l	0.2	0.325	0.087	5.0
30	Total Toxic Metals	mg/l	0.640	0.279	0.407	2.0
31	Chlorine (Residual)	mg/l	<1.0	<1.0	<1.0	1.0

Source: SGS Lab Test Result, 2011

All the tabulated parameters of wastewater were within prescribed limits of NEQS except BOD₅, COD, Oil & Grease and Sulfide.

4.1.9 Noise

Noise monitoring in the project area is being carried out and the report will be updated after completion of monitoring. However, previous studies were conducted in August, 2011. Noise level was monitored with the help of a portable digital sound

meter in 2011. **Table 4.5** indicates that noise levels monitored in Project area during day time and night time were within prescribe limits of NEQS.

Table 4.5: Average Noise Level Monitoring

Sr. No.	Location	Test Results L_{eq}		Unit	NEQS (Commercial)	
		Day Time Average	Night Time Average		Day Time	Night Time
1	Soryab Phattak	60.37	58.46	dB (A)	65	5
2	Malli Bagh	58.85	50.63			
3	Sabzal Road	43.97	40.37			

Source: SGS Lab Test Result, 2011

4.1.10 Land use

The land use of the proposed project area is predominantly commercial and residential including health & religious facilities, shrines, graveyards and mosques.

Environmental Sensitive Receptors

Some important environmentally sensitive receptors have been identified during site visits. These sensitive receptors and their respective sensitivity are listed in the **Table 4.6**.

Table 4.6: Environmental Sensitive Receptors and their Sensitivity

Sr. #	Sensitive Receptors	Remarks
Educational Institutes		
1	St. Jude School	Sensitivity due to noise and dust exposure during teaching hours and access problems for the students and staff during construction phase.
2	University of Balochistan	
3	Govt. boys post graduate	
4	Balochistan Agriculture Training Institute	
Medical Facilities/Institutes		
5	Tariq Hospital	Sensitivity due to access problems for patients and staff during construction phase and exposure to noise and dust pollution.
6	Rasheed Clinic	
7	Elper Eye Hospital	
Mosques/Shrines/Graveyards		
8	Jamia Masjid Akbar	Sensitive to noise and dust pollution during construction phase and inconvenience for the Namazis.
9	Umar Mosque	
10	Masjid	
Bank/Offices		
11	Anti-Narcotics Office	Sensitivity due to noise and dust exposure

Sr. #	Sensitive Receptors	Remarks
12	Police Station Sariab	during office hours and access problems for the customers and staff during construction phase.
13	Municipal Committee	
14	Agriculture office	
15	Excise Office	
16	Postal life Insurance	
17	National Bank of Pakistan	
18	Habib Bank Limited	

4.2 Ecological Environment

4.2.1 Flora

The soil of the district is sparsely covered with vegetation. A variety of species of flora are found in the hills and their surroundings. *Artemisia maritima* is the most prevalent species followed by *cymbopogon*, *chrysopogon*, *nepeta juncea* and *astragalus stocksic*. *Artemisia* is used for medicine purpose. *Camelarom*, *Juniper* and *pistachio* trees are used for fuel purpose. Other vegetation found in the district, are *humma* (*ephedra intermedia*), *ghurezah* (*Sophora alopecuroides*), *khakshir* (*sisymbium Sophia*), *kharorak* (*arnebia cornuta*), *lokhae* (*Scirpus wardianus*), *makhi* (*caragana ambigua*) etc.

4.2.2 Fauna

The common wild beasts are the hyena, wolf, fox, and jackal. *Zarghun* and *Takatu* mountains contain sheep and markhor. Leopard is occasionally seen in the *Zarghun* and *Chiltan* hills. The most common game birds are *Chikor* and *Sisi*.

4.3 Socioeconomic Conditions

4.3.1 Population Size, Growth and Distribution

i) Population Size and Growth

The population of Quetta District according to census 2017 is 22,756,99 which was 773, 936 in 1998 as compared to 381,570 in 1981 recording an increase of 99.16 percent over the last 17 years i.e. 1981-98. The increase of 51.19 and 77.64 percent was observed during Intercensal period 1972-81 (8.46 years) and 1961-72 (11.67 years) respectively. Overall the population of the district has increase quite rapidly showing substantial increase of 434.91 percent during the last 37 years i.e. 1961-98 which is more than five times. The average annual growth rate of population in the district is 5.83 during the intercensal period 1998-2017 which was 4.13 percent

during Intercensal period 1981-98 as against 5.01 percent during 1972-81 and 5.05 percent in 1961-72.

Table.4.7: Population of different intercensal period.

Description	1961	1972	1981	1998	2017
Population(thousand)	142070	252380	381570	773936	2275699
Intercensal increase %	--	77.64	51.19	99.16	--
Cumulative increase %	--	77.64	168.58	434.91	--
Average annual growth rate %	--	5.05	5.01	4.13	5.83

- The total area of the district is 2653 square kilometers according to census report 2017 the population density of district is 857.78 persons per square kilometers, which was 286.04 persons per square kilometers according to census report 1998.

ii) Household Size

According to census report 2017 the Average household size for the district is 8.22 persons, which was 8.5 persons in 1998. The household size varies at 8.61 and 7.78 for rural and urban areas respectively.

iii) Rural/ Urban Distribution

The rural population of the district is 1274494 constituting 56 percent of the total population. The average annual growth rate of rural population is 9.96, which was 4.26 percent during 1981-98 and was 0.19 and 8.75 percent during 1972-81 and 1961-72 respectively. The urban population of the district is 1001205 constituting 44 percent of the total population. The average annual growth rate of urban population according to census report 2017 is 3.05 percent, which was 4.09 percent during 1981-98 and was 7.25 and 3.43 percent during 1972-81 and 1961-72 respectively.

iv) Sex Ratio

Sex ratio is an important demographic indicator which is defined as the “number of males per hundred females”. According to the census report 2017 the sex ratio of the district is 110.37, which was in 1998 118.45 for the district. The sex ratio in rural and urban areas of the district is 108.91 and 112.26 respectively which indicates that the male proportion is higher in the urban areas as compared to the rural areas.

v) Religion

The population of the district is almost Muslim. They constitute 96.41 percent of the total population with a breakup of 98.52 percent in rural and 95.68 percent in urban

areas. There are few Christian, Hindu, Qadiani/ Ahmadi, scheduled caste and other communities which are 3.59 percent of the total population.

Table.4.8: Religion of the district.

Religion	All Areas	Rural	Urban
Muslim	96.41	98.52	95.68
Christian	2.68	1.00	3.27
Hindu (Jati)	0.50	0.10	0.64
Qadiani/ Ahmadi	0.25	0.24	0.25
Scheduled Caste	0.05	0.08	0.04
Others	0.11	0.06	0.13

vi) Mother Tongue

The mother tongue refers to the language used for communication between parents and their children in the household. The question was asked about all individuals living in the housing unit.

The predominant mother tongues of population of the district are Pashto and Bullochi, spoken by 57.54 percent of the total population followed by others at 17.46 percent and Punjabi at 16.01 percent. The proportion of the population speaking Pashto and Bulloch is significantly higher in rural areas at 84.23 percent as compared to the urban areas at 48.34 percent. In contrast the proportion of others and Punjabi is higher in urban areas at 40.68 percent as against rural areas at 12.58 percent. The proportion of the population speaking Urdu, Sindhi and Saraiki is 8.99 percent.

Table.4.9: Language spoken in the district.

Area	Urdu	Punjabi	Sidhi	Pashto	Balochi	Saraiki	Others
All areas	5.96	16.01	1.44	29.97	27.57	1.59	17.46
Rural	1.41	4.42	0.37	48.16	36.07	1.42	8.16
Urban	7.53	20.01	1.80	23.70	24.64	1.65	20.67

vii) Migration

Migration data covers movement of population from one district to another in the same province and from one province to another. It does not cover persons who changed their place of residence within their own district.

vii) Economically Active population

The economically active population of the Quetta district among the population aged 10 years and above to the total population is 23.35 percent which is 177.45 thousand

souls with 96.33 percent male and 3.67 percent female. The remaining 76.65 percent economically inactive population consists of 29.16 percent children below 10 years, 30.32 percent domestic workers including 65.35 percent female amongst the total females and 0.74 percent male workers amongst the total males. In which 12.66 percent are students, while all other categories constitute 4.51 percent in the total economically inactive population of the district.

The labor force participation rate as percentage of total labor force to the population aged 10 years and above is computed at 32.96 percent for the district. There is a significant difference in the participation rates between male and female labor forces as 57.59 percent for male compared to 2.70 percent for female. The labor force participation rate is slightly higher i.e. 33, 00 percent in urban area as compared to 32.84 percent in the rural area.

4.3.2 Administrative Set up

i) Executive, Judiciary and Revenue System

The district is headed by a Deputy Commissioner on the executive side aided by the Additional Deputy Commissioner and the two Sub-Divisional officers who are in charge of the city and Saddar sub-divisions. At the tehsil level, in Quetta there is a full-fledged tehsil which is headed by a Tehsildar assisted by one Naib Tehsildar and the usual subordinate revenue staff. However, there is nowadays a Naib Tehsildar, whereas in ancient times there used to be only a Kanungo to look after the revenue work and was assisted by patwari and the Levies staff.

Besides, there are Extra Assistant Commissioners at Quetta who are also first-class Magistrates. Consequent upon the long-standing principle of separating the executive from judiciary, there have been since been appointed Judicial magistrates as well at Quetta. However, to maintain law and order Quetta district is divided into two Sub-divisions, Quetta city and Quetta Saddar and sub-tehsils is Quetta tehsil and Panjpai.

ii) Health

In addition to the provincial Civil Hospital of the British days, following additional health facilities in the public sector are available in Quetta city.

- Sardar Bahadur Khan T.B Sanatorium
- Railway Hospital
- Combined Military Hospital (C.M.H)
- Helpers Eye Hospital
- Christian Hospital

- Lady Duffer in Hospital for women
- Children Hospital Quetta (C.H.Q)

During recent years a number of private clinics and hospitals have sprung up in the city. Prominent among them are the following

- Al-Rehman Hospital
- Saleem Hospital
- General Hospital
- Jilani Hospital
- Tariq Hospital
- Alfahad hospital
- Al-Noor hospital
- Universal Medical Complex

The position of health services available in the district is as under in the **Table 4.10**

Table 4.10: Name and number of institutions

Sr.#	Name of institutions	No of institutions
1	Hospitals (Government and private)	26
2	T.B Clinic	1
3	Basic Health units	27
4	Dispensaries	21
5	Rural Health centers	1
6	MCH Centers	14
7	School Health Services unit	2

iii) Education

Besides the university of Baluchistan, two private sector institutions namely juniper and Princeton universities are catering to the higher studies need of the students of the province. Additionally, two professional colleges that is Bolan Medical College and Agriculture College are functioning under the aegis of the University of Baluchistan.

Moreover, the following colleges are also available in the city.

- Two-degree colleges one each boy for boys and girls
- Five intermediate colleges two for boys and three for girls
- Two intermediate colleges co-educational being run under the aegis of the Federal Board of Education
- Three colleges in the PTV sector, one co-educational and one each for boys and girls.

The education statistics of the district are as under in the **Table 4.11**

Table 4.11: The education statistics of the district

Sr. #	Particulars	YEARS					
		1993	1994	1995	1996	1997	1998
1	No of Boys Schools	388	338	315	312	293	298
2	No of Girls schools	175	145	166	166	177	181
3	Enrolment in Boy school	68762	70480	79698	79012	76438	70687
4	Enrolment in Girl schools	43762	48675	54050	61558	61438	60564

Education statistics regarding level of educational institutions and enrolment of students in the district for the year 1998 is given below in **Table 4.12**

Table 4.12: Enrolment of students in the district for the year 1998

Particulars	Primary			Middle			High			Total		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
No. of schools	249	139	388	28	25	53	21	17	38	298	181	479
Enrolment of students	50806	46535	97341	13371	9850	23221	6510	4179	10689	70687	60564	131251

4.3.3 Industry and Trade

i) Industry

In all there are thirty-five industrial establishments at Quetta. Pharmaceutical manufacturing, fruit preservation and coal mining are the main industrial activities. The Bolan textile mill (presently not functioning) at Baleli and Chiltan ghee mills at Quetta are the main industrial units. The development of cottage or small-scale industries especially in Quetta city is now taking shape. The embroidery industry is developing and its products are supplied to various parts of the country and exported abroad.

ii) Communication

The railway traverses the district from Sariab through Quetta to kuchlak and the principal roads are those running from Quetta to Chaman: to Sibi via Bolan Pass; to Mastung through Lak pass onward to Karachi on RCD Highway.

Quetta is linked with all the districts of Baluchistan through a well-developed network of roads. It is also directly linked with the other provinces through roads. Quetta occupies a central and strategic position. It is seen as the gateway to Central Asia. Quetta is also connected to the rest of the country and to Iran and Afghan borders by rail. The railway was introduced by the British.

Radio and television stations are functioning in Quetta. The first radio station was established in Baluchistan in 1956 at Quetta. The Program of PTV World and STN

can also be clearly watched at Quetta. There is also a very good network of telecommunication in the district. Digitalized telephone exchanges have been installed in the district.

There are 34 post offices in Quetta district. The Pakistan post office Quetta is additionally providing the following services: e.g. Fax Money order, Fax Messages, Urgent Mail Service, and Air Express Service. There are also a number of courier services available in the district.

In Quetta there are seven grid stations and one power house. More than 99 percent of the population has been provided with electric connections. Piped natural gas for domestic and industrial use is also available in the district.

iii) **Trade and Trade Centers**

A Chamber of commerce and trade is functioning at Quetta. There is also a market committee. The federal government has an office of the controller of imports and exports to look after the issue arising from border and facilitate local traders.

iv) **Forestry**

Small scale natural forests are found in Quetta and at Urak such as Karkhasa, Takatu south and Hazargunji. While those in Urak area are Spin Karez, tagha Tarkhar and zarghun central. Total estimated area under forests comprises 34,634 hectares. There is no private commercial forestry in the district.

4.3.4 **Socio Economic Environment**

I. **Agriculture**

The soil of the center of the valley is good, but the district is mostly barani. However, with the coming of grid electricity the tube wells have replaced the old karez system and mechanization of farming has been introduced.

There are two cropping seasons in Quetta district, kharif and rabbi. Kharif crops are sown in summer and harvested in late summer or early winter, while rabbi crops are sown in winter or early winter and harvested accordingly. The important rabbi crops are wheat, barley, cumin, vegetables and fodder. The crops grown during kharif are vegetables, potato, melon, fodder, onion etc.

II. **Irrigation**

The major sources of irrigation during the last quarter of the 19th century were karezes. The construction of karezes and its maintenance was an expensive affair.

Now a day's tube well becomes the major source of irrigation. Following irrigation schemes have been initiated in Quetta district.

- Flood irrigation
- Perennial Irrigation schemes
- Small delay action dams and flood protection work

III. Forestry

Small scale natural forests are found in Quetta and at Urak such as Karkhasa, Takatu south and Hazargunji. While those in Urak area are Spin Karez, tagha Tarkhar and zarghun central. Total estimated area under forests comprises 34,634 hectares. There is no private commercial forestry in the district.

IV. Horticulture

Hanna and Urak valleys are well known for their extensive orchards of apple, peach, apricot, almond and plum. These are all cash crops. Average production and yield of major fruits grown in the Quetta district during the year 1997-98 is shown in the **table 4.13**

Table 4.13: Average, Production and yield of Major fruits grown in Quetta District

Sr. #	Fruit	Total Area (Hectares)	Production (Tones)	Yield per Hectare (Kilograms)
1	Almond	98	404	4124
2	Apple	3025	44553	15149
3	Apricot	564	10215	18438
4	Grapes	851	9320	11135
5	Peach	510	7022	14158
6	plum	541	9173	17573
7	pear	38	400	10526
8	Pomegranate	2	40	20000
9	Cherry	216	1014	5172
10	Pistachio	16	16	2000
11	Other Fruits	5	5	1000

V. Live stock

A minor but a sizeable proportion of the rural population is engaged in livestock rearing activities. In Urban areas, dairy farms are maintained for commercial purpose. There is a network of veterinary institutions which include hospitals, dispensaries, artificial insemination center (A.I.C) and Disease Investigation Laboratory (D.I.L). Livestock population of Quetta district according to the livestock Census, 1996 in **Table 4.14**

Table 4.14: Livestock population of Quetta district according to the Census, 1996

Sr.#	Live stock	Number
1	Cattle	10392
2	Buffalo	5496
3	Sheep	67204
4	Goat	39,738
5	Camel	2
6	Horse	204
7	Mule	43
8	Ass	429
9	Poultry	100,071

VI. Horticulture

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VII. Live stock

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Table 4.16: Livestock population of Quetta district according to the Census, 1996

Sr.#	Live stock	Number
1	Cattle	10392
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6	Horse	204
7	Mule	43
8	Ass	429
9	Poultry	100,071

4.3.5 Important/ Historical places of Quetta City

Following are the land marks and important sites of Quetta city.

i Hazarganji Chiltan National park

In the Hazargunji Chiltan Park, 20 kilometers south–west of Quetta, markhors have been given protection. The park is spread over 32.500 acres' altitude ranging from 2021 to 3264 meters.

Hazargunji literally means “A thousand treasures” Legend has it, that there are a thousand treasures buried, in the fold of these mountainous which relate to the passage of great armies down the corridors of history. The Bactrian's, Scythians, Mongols and then the great migrating hordes of Baloch, all passed this way.

ii Karkhasa

Karkhasa is a recreation park situated at a distance of 10 kilometers to the west of Quetta. It is a 16 kilometers long narrow valley having a variety of flora like ephedra, Artemisia and Sephora. One can see birds like partridge and other wild birds in the park. Limited recreational facilities are provided to the visitors through the forest department.

iii Urak Valley

The Urak valley is 21 kilometers from Quetta city. The road is lined on either side with wild roses and fruit orchards. Peach, Plum, apricot and apple of many varieties are grown in this valley.

The water falls at the end of the Urak valley, which is full of apple and apricot orchards, makes for an interesting picnic spot.

iv Hanna Lake

A little short of the place where the Urak valley begins and 10 kilometers from Quetta is the Hanna Lake, where benches and pavilions on terraces have been provided. Gold fish in the lake comes swimming right up to the edge of the lake. A little distance away, the waters of the lake take on a greenish blue tint. All along the edge of the lake plantation of pine trees have been made. Chair lift has recently along the lake for the attraction of visitors.

The greenish- blue water of the lake provides a rich contrast to the sandy brown hills that surround it. One can promenade on the terraces.

v Askari Park

Askari Park at the airport road offers amusement and recreational facilities.

Table.4.17: Economically active population.

Economic Category	All Areas			Rural			Urban		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Economically active	23.35	41.48	1.87	21.60	39.07	1.47	23.95	42.30	2.02
Economically inactive	76.65	58.52	98.13	78.40	60.93	98.53	76.05	57.70	97.98
Children below 10 years	29.16	27.97	30.56	34.24	33.75	34.80	27.41	26.02	29.07
Domestic workers	30.32	0.74	65.35	29.64	0.70	63.00	30.55	0.76	66.18
Students	12.66	21.61	2.07	10.35	18.71	0.72	13.47	22.60	2.54
All others	4.51	8.19	0.14	4.17	7.78	0.01	4.62	8.33	0.19
Labor force participation rate (Refined)	32.96	57.59	2.70	32.84	58.96	2.25	33.00	57.17	2.85
Un-Employment rate	24.99	25.83	2.82	28.93	29.88	0.00	23.76	24.57	3.54

4.4 Impact Assessment Survey of the Project Area

A social survey was carried out in the project area to identify the perceived impacts and their magnitudes on the affected population. A sample of 50 respondents was taken on the basis of random sampling technique, which included shop keepers, drivers, workers, government employee, students and private job etc.

4.4.1 Survey Findings

The following information has been collected during the survey:

- Demographic Characteristics.
- Socio- Economic Characteristics.
- Awareness Regarding the Proposed Project
- Acceptability of the Proposed Project
- Perception of Environmental & Social Impacts of the project by public

The details of the aforesaid have been presented in the succeeding sub-sections below and social survey Performa is attached as **Annex-I**

A) Demographic Characteristics.

The demographic characteristics have been discussed in the subsequent sub-sections:

i) Gender Distribution

Efforts were made to contact the maximum population during survey. 90% were males and remaining 5% were females as shown in **Table 4.18**.

Table 4.18: Gender Distribution

Sr. No.	Gender Ratio	Number of Respondents	Percentage (%)
1	Male	45	90
2	Female	5	10
Total		50	100

ii) Age Composition

The age composition of the respondents is such that 06% of the respondents were in the range of 15 to 25 years of age, while 88% were between 26 to 35 years, and 6% were in between 36 to 45 years. As shown in **Table 4.19**. These figures elucidate that the majority of the respondents were mature enough to give their opinion about the proposed Project.

Table 4.19: Age Composition of the Respondents

Sr. No.	Age Group	Number of Respondents	Percentage (%)
1	15 – 25	3	6
2	26 – 35	44	88
3	36 – 45	3	6
Total		50	100

iii) Education

About 30% had graduation degree and/or possessed higher education, 8% were primary, 12% were with middle level schooling, 20% of the respondents were educated up to metric, 24% were educated up to intermediate level, while the remaining 6% of the respondents were illiterate as shown in **Table 4.20**.

Table 4.20: Educational Level of the Respondents

Sr. No.	Educational Level	Number of Respondent	Percentage (%)
1	Illiterate	3	6
2	Primary	4	8
3	Middle	6	12
4	Metric	10	20
5	Intermediate	12	24
6	Graduation & above	15	30
Total		50	100

iv) Marital Status

The majority of the respondents i.e. 70% were un-married while the remaining 30% were married as shown in **Table 4.21**.

Table 4.21: Marital Status of the Respondents

Sr. No.	Marital Status	Number of Respondent	Percentage (%)
1	Married	15	30
2	Un-Married	35	70
Total		50	100

v) Occupation

The occupational status of the respondents is such that about 24% of the respondents were businessmen/ shop keepers, 6% were drivers, 30% were Labor/workers, 6% were in job, 22% were student, 6% were doctor and the remaining 6% of the respondents were farmers by occupation as shown in **Table 4.22**.

Table 4.22: Occupation Status of the Respondents

Sr. No.	Occupation Status	Numbers of Respondent	Percentage (%)
1	Businessmen/ shopkeepers	12	24
2	Drivers	3	6
3	Labor/Workers	15	30
4	Govt. Employee	3	6
5	Student	11	22
6	Doctor	3	6
7	Farmers	3	6
Total		50	100

vi) Religion

All the respondents interviewed i.e. 100 percent were Muslims and reported their religion Islam.

vii) Family Structure and Family Members

Majority of the respondents were living in joint family system. With regard to the family members of the respondents, 60% of the respondents had 5-10 number of family members and 24% had 10-15 number of family members whereas 16% had more than 15 number of members in their family as shown in **Table 4.23**.

Table 4.23: Number of Family Members of the Respondents.

Sr. No.	Number of Family Members	Numbers of Respondent	Percentage (%)
1	05--10	30	60
2	10--15	12	24
3	15 & above	8	16
Total		50	100

viii). Average Daily Working Hours

As mentioned in preceding sub-section, the respondents were associated with various professions such as business/ shop owners, office workers, and drivers. About 60% of the respondents were working for 1 to 8 hours daily, 24% worked for 9 to 12 hours per day and 10% of the respondents were those people who were working for 13 hours and above in daily basis like hotel owners and drivers etc. whereas the remaining 6% did not respond in this regard as shown in **Table 4.24**.

Table 4.24: Average Daily Working Hours of the Respondents

Sr. No.	Working Hours	Numbers of Respondent	Percentage (%)
1	1--8	30	60
2	9-12	12	24
3	13 and Above	5	10
4	Not Response	3	6
Total		50	100

B) Socio- Economic Characteristics

The Socio- economic characteristics of the respondents are described below.

i) Average Monthly Income

Table 4.25 indicates that the majority of the respondents i.e. 24% had income level between Rs. 11,000 to 20,000, 20% belonged to income group of less than Rs. 10,000 and 16% of the respondents had monthly income in the range of Rs. 21,000 to 30,000, 12% had income between Rs. 31,000 to 40,000 and 16% of the respondents had average monthly income above Rs. 40,000 whereas the remaining 12% of the respondents did not give any response about their monthly income.

Table 4.25: Average Monthly Income of the Respondents

Sr. No.	Average Monthly Income (Rs)	Number of Respondent	Percentage (%)
1	less than 10,000	10	20
2	11,000 – 20,000	12	24
3	21,000 – 30,000	8	16
4	31,000-40,000	6	12
5	Above 40,000	8	16
6	No Response	6	12
Total		50	100

ii) Average Monthly Expenditures

About 16% respondents reported their monthly expenditure as less than Rs. 10,000, 40% respondents belonged to group had average monthly expenditures between Rs. 11000- 20,000, 14% had their expenses in the range of Rs. 21,000 to 30,000 were, while 12% had expenditure ranging from Rs. 31,000 to 40,000. 10 % of the respondents were bearing their expenses above 40,000 whereas the remaining 8% of the respondents gave no response in this regard as shown in **Table 4.26**.

Table 4.26: Average Monthly Expenditures of the Respondents

Sr. No.	Average Monthly Expenditure (Rs.)	Number of Respondents	Percentage (%)
1	less than 10,000	8	16
2	11,000 – 20,000	20	40
3	21,000 – 30,000	7	14
4	31,000-40,000	6	12
5	Above 40,000	5	10
6	No-Response	4	08
Total		50	100

iii) Housing Ownership Status

The respondents were asked about their housing ownership status. As reflected in **Table 4.27**. 60% respondents were living in their own houses and 32% was living in rented houses while the remaining 8% of the respondents did not share information regarding the status of their ownership.

Table 4.27: Housing Ownership Status of the Respondents

Sr. No.	Housing Ownership status	Number of Respondent	Percentage (%)
1	Owner	30	60
2	Renter	16	32
3	No Response	4	8
Total		50	100

iv). Period of residence in the Project Area

About 60% of the total respondents were living in the Project Area from last 10 years 24% had been living from last 20 years. Whereas 16% of the total respondents that were living in project area more than 20 years or living by birth.

Table 4.28: Residence Period of the respondent in the Project Area

Sr. No.	Living Period of Respondent in the Area	Number of Respondent	Percentage (%)
1	1 to 10 years	30	60
2	11 to 20 years	12	24
3	21 and Above / By Birth	8	16
Total		50	100

v). Source(s) of Drinking Water

Table 4.29 presents the source of drinking water being used by the respondents. About 44% were relying on public water supply scheme and 16% were depending on bore water/well while the remaining 40 % were using the drinking water of filtration plant.

Table 4.29: Sources of Water

Sr. No.	Water Source	Number of Respondent	Percentage (%)
1	Tap Water/Govt Water Supply	22	44
2	Bore Water	8	16
3	Filter plant	20	40
Total		50	100

vi) Satisfaction about Quality of Water

Majority of the respondents i.e. 60% were satisfied with the quality of water available in the Project Area, while the remaining 40% of the respondents were not satisfied with the quality of water as indicated in **Table 4.30**.

Table 4.30: Response on Satisfaction regarding Quality of Water in Project Area

Sr. No.	Satisfaction with Quality of Water	Number of Respondent	Percentage (%)
1	Yes	30	60
2	No	20	40
Total		50	100

vii). Status of Land or Asset Acquisition

The respondents were also inquired about their land acquisition or any other asset required by the Government due to the project implementation. Majority of the respondents 64% respondents were not being affected by the Project or had not reservations on land acquisition. But 36% showed their apprehensions for the loss of their business activity and property as well. The responses have been presented in **Table 4.31** below.

Table 4.321: Response regarding the Acquisition of Land or any Asset

Sr. No.	Is your Land / Asset is Acquired	Number of Respondent	Percentage (%)
1	Yes	18	36
2	No	32	64
Total		50	100

vii) Mode of Transport

Table 4.32 describes the mode of transport being used in the Project Area by the respondents. About 50% of respondents were using public transport, 10% were using private transport while the remaining 40% of the respondents were using both public and private mode of transportation.

Table 4.32: Mode of Transport used in the Project Area

Sr. No.	Mode of Transport used	Number of Respondent	Percentage (%)
1	Public	25	50
2	Private	5	10
3	Both	20	40
Total		50	100

ix). Alternative Route for Travelling

Out of total respondents about 32% responded that they have alternate route for traveling during the construction phase of proposed Project, while 68% said that they do not have any alternative route to be used during the construction phase of the proposed project as shown in **Table 4.33**.

Table 4.33: Availability of Alternate Route during construction phase

Sr. No.	Availability of Alternate Route	Number of Respondent	Percentage (%)
1	Yes	16	32
2	No	34	68
Total		50	100

x). Impacts of Adopting Alternative Route

Table 4.34 indicates the Impact on respondents while using alternate route during construction period of the proposed project. About 20% of respondents said that their vehicles mileage will increase, 10% responded that their business activities will be disturbed, 50% highlighted that more time will be consumed, while the remaining 20% of the respondents informed that they will not be having any issue in adopting alternative route as the project will increase development in their area.

Table 4.34: Impacts of Adopting Alternate route During Construction.

Sr. No.	Impact Using Alternate Route	Number of Respondent	Percentage (%)
1	Extra Travelling	10	20
2	Loss in business	5	10
3	Time consumption	25	50
4	No issue	10	20
Total		50	100

C). Awareness Regarding the Proposed Project

Majority of the respondent 56% were not aware of the proposed project while 44% were those who had prior knowledge of the project. **Table 4.35** shows the status of awareness of the respondents regarding the proposed Project.

Table 4.35: Status of Awareness about the Proposed Project

Sr. No.	Awareness of the Project	Number of Respondent	Percentage (%)
1	Yes	22	44
2	No	28	56
Total		50	100

D). Acceptability of the Proposed Project

During the survey 96% respondents were in favor of the proposed project keeping in view its importance and only 4% respondent's response was against the construction of the proposed project due to loss of their property, business and structures.

Table 4.36: Acceptability of the Proposed Project

Sr. No.	Acceptability of Project	Number of Respondent	Percentage (%)
1	Yes	48	96
2	No	2	4
	Total	50	100

E) Perception of Environment and Social Impacts

Environment and social impact as perceived by the respondents are describe below:

i) Perceived Impacts of the Project during Construction Phase

Table 4.37 presents various perceived impacts by the respondents likely to occur during construction phase. About 30% were worried about the traffic congestion issue(s), 20% of the respondents were concerned about loss of their business, 16% pointed that dust and noise pollution will be increased during the construction phase of the Project, 12% highlighted that more time will be consumed during travelling, 10% responded that the proposed Project will affect their property (loss of property), while the remaining 12% of the respondents responded that there will be no impact during construction phase.

Table 4.37: Perceived Impacts of the Project during Construction Phase

Sr. No.	Impacts during Construction Phase	Number of Respondent	Percentage (%)
1	Increase in traffic congestion	15	30
2	Business Loss	10	20
3	Increase in Dust & Pollution	8	16
4	Increase travelling time	6	12
5	Property Loss	5	10
6	No Impacts	6	12
	Total	50	100

ii) Perceived Impacts of Project during Operational Phase

The impacts anticipated by the respondents for operational phase of the proposed Project has been presented in **Table 4.38** which illustrate that about 40% predict that no traffic congestion due to smooth traffic flow, 20% were of the view that the proposed Project will bring development and improvement in their area., 14% respondents predicted the increase in business activities,10% responded that their time will be saved due to smooth flow of traffic, whereas the remaining 16% of the respondent responded that there would be no impact from the project.

Table 4.38: Perceived Impacts during Operation Phase

Sr. No.	Impacts during Operation Phase	Number of Respondent	Percentage (%)
1	No traffic congestion	20	40
2	Development of area	10	20
3	Business improvement	7	14
4	Time saving	5	10
5	No impact	8	16
Total		50	100

iii). Protective Measures Suggested by the Respondents

Table 4.39 below indicate that 20% of the respondents emphasized on health and safety measure to be adopted by workers, 16% respondents recommended to control the dust and noise during the construction period, 14% were concerned regarding the timely completion of the proposed Project while 24% suggested that traffic shall be managed during construction., 16% suggested the use of good raw material during construction whereas 10% did not respond.

Table 4.39: Protective Measures Suggested by the Respondents.

Sr. No.	Measures Suggested	Number of Respondent	Percentage (%)
1	Health and Safety	10	20
2	Control of dust and noise pollution	8	16
3	Timely Completion of the Project	7	14
4	Protect from traffic congestion	12	24
5	Use good Raw Material	8	16
6	Non-Response	5	10
Total		50	100

iv). Pressing Needs

The respondents shared their views regarding pressing needs in the area such as clean drinking water, Sui gas, and infrastructure parking facilities, more plantation and public security as depicted in **Table 4.40**. It shows that public security and parking facility was the most desired need by 32% of the total respondents, whereas, 28% demanded for clean drinking water and control over gas pressure especially in winter season, 20% desired the need for more traffic signal in project area, 12% demanded for widening the road as soon as possible and 8% demanded more plantation in the project area for better environment condition.

Table 4.40: Pressing Need of the respondents of the Project Area

Sr. No.	Pressing Need of the Area	Number of Respondent	Percentage (%)
1	Gas pressure and drinking water	14	28
2	More Traffic Signal	10	20
3	Security& parking facility	16	32
4	Widening of road	6	12
5	More plantation	4	8
Total		50	100

SECTION - 5

PUBLIC CONSULTATION

This section deals with the information disclosure to the public and consultation sessions held with the different stakeholders of the proposed project. The public consultation with stakeholders was carried out as per the guidelines of Environmental Protection Agency (EPA).

This consultation process had the following objectives:

1. Share information with stakeholders on proposed project and expected impacts on the physical, biological and socio-economic environment of the project corridor;
2. Understand stakeholders' concerns regarding various aspects of the project, including the existing condition of the area, future requirements, and the likely impact of construction and operation activities of the clearing/aligning of road.
3. Provide an opportunity to the public to influence Project design in a positive manner;
4. Obtain local and traditional knowledge, before decision making;
5. Increase public confidence about the proponent, reviewers and decision makers;
6. Reduce conflict through the early identification of controversial issues, and work through them to find acceptable solutions;

5.1 Stakeholder Identification and Analysis

During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. Different stakeholders identified were the local residents, government officials, shop owners, public representative, NGO's and general public. All those stakeholders had different types of stakes according to their professions.

5.2 Consultation and Participation Process

For ascertaining the perceptions of different stakeholders about the project (during/ after construction) meetings were held with stakeholders in the project area of influence. The following methods were used for consultation with project stakeholders in order to obtain their concerns, potential risks and priorities regarding project implementation.

- A structured questionnaire
- Public Meetings

5.3 Categories of Stakeholders Contacted

During the survey effort were made to consult /identify all the possible stakeholders in the project. The categories of stakeholders contacted are shown in **Table 5.1**.

Table 5.1: Stakeholders Contacted in the Project Area

Sr. No.	Stakeholder Category
1	Office workers
2	Business/ shop owners
3	Residents
4	Commuters
5	Hospital Staff
6	Students
7	Drivers
8	Pedestrians

5.4 Major Stakeholders and their Apprehensions

Table 5.2 contains the list of stakeholders and their apprehensions.

Table 5.2: Different Stakeholders and their Stakes in the Project Area

Sr. No.	Stakeholders	Concerns of Stakeholders
1.	Office workers	Dust, noise & vibrations, access problem to office, disruption in routine work, parking of vehicles, disruption of utilities
2.	Shop owners	Noise, air pollution, access problem for customers, reduction in number of customers, disturbance of utilities, security/ safety and decline in business.

Sr. No.	Stakeholders	Concerns of Stakeholders
3.	Residents	Noise, dust, disturbance of utilities, privacy and security / safety issues, and improper dumping or storage of waste material.
4.	Commuters	Increased time and fuel consumption due to alternative routes dust and noise.
5.	Hospital Staff	Noise, dust, access problem for patients and doctors, discomfort for the indoor patients, disruption of utilities.
6.	Students & Teachers	Disturbance in the class due to noise, dust and access issues for the students & teachers, disruption of utilities, etc.
7.	Drivers	Diversion of traffic will increase time consumption, dust & noise, vibrations, disruption to passengers, increase travelling time during construction
8	Pedestrians	Provision of appropriate passages for pedestrian to cross the road in project area.

5.5 Public Meetings

Public meetings were conducted and their concerns were documented. **Table 5.3** describes the details of public meetings and discussions held with different stakeholders at two different locations.

Table 5.3: Schedule and Details of Public Consultation Meetings (Sariab Road)

Sr. No	Date & Time	Venue	Stakeholder Category	No. of Participants	Concerns & Comments Raised	Expectations
1	14/02/2018	Khilji House #1	Local Residents and Shopkeeper	09	<ul style="list-style-type: none"> • The level of noise and dust during the construction phase will be increased. • Land acquisition will affect structures and business of people. • Proper arrangements should be done to avoid construction hazards. 	<ul style="list-style-type: none"> • Judicious compensation at market price should be given to affected persons if land is acquired. • Traffic issues will be resolved in the project area. • Jobs should be provided to local people during construction stage of the project. • Public utilities shall be relocated timely. • Safety barriers and sign boards should be provided along the construction site.
2	14/02/2018	Near Baluchistan University	Local Residents and Shopkeeper	08	<ul style="list-style-type: none"> • Land acquisition will affect structures and business of people. • People will face access problems due to storage of materials and movement of heavy machinery. • Dust and noise will increase in the area 	<ul style="list-style-type: none"> • Judicious compensation at market price should be given to affected persons if land is acquired. • Regular sprinkling of water shall be done. • Construction activities shall be restricted at peak hours.

5.6 Proposed Measures for Addressing the Stakeholders' Concerns

The contractors and design consultants will include the following environmental and safety provisions in the project design and to protect surrounding communities from the expected impact of construction:

- Project site will be fenced with corrugated iron sheets to minimize the level of noise and dust on the surrounding areas during the construction phase;
- Construction machinery will be placed at a location away from the sensitive areas to minimize the impacts related to the noise;
- Regular sprinkling of dust particles from impacting surrounding environment;
- Project facilities will be located outside the existing residential and commercial areas. In order to avoid restricting the mobility of the local stakeholders, construction vehicles will remain confined within their designated areas of movement;
- The utilities to be shifted due to the improvement of clearing/ aligning of Sariab Road will be rehabilitated on priority basis to minimize the impact on the stakeholders;
- QDA is bound to comply with the prevailing national/provincial regulations concerning pollution and waste disposal;
- QDA shall ensure judicious payment for the acquisition of land if acquired;
- Solid waste generated during construction and at camp sites will be disposed of safely at the waste disposal sites approved by the Quetta Development Authority; and
- All necessary measures will be taken to ensure the safety of traffic during construction, (including barricade, signboard, pavement markings, flags and lights).

All such barricades will be set up to facilitate the local traffic.

Generally, people were found to be aware & convinced of the improvement of Clearing / Aligning of Sariab Road project and indicated remarkably their support for the implementation of project. Local communities demanded that they should be the part of meaningful consultation activities along with other stakeholders at different stages of the Project including the design, construction, and operational periods.

Plate 5.1 shows the pictorial presentation of public involvement (PI) process.



Plate 5.1: Public involvement in Project Area

5.7 Information Disclosure

After suggesting the possible solutions of the stakeholders' concerns, the solutions (final EIA report) will be disclosed once again before the stake holders and general public. EIA report will be accessible to interested parties on request and the version of final report will be available in the nearest library and its summary will be available in stakeholders' mother tongue.

5.8 Type of Grievance

The following are some of the environmental issues that could be subject of grievance from the affected people, concerned public and NGOs.

- Dust, noise and air pollution from construction activities
- Nuisance
- Intensive schedule of construction activities
- Traffic Movement including movement of heavy machinery
- Waste disposal
- Health and safety
- Failure to comply with NEQS or legal obligations

SECTION 6

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

This section identifies the overall impacts of pre-construction (design), construction and operational phase of the proposed project on the physical, biological and socio-economic environment of the project. In addition, it also narrates the measures that will mitigate the project's adverse environmental impacts.

6.1 Environmental Impact Matrices

The environmental impacts matrices have been developed to evaluate magnitude of the impacts of different project activities on different environmental settings for both construction and operation phases. These matrices are given in **Tables 6.1** and **6.2**.

The following scale has been used for the evaluation of impacts:

LA	=	Low Adverse
MA	=	Medium Adverse
HA	=	High Adverse
B	=	Beneficial
O	=	Insignificant / No Impact

6.2 Anticipated Impacts during Pre-Construction/Design Phase

Following is the description of impacts envisaged and the recommended mitigation measures during pre-construction/design Phase.

6.2.1 Design & Layout Planning

Incompatible layout plan and engineering design of the project's structures can undermine the overall aesthetic beauty and ambience of the project area. Also, low utilization of the available spaces and not designing the structures taking into account, the prospective and futuristic needs can result in structures with low social acceptability and functionality. This impact will be permanent and moderate negative in nature.

Mitigation:

All structural, layout and engineering design should be in strict accordance with the applicable bylaws and engineering parameters.

6.2.2 Topography

Removal of structures (residential, commercial, public buildings), vegetation and soil excavation is involved for the proposed improvement which may contribute to change

**Table 6.1
Environmental Impacts Matrix During the Constructional Phase**

#	Environmental Components Project Activities	Physical Environment									Biological Environment		Socio-economic Environment						
		Topography	Drainage	Soil Quality	Landscape	Surface Water	Groundwater	Air Quality	Noise & Vibration	Climate	Flora	Fauna	Public Health & Safety	Disruption of Public Utilities	Employment	Population Disturbance	Social Disturbance	Cultural/Religious Values	Traffic Management
1.	Construction camps, workshops etc.	LA	O	MA	LA	LA	O	LA	LA	O	MA	MA	LA	O	B	LA	LA	MA	LA
2.	Excavation operations at borrow & quarry areas	MA	MA	MA	MA	MA	LA	MA	LA	LA	LA	LA	MA	LA	B	LA	MA	O	MA
3.	Transportation of construction materials	O	O	LA	O	O	O	LA	LA	LA	LA	LA	LA	O	B	LA	O	O	MA
4.	Open storage of construction materials, fuel etc.	LA	LA	LA	LA	LA	O	LA	O	O	LA	LA	LA	O	O	LA	LA	O	LA
5.	Earthwork operations	MA	MA	MA	LA	LA	O	MA	MA	LA	LA	LA	MA	LA	B	LA	LA	LA	LA
6.	Operation of concrete batching plants	O	O	LA	LA	LA	O	HA	MA	MA	LA	LA	LA	O	B	MA	LA	O	O
7.	Operation of asphalt plants	O	O	LA	LA	LA	O	HA	MA	MA	LA	LA	LA	O	B	MA	LA	O	O
8.	Power generators	O	O	O	LA	O	O	MA	MA	LA	O	O	LA	O	O	LA	O	O	O

Legend

O - Insignificant / no impact
NA - Not Applicable

LA - Low Adverse
B - Beneficial

MA - Medium Adverse

HA - High Adverse

**Table 6.2
Environmental Impacts Matrix During the Operational Phase**

#	Environmental Components Project Activities	Physical Environment									Biological Environment		Socio-economic Environment					
		Topography	Drainage	Soil Quality	Landscape	Surface Water	Groundwater	Air Quality	Noise & Vibration	Climate	Flora	Fauna	Agricultural Land	Public/passengers' Safety	Employment	Population Disturbance	Economic Activity	Communication System
1.	Movement of vehicular traffic	O	O	O	O	O	O	LA	MA	LA	LA	LA	O	MA	O	LA	B	B
2.	Transportation of goods	O	O	O	O	O	O	LA	MA	LA	LA	LA	O	MA	O	LA	B	B
3.	Commercial / industrial development	LA	O	LA	LA	O	LA	MA	MA	NA	LA	LA	MA	O	B	LA	B	NA

Legend

O - Insignificant / No Impact
NA - Not Applicable

LA - Low Adverse
B - Beneficial

MA - Medium Adverse

HA - High Adverse

in the topography of the area. This impact is permanent and moderate negative in nature.

Mitigation:

Mitigation measures will include provision of embankments, designed by considering the geotechnical investigation studies. Due consideration should be given to aesthetic improvement during the design phase.

6.2.3 Land Acquisition

Land acquisition will be the most challenging activity related to the project as it may create offence among the affectees and it will also result in loss of infrastructure, commercial and cultural activities within the proposed project area. The impact is permanent and high adverse in nature.

Mitigations:

- Careful alignment and route selection by the designer to minimize land acquisition; and
- Adequate budget will be provided in the project cost for the compensation to the affected people as per Land Acquisition Act, 1894 and framing of a judicious and fair compensation package for provision of compensation on at least the prevailing market rates.

6.2.4 Air Quality and Noise

Due to the construction of the proposed project, air pollution, noise and associated health risks may increase. This impact is permanent and moderately negative in nature.

Mitigation:

- Incorporate technical design features that enable continuous traffic flux and avoid congestions e.g. sign boards, speed limits and bays;
- Provision of noise barriers in sensitive areas/ populated areas shall be considered in design; and
- Plantation plan of trees on available spaces along the road to minimize the effect of air and noise pollution.

6.2.5 Seismic Hazard

The project area is located in Seismic Zone 4, where 4 represents severe damage. In this Zone, designing of various types of structures should be done on the basis of Peak Ground Acceleration (PGA). A severe intensity earthquake impacting the

project site can adversely impact the development. This will be a major negative impact. This factor requires special consideration of the designers keeping in view the major earthquakes of 2015, 2013, 2012 and others.

Mitigation:

The proposed project shall be designed and constructed to withstand severe earthquakes. For seismic hazard analysis, updated structural and seismic evaluations will be conducted and selection of materials shall be done accordingly.

6.2.6 Resource Conservation

The materials used in construction of proposed project would include coarse aggregates (crush), fine aggregates (sand), steel, water, asphalt, reinforcement and cement etc. Almost all the materials to be used in the construction of proposed project are non-renewable and therefore their sustainable use is necessary for the future use.

Fuel will be used to operate construction machinery and asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use but also to help to reduce air emissions. For conservation of energy, efficiency of the engines and burning processes is very important.

Mitigation:

- Wastage of water should be reduced by training the workers involved in water use;
- Source of water should be carefully selected;
- Water use should not disturb the existing community water supplies;
- Ensure adequate insulation to reduce heat loss through batching plants;
- Regularly monitoring of CO and CO₂ content of the flue gases to verify that combustion systems are using practical excess air volumes; and
- Maintain clean heat transfer surfaces in asphalt batching plant.

The Resources Conservation Plan is attached as **Annex- II**.

6.2.7 Public Utilities

Due to the proposed project, public utilities may be affected which will create disruption of public services. This may adversely affect daily routine of the community including communication and business. This impact is however temporary and moderate negative in nature.

Mitigation:

- Incorporate technical design features to minimize effect on public utilities; and
- All public utilities likely to be affected by the proposed project need to be relocated well ahead of the commencement of construction work.

6.2.8 Ecological Impacts**Flora**

Some trees of varying species and sizes in the project area may be affected by the proposed project.

Mitigation:

- Affected trees shall be transplanted preferably;
- Plan for compensatory plantation for four (04) trees against each fallen tree of similar floral function;
- Provision of compensation in the Project Budget for the loss of fruit trees (if any) to the affected people; and
- Disallow introduction of exotic species with known environmental setbacks.

6.2.9 Drainage

Improper drainage of the road may result in stagnant water due to which following impact are expected to arise:

- Deteriorate the road surface and reducing its performance or bearing capacity;
- Inconvenience for commuters/pedestrians;
- Stagnant water may provide the breeding ground for disease vector; and
- Foul odour may be generated

This impact permanent and minor negative in nature

Mitigation measures will include provision of appropriate drainage structures. Proper slopes shall be incorporated in design feature to avoid the stagnant water on road surfaces.

6.3 Anticipated Impacts during Construction Phase

Following is the brief description of impacts and their mitigation envisaged during the construction phase:

6.3.1 Soil

Soil erosion and contamination may occur on roadside, at contractors' camps due to the following likely impacts:

- Excavation of earth/cutting operations, clearing of vegetation and land levelling activities can destabilize the surrounding land surface, particularly if the excavated area is left unfilled for long, which may lead to soil erosion;
- The unspent materials and debris produced from consumed up materials, if left as such and allowed to mix with soil underneath, can degrade the quality of receiving soils and may render them unfit for plantation later on;
- Leakages of oils, lubricants, chemicals, and other similar substances from their storage sites and from engines of the generators, machines, equipment and vehicles can spoil the receiving soils and may undermine ability of the spoiled soils to support growth of vegetation and plants; and
- Onsite storage of the construction materials such as sand, aggregate, crushed stone, cement, bricks, lubricants, fuels and iron bars on the land without an intervening barrier, can degrade soil quality and may smear them with fine particulates of the dumped materials.

Mitigation measures will include:

- All spoils shall be disposed of as desired and the site shall be restored back to its original conditions;
- Non-bituminous wastes from construction activities shall be dumped in approved sites, in line with the legal requirements;
- As applicable and needed, plantation of grasses and shrubs shall be done to reduce soil erosion;
- Excavations would be kept confined to the specified foundation spots as per the approved engineering drawings. Unnecessary excavations should be avoided;
- Site camps for the resident labors should not be setup on the land earmarked for developing green belts and lawns;
- All the unspent and left-over materials should be completely removed offsite upon completion of construction and the site should be restored to original or near to original condition; and
- Washout from washing of equipment and gadgets should be drained into either a septic tank or a sand-gravel bed for removal of the grit and contaminants.

6.3.2 Construction Camps/Camp Sites

Due to the proposed camp sites, loss of vegetation on the selected land, generation of solid waste and discharge of sanitary effluent may occur. The final location and number of sites will be determined by the construction contractors after approval from the QDA. However, the impact will be a temporary and minor negative impact. For these impacts, following mitigation measures have been developed to minimize the adverse effects.

- Implement Waste Management Plan to ensure safe handling, storage, collection and disposal of wastes generated at camp sites and the training of employees who handle waste;
- Provision of the pit latrines, septic tanks for camps to treat the sanitary wastewater before its discharge into public sewer;
- All efforts during the design stage should be made to minimize the removal of existing macro-plants at camp sites;
- The contractor(s) shall ensure removal & rehabilitation of site upon completion; and
- Contractors camps should be placed at least 1 Km away from population/residential area.

6.3.3 Health and Safety

a) Occupational Health and Safety

Health risks and hazards, injuries and casualties may result at the workplace due to unsafe storage, handling and transport of hazardous construction materials, chemicals and waste, working at height, noise, vibration, dust, fire, electrocution, repetitive movement, unsafe drinking water and communicable diseases. The impact is significant in nature which may be permanent in certain cases.

Mitigation measures will include:

- Adequate signage, lightning devices, barriers, yellow tape shall be provided at construction sites, haulage and access roads.
- Provision of firefighting equipment, safe storage and labelling of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;
- Personal Protective Equipment (PPE) should be provided to the workers and ensure adequate usage of PPEs.

b) Community Health and Safety

The construction activities will generate noise and dust which will result in inconvenience and health impacts of the surrounding community. The movement of vehicles and storage of materials may also result in accidents.

Quality of groundwater and surface water resources available in the nearby local communities may get contaminated due to the construction activities. The usage of contaminated water for drinking purposes, may affect the public health. The laborers suffering from communicable diseases may spread disease among the local residents. This is a temporary and moderate negative impact.

Mitigation measures will include:

- The labourers shall have regular health surveillance and any worker diagnosed with transmittable diseases should be restricted within the construction site;
- Provision of proper safety and diversion signage, particularly at sensitive/accident-prone spots;
- Timely public notification of planned construction works to avoid inconvenience/accidents related to noise and access;
- During construction work pedestrian and vehicular passages should be provided for crossing near settlement; and
- Fencing around the camps, excavated areas and construction sites should be ensured.
- Use of resources shall be sustainable and protection of resources from contamination shall be ensured.

c) Emergency Response

Disasters such as earthquakes, flooding and other disasters such as terror attacks may occur, and that must be considered for minimizing their impacts.

Mitigation measures will include:

An Emergency Response Plan for earthquakes and manmade disasters including violence and terror activities will be developed. Emergency Response Plan will be implemented in close consultation with Rescue department, Firefighting department, bomb disposal squad and paramedics. In addition, training of the staff/employees regarding the emergency procedures/plans will be regularly conducted. The Emergency Response Plan is attached as **Annex - III**.

6.3.4 Air Quality

Air quality will be affected by fugitive emissions from construction machinery; dust from the unpaved surface and construction vehicles. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. Exhausts from fossil fuel burning in the construction machinery will also deteriorate local air quality. Similarly, exhausts from generators can also have impacts on air quality in the vicinity.

The critical sources of dust pollution during the construction phase will be:

- Unpaved road surface;
- Transportation of materials and other construction activities that create dust emissions.

The overall impact on the quality of air during the construction phase will, however, be temporary and limited to the project implementation phase only.

Mitigation measures will include:

- All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;
- Open burning of solid waste from the Contractor's camps should be strictly banned;
- Preventive measures against dust should be adopted for on-site mixing and unloading operations;
- Regular water sprinkling of the site should be carried out to suppress excessive dust emission(s);
- Proper maintenance and repair is needed to minimize the hazardous emissions; and
- Compliance of NEQS shall be ensured.

6.3.5 Noise and Vibrations

Heavy machinery such as bulldozers, excavators, stabilizers, concrete mixing plant, pneumatic drills, stone crushers and other equipment will generate high noise which may affect the sensitive receptors located near the project area. High noise will disturb the people visiting hospital and mosques in the vicinity of project area. This impact is temporary and moderate negative in nature.

Mitigations:

- Confining excessively noisy work to normal working hours in the day, as far as possible;
- Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in their use;
- Use of low noise machinery, or machinery with noise shielding and absorption; and
- Noise barriers in sensitive areas i.e. in front of schools, hospitals and mosques

6.3.6 Waste Generation (Construction Waste and Hazardous Waste)

Due to construction activities waste will be generated at construction and contractors camp site. The construction waste will include wastewater, oil spillage from machinery, domestic waste and waste construction materials etc. The likely impacts of solid waste are:

- Unhygienic disposal of the solid waste generated at the worksite, particularly garbage and trash may cause degradation of soil and land;
- Open dumping of wastes will result in odor and can serve as breeding grounds for the disease vectors;
- Throwing away of solid wastes into water channels and the wastewater network can result into choking of drains.

These impacts are temporary and minor negative in nature.

Mitigation measures will include:

- An efficient and responsive solid waste management plan should be planned and implemented for the entire duration of the construction phase;
- Solid waste generated during construction and camp sites will be safely disposed in demarcated waste disposal sites;
- Training of employees involved in the transportation of hazardous material regarding emergency procedures;
- Construction workers and supervisory staff should be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste for disposal; and
- Prohibit open burning of solid waste.

6.3.7 Surface and Groundwater

There is no considerable surface water resource in the project area so there will be no impact on surface water quality during the construction of the project area. During the construction phase, the sanitary waste water will be generated at the workers' camp(s). If this wastewater is allowed to stagnate in water ponds on the site, it can percolate into the soil, thereby, contaminating groundwater.

Persistent and prolonged withdrawal of ground water higher than the safe yield limits of the aquifer can initiate early depletion of aquifer. This situation can result in reduced water supplies for other users who share the same groundwater resource. Abstraction of the ground water more than the safe yield limit can affect the quality of water available in the area.

These impacts are temporary and minor negative in nature.

Mitigation measures will include;

- Protection of groundwater reserves from any source of contamination such as the construction and oily waste that will degrade its potable quality;
- Water required for construction should be obtained in such a way that the water availability and supply to nearby communities remain unaffected;
- Regular water quality monitoring according to determined sampling schedule; and
- Wastes must be collected, stored and taken to approved disposal site.

6.3.8 Biodiversity Conservation and Natural Resources

The project involves tree cutting of various species and sizes. Loss of trees will have a negative impact in the surroundings of project area as it provides oxygen in the atmosphere, shelter for fauna, food to animals & humans and improves the aesthetics.

Mitigations:

- Only trees coming along the road shall be removed and efforts shall be made to save the suitable trees along track and to make them, part of the future plantation plan;
- Campsites will be established on waste/barren land rather than social and commercial land. However, if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to trees and undergrowth;
- The Contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes;
- Contractor will provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel will not be allowed; and
- A tree plantation program will be formulated by QDA.

Fauna

Fauna will try to find shelter and food somewhere else and will tend to move away from the project area due to the construction activities mentioned above for fear of being hunted or caught.

Mitigations:

- Hunting, poaching and harassing of wild animals will be strictly prohibited and Contractor shall instruct the labour accordingly; and
- Special measures will be adopted to minimize impacts on the wild birds, such as avoiding noise generating activities during the critical periods of breeding.

6.3.9 Disposal of Mucking Material

Inevitable earthwork operations during project construction will open up scars on the land around the project area. This impact is temporary and minor negative in nature.

Mitigation measure will include proper landscaping, which should be given due consideration along with re-establishment of the local/indigenous vegetation. The excavated materials that are unsuitable for use will need to be stored, transported and disposed of appropriately at designated sites.

6.3.10 Traffic Management

Movement of heavy vehicles and machinery will increase the traffic load in the project area and the adjoining roads. It will cause inconvenience and increased travel time for the commuters in the project area. This impact is temporary and minor negative in nature.

Mitigation measures will include:

- Traffic management plan shall be implemented in the project area;
- The Traffic management plan shall be communicated through local communication media (newspaper, radio station etc., sign).
- The executing agency is required to maintain liaison between the Traffic Police, local residents/ travelers and the contractor to facilitate traffic movement during construction stage.

6.3.11 Economic Activity

Due to the construction of the proposed project, economic activity will be generated in the project area as the laborers and semi-skilled staff will have an opportunity to work for the construction of the proposed project. This will help in developing their skills and capacities. This is a moderate positive impact.

6.3.12 Physical and Cultural Resources

No significant physical and cultural resources were identified in the project area. However, during excavation, there is a chance of finding archeological remains. In that case, the contractor shall immediately report through Supervision Consultant to Directorate General (DG) of Archeological Department, Government of Pakistan to take further suitable action to preserve those antiques or sensitive remains. Chance Finds Procedure as given in **Annex VII** will be adopted in case of any accidental discover of cultural heritage.

6.4 Anticipated Impacts during Operational Phase

The anticipated potential environmental impacts related to the proposed project for the operational stage are discussed as under.

6.4.1 Improved Traffic Conditions

The clearing/aligning of road will alleviate traffic congestion and provide improved road conditions for commuters. This impact will be beneficial and permanent in nature.

6.4.2 Ecology

During the operation stage, the trees and vegetation coming in the RoW of the proposed widening would already have been removed. However, raising of new plants/trees at available spaces will have a positive and permanent impact. No negative impacts are envisaged on the flora during the operational phase. A large number of plants will be raised along Sariab road at available spaces. The presence of adequate flora, along the road, will absorb flue gases, emitted from a large number of cars, vehicles and public transport, which shall in turn improve air quality.

6.4.3 Air Quality

Air quality will be comparatively improved in operational phase due to smooth flow of traffic. This impact is permanent and positive; however, the emissions from vehicles cannot be absolutely eliminated.

Mitigation measures will include:

- Along the road, tree plantations as applicable and feasible under harsh climatic conditions; plants should be selected in accordance to their ability to absorb emissions;
- Regular road maintenance to ensure good surface condition; and
- Regular monitoring to control/ensure compliance with NEQS.

6.4.4 Noise

The proposed widening of road is expected to reduce the noise due to alleviation of congestion and smooth flow of vehicles.

6.4.4 Economic Activities

Economic activities will be generated at operation stage due to improved communication infrastructure, as it will promote new business opportunities. Improved mobility and direct access to local roads will generate productive employment. In addition, such activities will also increase the land value that will benefit the local residents. This impact will be permanent and major positive in nature.

6.4.5 Solid Waste

No hazardous waste is expected to be generated in operational phase of the project, except during road maintenance works. However, miscellaneous municipal wastes comprising wrappings, papers, eatables, empty cans or bottles, food residues and other similar wastes that may be thrown out of vehicles or pedestrians along the road.

Mitigation measures will include

- Management of hazardous waste during road maintenance works will be similar as given for construction phase;
- Ensure regular road sweeping; and
- Waste bins shall be provided at bus stops.

6.4.6 Drainage

At operation stage, drainage may be affected due to lack of proper maintenance of drainage structures or obstruction due to uncontrolled solid waste that may obstruct the flow of water. Following impacts are expected during operation phase

- Deteriorate the road surface and reducing its performance or bearing capacity;
- Inconvenience for commuters/pedestrians;
- Stagnant water may provide the breeding ground for disease vector; and
- Foul odour may be generated

This impact permanent and high negative in nature

Mitigation measures will include regular inspection and maintenance of drainage structures.

SECTION – 7**ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN****7.1 Environmental Management**

This section aims to address the measures which are needed to be adopted during each phase of the project to avoid, contain, mitigate or compensate the potential impacts identified in Section 6. Environmental Management and Monitoring Plan (EMMP) is the major part of this section and forms the gist of the EIA study. EMMP not only includes Best Management Practices (BMPs) but also includes monitoring Indicators, frequency, responsibility and estimated environmental budget.

The objective of the EMMP is to provide framework for the implementation of the proposed mitigation measures during all the three phases of the proposed project. The proper implementation of the EMMP will ensure that all the adverse environmental impacts identified in the EIA are adequately mitigated, either totally prevented or minimized to an acceptable level and required actions to achieve those objectives are successfully taken by the concerned institutions or regulatory agencies. The implementation of EMMP should be carefully conducted by QDA.

For effective environmental management, the client should assign the necessary responsibilities to an Environmental Committee (EC), which should ensure implementation of the EMMP of the proposed project.

7.2 Staff and Training**7.2.1 Environmental Committee and its Responsibilities**

QDA will form an Environmental Committee (EC), which will be responsible for the environmental management and supervisory affairs of the proposed project.

The responsibilities of the Environmental Committee (EC) are as follows:

- To ensure implementation of all the mitigation measures proposed in EMP of the project;
- To organize routine monitoring of motor vehicle emissions, air quality, traffic, noise and vibration; etc. In case, the noise and emission levels exceed the acceptable levels; a penalty or ban must be enforced;
- To develop operational guidelines and implementation schedules;
- Receiving internal and external complaints and assisting the local environmental authority including liaison with EPD Baluchistan; and

- To ensure that the proposed project is implemented in an environment friendly manner, causing least harm to the existing environment.

7.2.2 Environmental Monitoring

Environmental monitoring of project will be carried out by a certified laboratory hired by QDA during construction and operational stages of the proposed project. A cost estimate has been proposed later in this section.

7.3 Environmental Management Plan

The Environmental Management Plan (EMP) provides the framework for the implementation of the mitigating measures and environmental management and monitoring during the construction and operation phases of the proposed project. **Tables 7.1** portray impacts, targets, mitigations and the responsible organizations for the implementation of the mitigation measures during the construction and the operation phases respectively.

Table 7.1: Environmental Management Plan

Sr. No.	Parameters	Target	Mitigation	Responsibility
Design Phase				
1.	Design & Layout Planning	To ensure safe and aesthetic designing	<ul style="list-style-type: none"> ▪ All structural, layout and engineering designing should be in strict accordance with the applicable bylaws and engineering parameters. 	DC & QDA
2.	Topography	To avoid significant damage to the topography of project area	<ul style="list-style-type: none"> ▪ Provision of embankments, designed by considering the geotechnical investigation studies; and ▪ Due consideration should be given to aesthetic improvement during the design phase. 	DC & QDA
3.	Land Acquisition	To avoid/resolve land acquisition issues	<ul style="list-style-type: none"> ▪ Careful alignment and route selection by the designer to minimize land acquisition; and ▪ Adequate budget will be provided in the project cost for the compensation to the affected people as per Land Acquisition Act, 1894 and framing of a judicious and fair compensation package for provision of compensation on at least the prevailing market rates. 	DC & QDA
4.	Air Quality and Noise	To avoid/reduce air and noise pollution	<ul style="list-style-type: none"> ▪ Incorporate technical design features that enable continuous traffic flux and avoid congestions e.g. sign boards, speed limits and bays; ▪ Provision of noise barriers in sensitive areas/populated areas shall be considered in design; and ▪ Plantation plan of trees on available spaces along the road to minimize the effect of air and noise pollution. 	DC & QDA

5.	Seismic Hazard	To avoid the new structures from seismic hazards	<ul style="list-style-type: none"> ▪ The proposed components will be designed and constructed to withstand severe earthquakes. For seismic hazard analysis, updated structural and seismic evaluations will be conducted and all materials will be used accordingly. 	DC & QDA
6.	Resource Conservation	To ensure sustainable use of natural resources	<ul style="list-style-type: none"> ▪ Wastage of water should be reduced by training the workers involved in water use; ▪ Source of water should be carefully selected; ▪ Water use should not disturb the existing community water supplies; ▪ Ensure adequate insulation to reduce heat loss through batching plants; ▪ Regularly monitoring of CO and CO₂ content of the flue gases to verify that combustion systems are using practical excess air volumes; and ▪ Maintain clean heat transfer surfaces in asphalt batching plant. 	DC & QDA
7.	Public Utilities	To avoid damage to public utilities	<ul style="list-style-type: none"> ▪ Incorporate technical design features to minimize effect on public utilities; and ▪ Relocation of all public utilities likely to be affected by the proposed project shall be planned before commencement of the project. 	DC & QDA
8.	Ecological Impacts	To conserve natural ecology of the project area including flora and fauna	<ul style="list-style-type: none"> ▪ Plan for compensatory planting for four (04) trees against each fallen tree of similar floral function; ▪ Transplantation plan of maximum trees/plants to be affected; ▪ Provision of compensation in the Project Budget for the loss of fruit trees (if any) to the affected people; and ▪ Disallow introduction of exotic species with 	DC & QDA

			known environmental setbacks.	
9.	Drainage	To ensure efficient drainage of road.	<ul style="list-style-type: none"> ▪ Provision of appropriate drainage structures and stormwater pumping station in design. Proper slopes shall be incorporated in design feature to avoid the formation of the water layer on road surfaces 	DC & QDA
Sr. No	Project Component or Impact	Target	Mitigation	Responsibility
Construction Phase				
1.	Soil	To avoid/reduce soil contamination and erosion	<ul style="list-style-type: none"> ▪ All spoils shall be disposed of as desired and the site shall be restored back to its original conditions; ▪ Non-bituminous wastes from construction activities shall be dumped in approved sites, in line with the legal requirements; ▪ As applicable and needed, plantation of grasses and shrubs shall be done to reduce soil erosion; ▪ Excavations would be kept confined to the specified foundation spots as per the approved engineering drawings. Unnecessary excavations should be avoided; ▪ Site camps for the resident labors should not be setup on the land earmarked for developing green belts and lawns; ▪ All the unspent and left-over materials should be completely removed offsite upon completion of construction and the site should be restored to original or near to original condition; and ▪ Washout from washing of equipment and 	CC, SC & QDA

			gadgets should be drained into either a septic tank or a sand-gravel bed for removal of the grit and contaminants.	
2.	Construction Camps/Camp Sites	To avoid/settle camp issues	<ul style="list-style-type: none"> ▪ Implement Waste Management Plan to ensure safe handling, storage, collection and disposal of wastes generated at camp sites and the training of employees who handle waste; ▪ Provision of the pit latrines, septic tanks for camps to treat the sanitary wastewater before its discharge into public sewer; ▪ All efforts during the design stage should be made to minimize the removal of existing macro-plants at camp sites; ▪ The contractor(s) shall ensure removal & rehabilitation of site upon completion; and ▪ Contractors camps should be placed at least 1 Km away from population/residential area. 	CC, SC & QDA
3.	Health and Safety <i>Worker Health and safety</i>	To ensure HSE compliance and avoid accidents	<ul style="list-style-type: none"> ▪ Adequate signage, lightning devices, barriers, yellow tape shall be provided at construction sites, haulage and access roads. ▪ Provision of firefighting equipment, safe storage and labelling of hazardous material, first aid, security, fencing, and contingency measures in case of accidents; ▪ Personal Protective Equipment (PPE) should be provided to the workers and ensure adequate usage of PPEs. ▪ The labourers shall have regular health surveillance and any worker diagnosed with 	CC, SC & QDA

	<i>Community Health and safety</i>	To ensure community health and safety will not be jeopardized	<p>transmittable diseases should be restricted within the construction site;</p> <ul style="list-style-type: none"> ▪ Provision of proper safety and diversion signage, particularly at sensitive/accident-prone spots; ▪ Timely public notification of planned construction works to avoid inconvenience/accidents related to noise and access; ▪ During construction work pedestrian and vehicular passages should be provided for crossing near settlement; and ▪ Fencing around the camps, excavated areas and construction sites should be ensured. ▪ Use of resources shall be sustainable and protection of resources from contamination shall be ensured. 	
	Emergency Response	To minimize impacts of natural and other disasters	<ul style="list-style-type: none"> ▪ An Emergency Response Plan for earthquakes and manmade disasters including violence and terror activities will be developed. Emergency Response Plan will be implemented in close consultation with Rescue department, Firefighting department, bomb disposal squad and paramedics. In addition, training of the staff/employees regarding the emergency procedures/plans will be regularly conducted. 	
4.	Air Quality	To avoid/reduce air pollution	<ul style="list-style-type: none"> ▪ All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions; ▪ Open burning of solid waste from the 	CC, SC & QDA

			<p>Contractor's camps should be strictly banned;</p> <ul style="list-style-type: none"> ▪ Preventive measures against dust should be adopted for on-site mixing and unloading operations; ▪ Regular water sprinkling of the site should be carried out to suppress excessive dust emission(s); ▪ Proper maintenance and repair is needed to minimize the hazardous emissions; and ▪ Compliance of NEQS shall be ensured. 	
5.	Noise and Vibrations	To avoid/reduce noise pollution & vibrations	<ul style="list-style-type: none"> ▪ Confining excessively noisy work to normal working hours in the day, as far as possible; ▪ Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in their use; ▪ Use of low noise machinery, or machinery with noise shielding and absorption; and ▪ Noise barriers in sensitive areas i.e. in front of schools, hospitals and mosques. 	CC, SC & QDA
6.	Waste Generation	To avoid nuisance due to Construction Hazardous Waste	<ul style="list-style-type: none"> ▪ An efficient and responsive solid waste management plan should be planned and implemented for the entire duration of the construction phase; ▪ Solid waste generated during construction and camp sites will be safely disposed in demarcated waste disposal sites; ▪ Training of employees involved in the transportation of hazardous material regarding emergency procedures; ▪ Construction workers and supervisory staff 	CC, SC & QDA

			<p>should be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste for disposal; and</p> <ul style="list-style-type: none"> ▪ Prohibit open burning of solid waste. 	
7.	Surface and Groundwater	To avoid surface and groundwater resources	<ul style="list-style-type: none"> ▪ Protection of groundwater reserves from any source of contamination such as the construction and oily waste that will degrade its potable quality; ▪ Water required for construction should be obtained in such a way that the water availability and supply to nearby communities remain unaffected; ▪ Regular water quality monitoring according to determined sampling schedule; and ▪ Wastewater must be collected, stored and taken to approve disposal site. 	CC, SC & QDA
8.	Biodiversity Conservation and Natural Resources	To ensure conservation of biodiversity and natural resources in the project area	<ul style="list-style-type: none"> ▪ Only trees coming along the road shall be removed and efforts shall be made to save the suitable trees along track and to make them, part of the future plantation plan; ▪ Campsites will be established on waste/barren land rather than social and commercial land. However, if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to trees and undergrowth; ▪ The Contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes; ▪ Contractor will provide gas cylinders at the 	CC, SC & QDA

			<p>camps for cooking purposes and cutting of trees/bushes for fuel will not be allowed; and</p> <ul style="list-style-type: none"> ▪ A tree plantation program will be formulated by QDA. ▪ Hunting, poaching and harassing of wild animals will be strictly prohibited and Contractor shall instruct the labour accordingly; and ▪ Special measures will be adopted to minimize impacts on the wild birds, such as avoiding noise generating activities during the critical periods of breeding. 	
9.	Disposal of Mucking Material	To ensure safe disposal of mucking material	<ul style="list-style-type: none"> ▪ The excavated materials that are unsuitable for use will need to be stored, transported and disposed of appropriately at designated sites. 	CC, SC & QDA
11.	Traffic Management	To ensure smooth flow of traffic	<ul style="list-style-type: none"> ▪ Traffic management plan shall be implemented in the project area; ▪ The Traffic management plan shall be communicated through local communication media (newspaper, radio station etc., sign). ▪ The executing agency is required to maintain liaison between the Traffic Police, local residents/ travelers and the contractor to facilitate traffic movement during construction stage. 	CC, SC & QDA
13.	Physical and Cultural Resources	To avoid physical and cultural resources of the project area	<ul style="list-style-type: none"> ▪ Chance Finds Procedure will be adopted in case of any accidental discovery of cultural heritage. 	CC, SC & QDA
Sr. No	Project Component or Impact	Target	Mitigation	Responsibility
Operational Phase				

1.	Air Quality	To avoid/reduce air pollution	<ul style="list-style-type: none"> ▪ Along the road, tree plantations as applicable and feasible under harsh climatic conditions; plants should be selected in accordance to their ability to absorb emissions; ▪ Regular road maintenance to ensure good surface condition; and ▪ Regular monitoring to control/ensure compliance with NEQS. 	QDA, BEPA
2.	Solid Waste	To avoid nuisance due to solid waste	<ul style="list-style-type: none"> ▪ Management of hazardous waste during road maintenance works will be similar as given for construction phase; ▪ Ensure regular road sweeping; and ▪ Waste bins shall be provided at bus stops. 	QDA, BEPA
3.	Drainage	To ensure efficient drainage of road structure	<ul style="list-style-type: none"> ▪ Regular inspection and maintenance of drainage structures. 	QDA, BEPA

KEY

CC	Construction Contractor
SC	Supervision Consultant
BEPA	Baluchistan Environment Protection Agency
QDA	Quetta Development Authority

7.4 Environmental Monitoring

Environmental Monitoring will be carried out during both the construction and operational phases to ensure the effectiveness of the proposed mitigation measures. Parameters to be analyzed during construction and operation of the project and responsibilities for monitoring and reporting have been discussed below. A cost estimate for this measurement of parameters is given in **Table 7.2**.

Table 7.2: Budget Estimate for Environmental Monitoring During the Construction and Operation Phases

Components	Parameters	No. of Samples (No. of samples * Frequency * Year)	Frequency	Responsibility	Duration	Cost (Rs.)
Construction Phase (01 Year)						
Air Quality	All NEQS parameters	2x2x1 = 4	Biannually	Contractor/QDA	24 hours	100,000/- (@ 25,000 per sample)
Ground Water Quality	All NEQS parameters	2x2x1 = 4	Biannually	Contractor/QDA	-	104,000/- (@ 26,000 per sample)
Surface Water Quality	All NEQS parameters	2x2x1 = 4	Biannually	Contractor/QDA	-	88,000/- (@ 22,000 per sample)
Noise Level	-	2x2x1 = 4	Biannually	Contractor/QDA	24 hours	20,000/- (@ 5,000 per sample)
TOTAL						312,000/-
Operation Phase (1st year)						
Air Quality	All NEQS parameters	2x1x1 = 2	Biannually	QDA/BEPA	24 hours	50,000/- (@ 25,000 per sample)
Ground Water Quality	All NEQS parameters	2x1x1 = 2	Biannually	QDA/BEPA	-	52,000/- (@ 26,000 per sample)
Surface Water Quality	All NEQS parameters	2x1x1 = 2	Biannually	QDA/BEPA	-	44,000/- (@ 22,000 per sample)
Noise Level	-	2x1x1 = 2	Biannually	QDA/BEPA	24 hours	10,000/- (@ 5,000 per sample)
Sub-Total						156,000/-
TOTAL COST FOR OPERATIONAL PHASE FOR 1ST FIVE YEARS (with an annual Increment of 10% in each year to make provision for inflation)						= 468,000+514,800+566,280+622,908+ 685199 /-
GRAND TOTAL						= 2,857,187/-

*Note: Provision must be given in the annual budget of the operation phase for environmental monitoring. For this, the cost of operational phase monitoring must be considered with an annual increment of 10%.

KEY

BEPA – Baluchistan Environmental Protection Agency QDA - Quetta Development Authority

7.5 Environmental Technical Assistance and Training Plan

An *Environmental and Technical Assistance Program (TAP)* is to be carried out before the implementation of the project to raise the awareness in skilled and unskilled staff. Environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMP. A suitable training program is proposed to train the staff who will be involved in the construction phase and the professional staff from the client involved at the operational stage of the project.

The objective of the TAP will help in establishment of appropriate systems, and to train senior QDA staff for managing environment. The TAP representative will organize training courses/lectures for requirements of QDA and contractor staff to train them. The details of this training program are presented in **Table 7.3**.

Table 7.3: Personnel Training Program/ TA Services

Provided by	Contents	Trainees/Events	Duration
TA Representative	Short seminar on: Environmental laws and regulations, daily monitoring and supervision	One seminar for construction and QDA staff	1 day
TA Representative/ organizations specializing in social management and monitoring	Short seminar and course on: <i>Social awareness</i>	One seminar for QDA staff	1 day
TA Representative/ organizations specializing in Occupational, health and safety issues	Short lecture relating to Occupational Health and Safety	One seminar for construction and QDA staff	1 day

ANNEX

ANNEX – I
SOCIAL SURVEY PERFORMA



NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED

**ENVIRONMENTAL IMPACT ASSESMENT (EIA) OF
WIDENING / IMPROVEMENT OF SARAIB ROAD, QUETTA**

Interview Schedule

-
1. Name of Interviewer _____ Date _____
2. Location / Place _____
3. Road use category _____
4. Name of the Respondent _____ Contact Number _____

5. Gender

1. Male 2. Female

6. Age _____

7. Education _____

8. Profession _____

9. Marital Status

1. Married 2. Un-married

10. Total number of family members living with you?

Number _____

11. What are your normal working hours?

Hour's _____

12. What is your average monthly income?

Income (Rs.) _____

13. Status of ownership (In case of shop keeper/business owner/ resident)?

1. Owner 2. Renter

14. Since how long are you residing in this locality or using this building?

Period _____

15. What are the sources of household water being used in the project area?

1. Tap/Govt. supply _____ 2. Bore hole _____

3. Well _____ 4. Any other _____

16. Are you satisfied with the water quality?

1. Yes _____ 2. No _____

If no, then what are the reasons of dissatisfaction?

-
17. From which locality do you come here for your business/ job?
 1. Name of place _____ 2. Distance _____
18. Are you satisfied with the existing conditionality of mixed traffic flow on SaraibRoad ?
 1. Yes 2. No
19. Is there any alternate route, which you can use for travelling to reach your destination?
 1. Yes 2. No
20. If yes, then what is the name of the alternate route?
 1. Name of route _____ 2. Distance _____
21. If you asked to move to some other place or using the alternate route, what would be its impact on you?

Perceived Impact _____

22. Do you know about proposed project?
 1. Yes 2. No
- (if no, then tell him about the proposed project)
23. Is your any land or asset is acquired by widening / improvement of Saraib Road?
 1. Yes _____ 2. No _____
 If yes, give details _____
24. If yes, is there any other possible place where you could shift your business? (In case of shopkeeper/Business owner)
 1. Yes 2. No

25. If yes, then what is the name of place and its distance from the present place?
 1. Name of place _____ 2. Distance _____

26. In your opinion should this project be implemented here?
 1. Yes 2. No

If yes, then reasons	if no, then reasons
_____	_____
_____	_____
_____	_____

27. In your opinion, what would be the possible impacts of this project?
 During construction _____

During operation _____

28. What protective measures do you suggest during construction to safeguard your interests?

Protective measures _____

29. In your opinion, what are some of the pressing needs of this area?

Pressing Needs _____

ANNEX – II
RESOURCE CONSERVATION PLAN

Resource Conservation Plan

1. Introduction:

The resources in this world are not infinite. We are completely dependent on the resources of the earth to fulfill all our day to day requirements. Sustainable development calls for the need to conserve resources, especially the non-renewable resources.

2. Objective of the plan:

The Resource Conservation Plan is intended to make an effort towards achieving sustainable development. The objective of the resource conservation plan is to:

- Minimize the use of natural resources; and
- Mitigate/ prevent pollution contaminating the natural resources.

3. Planning:

Careful estimations of quantities of material, fuel, water and energy required directly or indirectly shall be done to avoid excessive or unnecessary wastage of these materials. In addition to this, pollution prevention strategies shall also be devised to prevent contamination of resources.

- The estimations include the following:
 1. Estimation of construction material required for the project
 2. Estimation of fuel consumption for construction machinery, construction vehicles and generators etc.
 3. Estimations of the energy requirements during all the stages of the project
 4. Estimations of water consumption for construction activities and construction camp sites.
- Strategies shall be planned to reduce loads on the identified resources to be consumed;
- Best management practices shall be devised to control or reduce pollution resulting from the activities during different stages of the project; and
- An inspector shall be assigned responsibility to oversee the ongoing activities to check the compliance of the planned strategies.

4. Execution of the plan:

The planned strategies shall be implemented to conserve the natural resources including but not limited to the following:

Material

- Material supplied shall be in conformance with the estimated quantities and excess material shall be returned to the supplier;
- Material wastage shall be avoided by using best management practices;
- Waste produced during the project execution shall be disposed off safely to the designated disposal sites through approved contractors; and
- Reuse of the materials shall be appreciated.

Fuel/Energy

- Reduce trips and optimize routes to and from the construction site for all kinds of activities;
- Regular maintenance of equipment and vehicles to avoid leaks and sustain efficient fuel consumption;
- Switch off/plug off idle equipment and vehicles to avoid wastage of fuel;
- Minimize warm up time, unnecessary acceleration and deceleration of the construction equipment and vehicles;
- Avoid unnecessary burning of fuel for cooking in construction camps;
- Avoid unnecessary heating/cooling systems during extreme weathers;
- Construction shall start in early hours of the day to avoid heat in summers and utilization of day light; and
- Alternate energy sources shall be considered for electricity generations during construction and operation to conserve fossil fuel as it is non-renewable resource.

Water

- Avoid using potable water for sprinkling, curing and washing of equipment/vehicles. Surface water or treated effluent can be used instead;
- Wastage of water should be controlled through providing proper valves and through controlling pressure of the water;
- Unnecessary equipment washings should be avoided;
- Awareness amongst workers shall be raised to conserve water and immediately report for any leaks detected; and
- Ensure protection of canal water from contamination resulting from construction activities.

Pollution:

- Emissions shall be reduced/controlled as far as possible and direct discharges to air shall be avoided by strictly adhering to the mitigation measures outlined in EIA report;
- Waste water shall not be discharged directly into the canal and must be managed as per the recommendations presented in EIA; and
- Construction & demolition waste and municipal solid waste shall not be dumped/ burnt openly and shall be handled according to the preventative measure given in EIA study.

5. Checking and Corrective Actions

The proponent shall bind the construction contractor through contract agreement to comply with the strategies outlined in the Resource Conservation Plan. The proponent shall also appoint an Inspector who shall monitor the daily onsite activities and shall report any issues/ concerns raised in relation to Resource Conservation Plan. The inspector shall recommend adequate corrective actions to mitigate the issues raised.

ANNEX – III
EMERGENCY RESPONSE PLAN

Emergency Response Plan

1. Introduction

Emergency management can be defined as the organization, coordination and implementation of a range of measures to prevent, mitigate, respond to, overcome and recover from the consequences of emergency events affecting the community, its assets and the environment.

2. Purpose of Plan

This plan intends to provide a framework for safety and security to infrastructure, people and vehicles. It assigns responsibility to organizations and individuals for carrying out specific actions at projected times and places in an emergency situation that exceeds the capability or routine responsibility of any one agency.

The emergency response plan provides guidance to:

- Prevent any potential sources causing hazard to the resources during all stages of the project;
- Coordinate between various organizations to take actions in case of emergencies;
- Protect people and property in emergencies and disasters;
- Develop procedures to respond to the emergencies efficiently;
- Identify and ensure availability of personnel, equipment, facilities, supplies, and other resources for use in order to provide timely and efficient response and recovery operations; and
- Confirm that measures taken in an incident are adequate to recover the affected resources or further improvements are needed.

3. Planning

i. Emergency Response Team

A group/team shall be dedicated to identify and control potential emergencies during the construction and operation of the project. The roles and responsibilities of the group members shall be clearly defined.

The primary responsibilities of the group are described below:

- Identify the potential hazard or risk sources that can lead to emergency situations;
Ensure availability of adequate resources, procedures and communication system to deal with the identified emergency situations;

- Ensure awareness and training of the staff to facilitate implementation of the emergency response plan;
- Maintaining the records of any previous incidents; and
- Post-event analysis to bridge the gaps of the existing risk prevention procedures.
- The emergency response team shall include but not limited to the following;
 1. Team Leader
 2. Safety Engineer
 3. Reporting officer/Inspector

Team Leader

- Approve/ modify devised measures to prevent or mitigate the risks associated with the identified risk sources
- Arrange resources for dealing with potential emergencies including, financial, equipment and personnel required to deal with emergencies.
- Assure that the Emergency Response plan is adequate, effective and can be implemented practically.

Safety Engineer

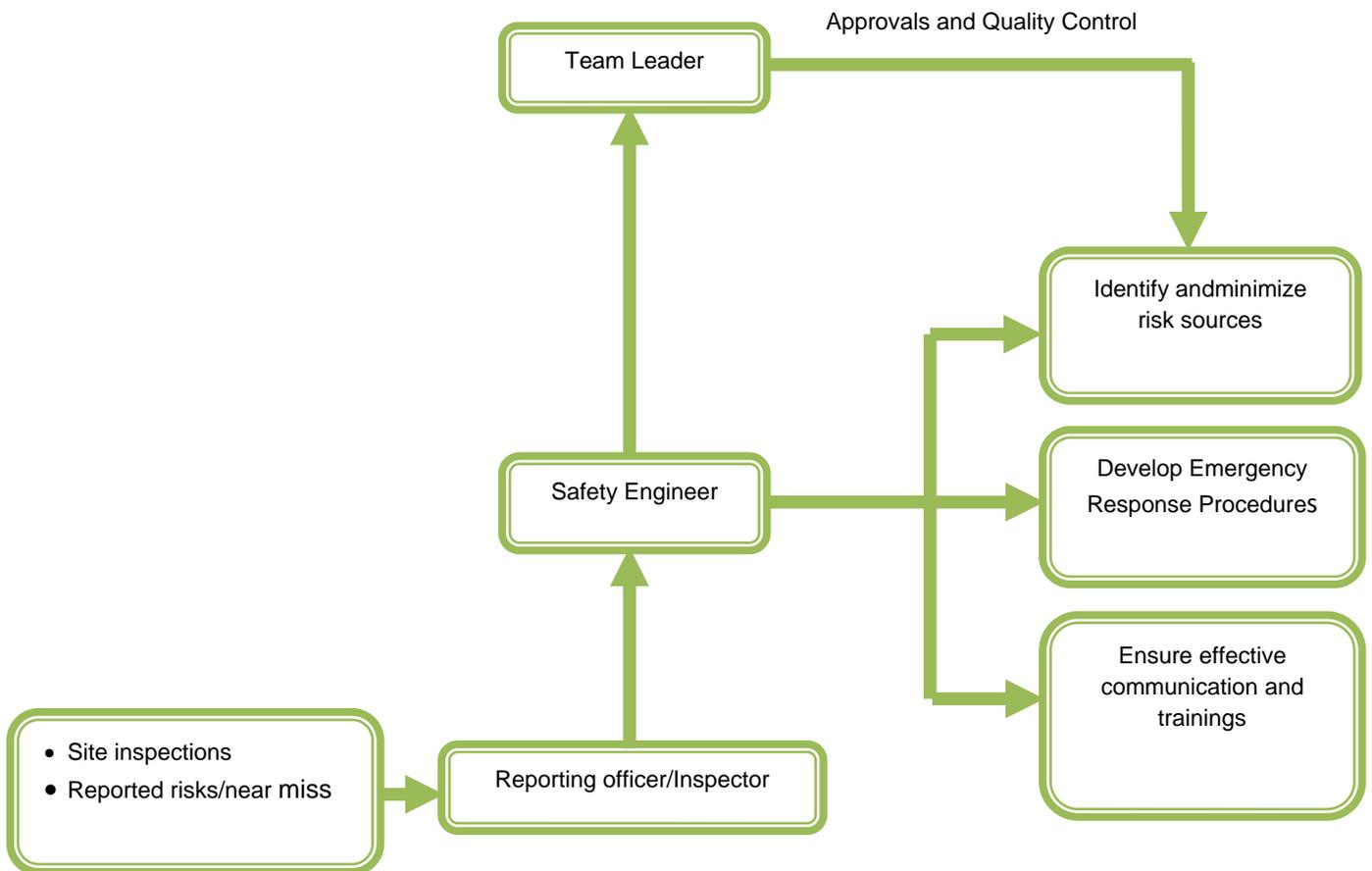
- Analyze the Identified risk sources and devise measures to prevent or mitigate the risks in close consultation with the Team Leader;
- Develop and implement the Emergency Response Procedures, in case of the possible emergencies arise;
- Ensure effective internal and external communication; and
- Provide regular trainings and arrange drills to make people aware of dealing with emergencies.

Reporting officer/Inspector

- Regular inspections of the site, to identify potential risks associated with equipment, materials and work practices;
- Anybody from the site can notify the reporting officer about potential risk and/or near misses on the site;
- Record any identified risks and mitigation measures to control the identified risk; and
- Notify the issue and control measures taken thereby to the safety engineer.

The designation, roles and responsibilities of each member shall be clearly defined and communicated to the employees.

An outline of the framework of responsibilities is presented in the following organizational chart:



ii. Hazard Identification

A comprehensive identification and evaluation of the hazards/risks likely to cause an emergency shall be done by Emergency Response Team (ERT). Major potential emergencies identified in road projects are as follows:

- Structural failure
- Disruption of Utility (Power, Water, Telecommunications, Gas, etc)
- Accidents
- Vehicle accident
- Fog
- Smoke
- Power/equipment failure or Vandalism

- Fire
- Earthquake
- Terrorism including bombing
- Disease Outbreak

iii. Prevention and Mitigation

The ERT shall work to eliminate or reduce the impact of identified emergencies and increasing the resilience of an affected community to recover from the consequences of such events. These activities include:

- Design considerations to control flooding, earthquakes and adequate lightening for fog etc.;
- Regular inspection and maintenance of construction machinery and the structural integrity;
- Review of work schedules based on weather updates; and
- Security controls based on political situations.

4. Emergency Preparedness

The ERT shall be prepared with all necessary resources and the personnel's shall be trained regularly

i. Resources

Finance and administration

The financial resources shall be reserved for dealing with any emergencies arising on site during construction and operation. Responsibilities of the person managing the resources in case of emergencies shall be clearly defined and the required resources shall be adequate and updated regularly.

Equipment

All the necessary equipment needed in an event of emergencies shall be made available, as a minimum, the equipment needed include;

- Personal Protective Equipment
- Alarms/ Warnings
- Fire extinguishers
- Crowd control, flashlights, signs, barricades
- First Aid Facility

- Detection instruments, e.g.; personal alarm kits; smoke detection instruments
- Tools to fix minor vandalism

Communication

All external and internal communication systems shall be made available. Local emergency numbers shall be clearly posted and communicated to the personnel involved in construction and during operation.

The local emergency numbers are given below, which shall be regularly updated.

Emergency Numbers

	Service	Quetta
1	Edhi Ambulance	081-115
2	Emergency Police	081-15
3	Bomb Disposal	081-831280
4	Fire Brigade Center	081-16

Trainings

Personnel shall be made aware of the importance of safety, potential emergencies and how to respond in case of emergencies .One day training and mock exercise shall be done to prepare, the personnel to deal with emergencies.

5. Emergency Response

Response includes actions taken to reduce the impacts of an emergency event, and to limit the threat to life, property and the environment.

The emergencies can be dealt with:

- On-Site Management of the situation
- Off-site coordination to arrange necessary resources to support the on-site management
- Providing advice and reports of the situation to stakeholders

i. Emergency Response Procedure

Any person can report about an emergency, an on-site worker, an outside agency, or the public. Circumstances change during the course of an emergency in different events, thus, the procedure will vary as per the specific situation on ground. However, a basic action plan to be followed in an emergency is discussed below. This order of response is applicable to almost any emergency and should be followed in sequence.

Assess the situation

The most important thing to do in case of emergency is to stay calm and avoid panic. Assess the situation, the cause and most immediate requirement to control, limit and/or manage the immediate, ongoing, or further damage.

Immediate control

The most senior person on the scene should take control and contact, or delegate someone to contact emergency services as posted and communicated by ERT and inform the reporting officer of ERT and explain the situation. The area of emergency shall be restricted by barricades, tapes and adequate signage, if and as required.

Protection from further losses

1. Once the site is restricted, to provide protection and reduce further losses, the source causing the emergency shall be controlled including equipment, materials, environment and accident scene from continuing damage or further hazards to the area and people .e.g. suppress fire, prevent objects from falling, shut down equipment or utilities, and take other necessary measures as required depending upon the type of emergency
2. Provide first aid if required or in doing so.
3. Designate people to emergency duties. e.g.: assign personnel to guide emergency services on arrival.
4. Headcount People/personnel to identify any missing persons.
5. People/ personnel shall be directed to safe location.
6. Arrange diversions for the traffic to reduce disturbance to the flow of traffic, if and as far as possible.
7. Preserve the accident scene until experts mark it safe; only disturb what is essential to maintain life or relieve human suffering and prevent immediate or further losses.

ii. Communication

Emergency service providers

The emergency service providers' needs to be kept informed of the situation. On site, personnel from the emergency services shall be guided towards the emergency scene, brief about the event, ongoing and potential hazards and cause(s), if known.

Emergency Response Team and Management

Members of ERT shall be immediately informed and the management shall also be kept informed.

Public

Timely notifications to public shall be disseminated through electronic and print media depending upon the requirement and urgency of the emergency so that they can adopt alternate routes and avoid the hazards associated with the emergency encountered.

Utilities

In case of disruption of utilities, the utility control authorities shall be immediately contacted to control the situation.

6. Recovery

Emergency affected individuals, communities and infrastructure shall be restored in terms of emotional, economic, and physical well-being including the following as a minimum:

- A detailed analysis and assessment of causes of emergency , extent of damage and gaps if any, in managing the emergency;
- Recovery/replacement of the assets and infrastructure;
- Reinstatement of disrupted services;
- Road and bridge repairs;
- Up-dation of safety arrangements and Emergency response procedures to ensure better safety and security in any other arising emergencies.

ANNEX – IV
CHANCE FIND PROCEDURES

CHANCE FIND PROCEDURES

Project may involve deep excavation. Therefore, the possibility of chance find is not ignorable. In case of any chance find, the contractor will immediately report through Supervision Consultant to Directorate General (DG) of Archeological Department, Government of Pakistan to take further suitable action to preserve those antique or sensitive remains. Representative of the DG will visit the site and observed the significance of the antique, artifact and Cultural (religious) properties and significance of the project. The report will be prepared by representative and will be given to the DG. The documentation will be completed and if required suitable action will be taken to preserve those antiques and sensitive remains.

In case any artifact, antiques and sensitive remains are discovered, chance find procedures should be adopted by contractor workers as follows:

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and provincial Archeological Department
- The suggestion of the local communities and the concerned authorities will be suitably incorporated during taking the preventive measures to conserve the antique, artifact and cultural (religious) properties
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over;
- After stopping work, the contractor must immediately report the discovery to the Supervision Engineer.

The contact Address of Archeology Department is given below:

Archeology Directorate,
Government of Balochistan,
Quetta.