ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

SEISMIC ACTIVITIES IN

SUI NORTH BLOCK

DISTRICT RAJANPUR, PUNJAB

Final Report **October - 2023**



EMC Pakistan
Private Limited

PPL

Environmental Impact Assessment (EIA)

Seismic Activities in Sui North Block, District Rajanpur, Punjab

Final Report

October 2023

Ref: EIA 02/04/23

EMC PAKISTAN PVT. LTD.

503, Anum Estate, Opp. Duty Free Shop, Main Shahrah-e-Faisal, Karachi.

Phones: 9221-34311466, 34324680, Fax: 9221-34311467.

E-mail: mail@emc.com.pk, info@emc.com.pk

Website: www.emc.com.pk

Disclaimer:

This report has Attorney – Client Privilege. EMC Pakistan Private Limited has prepared this report in accordance with the instructions of Project Owners “Pakistan Petroleum Limited” for their sole and specific use. Any other persons who use any information contained herein do so at their own risk. This report cannot be used in the court of law for any negotiation or standardization.

© EMC Pakistan Pvt. Limited 2023.

Abbreviations

Abbreviation	Explanation
API	American Petroleum Institute
BOC	Burmah Oil Company
BOD	Biological Oxygen Demand
CBD	Convention on Biological Diversity
COD	Chemical Oxygen Demand
CSR	Corporate Social Responsibility
DGPC	Directorate General of Petroleum Concessions
E&P	Exploration and Production
EHS	Environment, Health & Safety
EIA	Environmental Impact Assessment
EL	Exploration License
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
GOP	Government of Pakistan
GPS	Global Positioning System
HAVS	Hand-Arm Vibration Syndrome
HSE	Health, Safety and Environment
EIA	Environmental Impact Assessment
IUCN	International Union for Conservation of Nature
LSO	Louisiana State Wide Order
NCS	National Conservation Strategy
NEAP	National Environmental Action Plan
NEQS	National Environmental Quality Standards
NFPA	National Fire Protection Association
NGO's	Non-Government Organizations
NOC	No-Objection Certificate
OEM	Original Equipment Manufacturer
OGRA	Oil and Gas Regulatory Authority
OHSAS	Occupational Health and Safety Assessment Series
PEPA	Pakistan Environmental Protection Agency
PEQS	Punjab Environmental Quality Standards
PPC	Pakistan Penal Code
PPE	Personal Protective Equipment
PPL	Pakistan Petroleum Limited
QHSE	Quality, Health, Safety and Environment
QMS	Quality Management System
RH	Relative Humidity
SNB	Sui North Block
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UNDP	United National Development Program
WWF	World Wildlife Fund

Definition

Proponent	Pakistan Petroleum Limited
Project	The proposed project includes 2D Seismic Surveys to acquire seismic data for the Exploration of Hydrocarbon in Sui North Block (SNB). The block lies in two districts, the northwestern part of the block lies in Dera Bugti District (Balochistan) and south eastern part lies in Rajanpur District (Punjab). The proposed seismic survey would only be carried out in Rajanpur District. The objective of the study is to explore new hydrocarbon reserves through 2D seismic survey on the basis of promising geological features. Above objective will help increase the prospects of new hydrocarbon resources in the Country. Seismic activities will be carried out in the Sui North Block (SNB) district Rajanpur, Punjab. The project involves activities associated with 2D seismic surveys of approx. 27 Line km. for oil and gas exploration. **2D Seismic Survey** • Temporary Land acquisition • Construction of access track • Development of campsites • Mobilisation • 2D Seismic Surveying • Restoration and rehabilitation • Demobilization
Consultant	EMC Pakistan Pvt. Ltd
Project site	2D Seismic Activity in Sui North Block, Rajanpur Punjab
EPA	Punjab Environmental Protection Agency
Study	EIA study
Project area	Project site and 500 m radius around the project site

GLOSSARY

Client /Proponent:	Pakistan Petroleum Limited
Proposed Project:	Seismic Activities in Sui North Block, District Rajanpur, of Province Punjab
Environmental Consultant:	EMC Pakistan Pvt. Ltd.
Project Location:	Rajanpur District of Punjab Province.
PEPA	Punjab Environmental Protection Agency
Study	Environmental Impact Assessment (EIA)
Seismic Survey:	During the seismic survey, information about subsurface geology is gathered by directing seismic (sound) energy into the ground and recording the time taken by it to reflect off the subsurface rock layers. The reflected energy is recorded using geophones or motion detectors (sensitive microphones), which receive sound signals generated either by a controlled impulsive source such as seismic explosive or by vehicle mounted vibrator trucks.
Seismic Vibroseis:	A seismic method in which a vibrator is used as an energy source to generate a controlled wave train. A sinusoidal vibration of continuously varying frequency is applied during a sweep period typically lasting up to 32 s.
Seismic Vibrator:	A seismic vibrator is a truck-mounted or buggy-mounted device that is capable of injecting low-frequency vibrations into the earth
Geophones:	A device used in surface seismic acquisition, that detects ground velocity produced by seismic waves and transforms the motion into electrical impulses.
Bentonite mud:	Bentonite mud will be used during seismic operations for drilling of upholes and deep holes to avoid the holes from collapsing. The mud and the cuttings will be disposed of into earthen pits backfilled after drying the mud and cuttings. This mud is prepared by mixing bentonite with water. Bentonite is a natural clay material and non-hazardous in nature. The use of the mud and its preparation and disposal in earthen pits will therefore have negligible impact on groundwater or soil quality.
Government Approvals:	The Petroleum Concession Agreement for Sui North Block between the President Islamic Republic of Pakistan & Pakistan Petroleum Limited.

EXECUTIVE SUMMARY

Project Title:	Seismic Activities in Sui North Block, District Rajanpur, Punjab
Proponent:	Pakistan Petroleum Limited
Consultant:	EMC Pakistan (Pvt.) Limited

This document presents the findings of an Environmental Impact Assessment (EIA) carried out by EMC Pakistan (Pvt.) Limited for the proposed project "Seismic Activities in Sui North Block, District Rajanpur, Punjab", proposed by Pakistan Petroleum Limited (PPL). The Sui North block lies in two districts i.e., District Dera Bugti of province Baluchistan while southeastern part of the block lies in District Rajanpur of Punjab province.

Brief Outline of Proposed Project

The proposed project includes 2D Seismic Survey which will be carried out in Sui North Block (SNB) District Rajanpur, Punjab. The total area of Sui North Block is approximately 812 sq. km. out which approx. 145 sq. km. falls in the district Rajanpur of Punjab province and 667 sq. km. falls in the district Dera Bugti of Balochistan province. The proposed project will be carried out in district Rajanpur of Punjab Province.

The seismic survey will provide the subsurface data for the exploration of Oil and Gas reserves in the Sui North Block, which has been granted to PPL by the Government of Pakistan for carrying out Oil and Gas exploration and production activities. Seismic coverage may also increase or decrease due to technical requirements.

The EIA Report has been prepared to comply with Section 12 of Punjab Environmental Protection Act 1997 (amended 2012 & 2017).

Tentative location coordinates for proposed 2D Seismic lines are given below in **Table-ES-1** while project location map of Sui North Block is given as **Figure-ES.1**.

Table 1: Tentative Location Coordinates of 2D Seismic Lines

COORDINATE SYSTEM: UTM42N/ WGS1984

S. No	Line No.		Coordinates		Length (km)
			Latitude	Longitude	
1	PPL22-SuiN-08	Start	28°35'34.52"N	69°31'33.94"E	14.2
		End	28°43'15.82"N	69°31'32.95"E	
2	PPL22-SuiN-03	Start	28°37'39.64"N	69°34'43.90"E	12.8
		End	28°40'50.92"N	69°27'46.64"E	
Total					**27.0 Line.km**

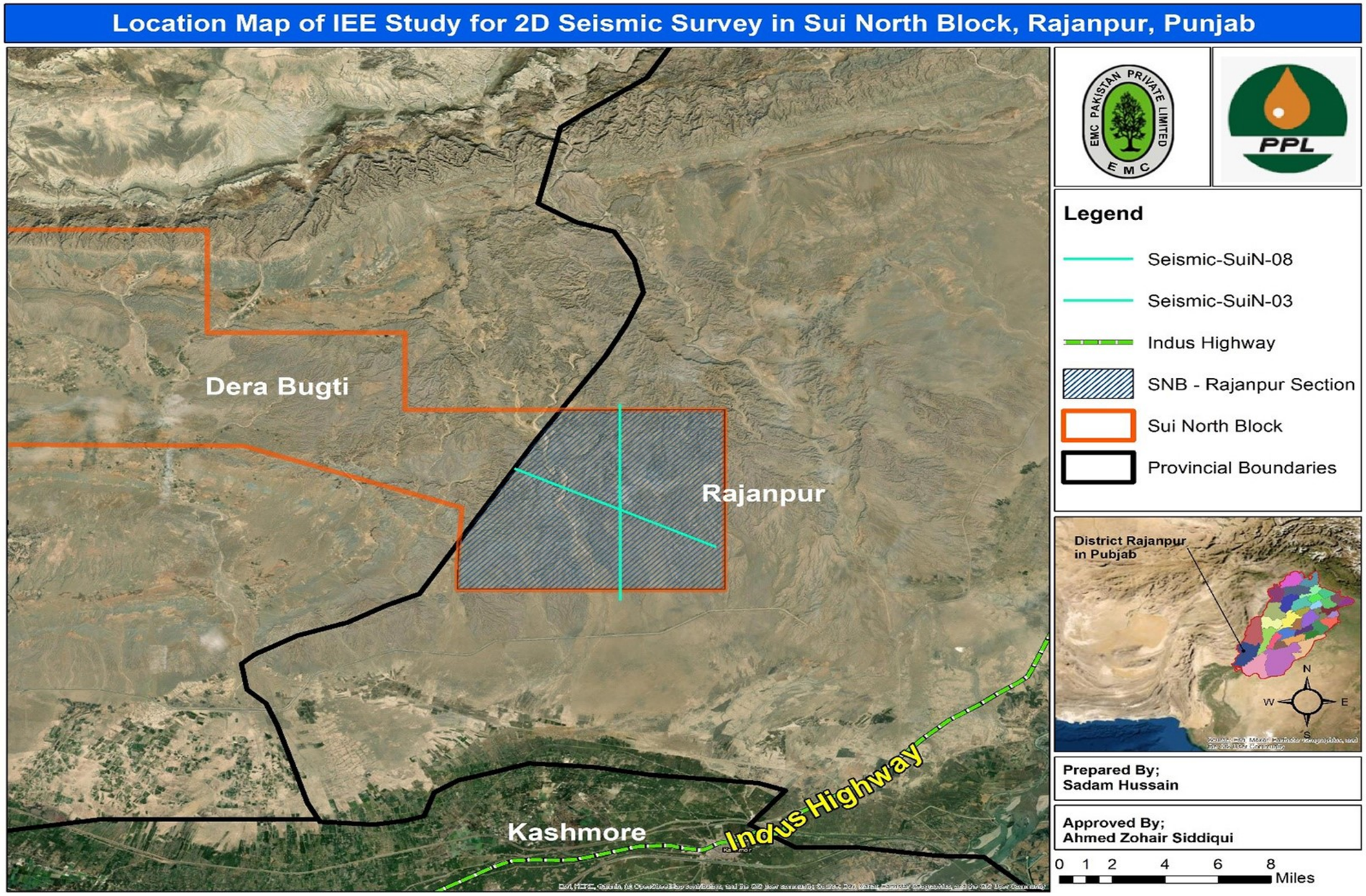


Fig. ES-1: Map showing 2D Seismic Lines and in Sui North Block

The schedule of seismic activities will be approximately of about 2 months. The tentative duration of key activities is provided in a table below;

Table ES-1: Expected Schedule of Seismic Activities	
Activities	**Duration**
Mobilization (if base camp is established)	15 days
Seismic Survey	45 - 60 days

There is only two seismic line of 27 km which are crossing through the arid area of sui north block which is particular sparsely populated due to extreme arid weather, semi barren land, sparse vegetation and lack of permanent water source. Sui North Block in the west of district Rajanpur near district Dera Bugti provincial border of Balochistan. There are minor settlements which are on distance of approx. 6.14 km to 10.8 km from proposed project boundaries. There is no protected area located or near to the Sui North Block.

The existing natural and socioeconomic environments of the project area have been studied and the report covers the area's physical and biological resources, including geomorphology, water resources, climate and air quality, vegetation, and wildlife and wildlife habitat. Description of the socioeconomic environment includes details of the area's population and households, education, health, gender issues, water supply, agriculture, transport and communications, and occupations and income.

Major Impacts

The potential environmental and socioeconomic impacts related to the proposed project have been identified through literature review, scrutinizing baseline data (both primary and secondary), professional opinions, experience, understanding of the proposed project activities, field observations and site surveys. No Reserved Forest, ecologically protected area and archeological sensitive area lies within the project area in Sui North Block (Punjab portion).

Screening and assessment of potential environmental impacts for the project finds that:

- Temporary and localized impacts to land use would result from campsite construction and seismic survey activities. These activities could create a temporary disturbance in the immediate vicinity of project activity area.
- Contamination of soil and water can result from untreated and uncontrolled release of effluent into environment such as campsite wastewater. Fuel or oil leakage or spill during the project activities can also result in contamination of soil and water and can be categorized as minor, moderate or major.

- Ambient air quality of the project area can be affected from dust emissions, from vehicular emissions and from exhaust emissions of equipment and generators.
- Noise from project activities can be nuisance to the workers and can propagate from project activities such as excavation, land clearance, seismic activities, etc.
- Water resources of the area can be impacted due to abstraction of water for project activities from groundwater.

Recommendations for Mitigation Measures

- Disturbance to the land and vegetation will be minimized as much as possible. Compensation will be paid for the land acquired temporarily.
- Proper implementation of plan for waste management will reduce the soil and water contamination. Campsite wastewater will be disposed through Septic tank and soak pit. Fuel and oil shall be stored at designated area(s) at project sites. Project sites will be restored after completion of activities.
- By minimizing the disturbance and areas cleared of vegetation, using dust control techniques, using well maintained machinery and vehicles, can effectively reduce the impact on air quality.
- Noise impacts will be minimized through engineering controls such as enclosures, barricading and provision of use of PPE for workers.
- Impacts on water resources will be minimized through judicious use of water and exploring options of greywater reuse.

Proposed Monitoring Plan

Monitoring plan for Seismic Activities has been provided in section 7. Based on project activities, monitoring has been proposed for following key parameters;

- Exhaust and vehicular emissions
- wastewater

Screening of potential environmental and socio-economic impacts resulting from various activities associated with the project reveals that majority of the impacts will occur on temporary basis and will be reduced with adaptation of good industrial practices, mindful planning, design and control of operations.

The risks identified have been addressed by recommendations of various mitigation measures to reduce the severity of each impact. Assessment of the identified impacts was validated using the information obtained through site surveys. The experts engaged for the EIA study visited the project area to gather information on the environmental and social characteristics of the project area. The proponent shall oversee the entire activities with an objective to ensure environmental protection.

The mitigation matrix for the proposed activities is included in the section 7 of this report.

The EMP has been prepared in accordance to national and provincial guidelines. Several actions have been identified in the EMP to prevent or mitigate the environmental impacts of proposed project.

Based on the findings of the EIA, the consultant recommends that the EIA may be approved with the condition that all mitigation measures recommended in the report including EMP, shall be implemented in letter and Spirit.

Table of Content

Abbreviations i

Definition ii

EXECUTIVE SUMMARY iv

SECTION 1: INTRODUCTION 1

1.0 General Introduction 1
1.1 Brief Description of the Project 1
1.2 Project Proponent – Contact details 3
1.3 EIA Consultant – Contact details 3
1.4 Need of Environmental Assessment 3
1.5 Screening of the Project 3
1.6 Scope of EIA Study 4
1.7 Project Alternatives 5
1.7.1 No project Alternative 5
1.7.2 No Project Alternative specific for Seismic Survey 5
1.7.3 Alternatives with respect to Project Site, Location and alignment of survey line 6
1.7.4 Design/Technology Alternatives 6
1.7.5 Environmental Alternatives 6
1.7.6 Economic Alternatives 6
1.8 The Proponent - Pakistan Petroleum Limited (PPL) 7
1.9 Methodology required for an Environmental Impact Assessment (EIA) 14
1.9.1 Understanding of the Proposed Project 14
1.9.2 Review of National Legislation and Guidelines 14
1.9.3 Collection of Secondary Data 14
1.9.4 Collection of Field Data 14
1.9.5 Baseline Studies 16
1.9.6 Impact Identification and Evaluation 16
1.9.7 Recommendations to Mitigate Impacts 16
1.9.8 Environmental Management Plan (EMP) 16
1.9.9 Documentation, Review and Conclusion 16
1.9.10 EIA Study Team 17

SECTION 2: DESCRIPTION OF PROJECT 18

2.1 The Project 18
2.2 Project Location 18
2.3 Objective of the project 20
2.4 Scope of Work 20
2.5 Seismic Survey 20
2.5.1 Schedule of Implementation 20
2.5.2 Seismic Survey procedure 21
2.6 Staffing & Supplies 24
2.7 Road Access 24
2.8 Vegetation feature of the site 25
2.9 Land Use of the project area 26
2.10 Site Suitability 28
2.11 Cost and Magnitude of the project 28
2.12 Government approvals 28

SECTION 3: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK 29

3.1 Introduction 29
3.2 PPL's Policy and Commitment to Quality, Health, Safety and Environment 30
3.3 National Legislations and Guidelines 31

3.3.1 National Conservation Strategy 31
3.3.2 Hazardous Substances Rules, 2003 32
3.3.3 Self- Monitoring & Reporting Rules, 2001 32
3.3.4 Pakistan Penal Code, 1860 32
3.3.5 Antiquities Act, 1975 33
3.3.6 Land Acquisition Act, 1894 33
3.3.7 The Cutting of Trees (Prohibition) Act, 1992 33
3.3.8 The Canal and Drainage Act, 1873 34
3.3.9 The Biodiversity Action Plan, 2000 34
3.3.10 Mines Act, 1923 34
3.3.11 The Forest Act, 1927 35
3.3.12 The Pakistan Environmental Policy, 2005 36
3.3.13 National Mineral Policy, 1995 and 2013 36
3.4 National Legislation on Oil and Gas Exploration and Production 38
3.4.1 The Petroleum Act, 1934 38
3.4.2 The Regulation of Mines and Oil-Fields & Mineral Development Act, 1948 39
3.4.3 The Regulation of Mines and Oilfields and Mineral Development (Government Control) (Amendment) Act, 1976 40
3.4.4 The Model Petroleum Concession Agreement, 2013 40
3.4.5 The Pakistan Petroleum (Production) Rules, 2001 40
3.4.6 The Pakistan Petroleum (Exploration and Production) Rules, 2013 40
3.4.7 Petroleum Exploration and Production Policy, 2012 41
3.4.8 The Pakistan Onshore Petroleum (Exploration & Production) Rules, 2013 41
3.4.9 The Oil and Gas (Safety in Drilling and Production) Regulations, 1974 42
3.4.10 Sectoral Guidelines for Environmental Reports – Oil and Gas Exploration and Production 43
3.5 Provincial and Local Environmental Laws and Legislations 43
3.5.1 Punjab Environmental Protection Act 1997, (Amended 2012 & 2017) 43
3.5.2 Environmental Protection Agency (Review of EIA/IEE) Regulations, 2022 44
3.5.3 Punjab Environmental Quality Standards, 2016 44
3.5.4 Punjab Local Government Act, 2013 48
3.5.5 The Punjab Wildlife (Protection, Preservation, Conservation, and Management) Act, 197448
3.5.6 The Punjab Special Premises (Preservation) Ordinance, 1985 49
3.6 Environmental and Social Guidelines 49
3.7 National Fire Protection Association (NFPA) 50
3.8 International Treaties 50
3.8.1 Climate Change 50
3.8.2 Waste and Pollution 51
3.8.3 The Convention on Biological Diversity 51
3.8.4 The Convention on Conservation of Migratory Species of Wild Animals, 1979 51
3.8.5 Cultural Heritage 52
3.8.6 ILO Conventions 52

SECTION 4: ENVIRONMENTAL AND SOCIAL BASELINE 53

4.1 General Introduction 53
4.1.1 The Aim of Baseline Study 53
4.1.2 Methodology 53
4.2 Physical Environment 54
4.2.1 District Rajanpur Location & History at a Glance 54
4.2.2 Geography of District Rajanpur at a Glance 54
4.2.3 Topography 55
4.2.4 Geological Setting 59
4.2.5 Soil Setting 59
4.2.6 Seismicity 62
4.2.7 Climate of District Rajanpur 62
4.2.8 Ambient Air Quality & Noise Level Monitoring 66
4.2.9 Noise Level Monitoring 66
4.2.10 Hydrology 68
4.2.11 Land-use 75

4.2.12 Forestry 75
4.3 Ecological Environment *76*
4.3.1 Floral Attributes of the Project Area 77
4.3.2 Faunal attributes of the Project Area 77
4.4 Socio- Economic Environment, ... *80*
4.4.1 Population and Administration 83
4.1.2 Household Distribution *84*
4.1.3 Agriculture and Irrigation *84*
4.1.4 Industry and Trade *85*
4.1.5 Health *85*
4.1.6 Education *86*

SECTION 5: STAKEHOLDER CONSULTATION 87

5.1 General *87*
5.1.2 Aims and Objectives of the Stakeholder Consultation *87*
5.1.3 Proponent *87*
5.1.4 Consultation Methodology *87*
5.1.5 Response from the Proponent *88*
5.2 Response of Institutional Stakeholder *89*
5.2.1 District EPA Officer – District *89*
5.2.2 TMA Officer *90*
5.3 Responses of Primary Stakeholders *91*
5.3.1 Settlement near project site *91*

SECTION 6: POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES 94

6.1 Introduction *94*
6.2 Methodology *94*
6.3 Screening of Potential Environmental and Social Impacts *94*
6.3.1 Soil and Water Contamination from Spills *97*
6.3.2 Impacts on the Ambient Air Quality *99*
6.3.3 Impacts due to noise pollution *100*
6.3.4 Impacts on water availability *101*
6.3.5 Impacts on water resources (surface water and ground water) *102*
6.3.6 Blockage of Natural Drainage *103*
6.3.7 Site Restoration *103*
6.3.8 Impacts on Ecological Resources *104*
6.3.9 Impacts due to Hazardous Materials and Solid Waste Generated *105*
6.3.10 Impacts on Cultural Resources/Sites of Archaeological Significance *106*
6.3.11 Positive Impacts on Socio-economic Environment *106*

SECTION 7: ENVIRONMENTAL MANAGEMENT PLAN (EMP) 109

7.1 General *109*
7.2 Purpose of EMP *109*
7.3 Environmental Management Framework *109*
7.4 Structure of EMP *110*
7.5 Organizational Structure and Roles and Responsibilities *110*
7.5.1 Organizational Structure 110
7.5.2 Contractors and Subcontractors 110
7.5.3 Environmental Protection Agency 111
7.5.4 Roles and Responsibilities of the proponent 111
7.5.5 Approvals 111
7.5.6 Contractual Provisions 111
7.5.7 Training 112
7.5.8 Communication and Documentation 112
7.6 Mitigation Management Matrix *113*
7.7 Environmental Monitoring *113*
7.8 Waste Management *130*

7.9 Change Management Plan 132
7.10 Emergency Response Plan 133
7.11 Implementation Environmental Management Plan & Environmental Budget 133

SECTION 8: CONCLUSION 135

District EPA Officer – District 139
TMA Officer 140

Table of Figures

Figure 1: Location Map of Proposed Project Showing Sui North Block Rajanpur Section 2
Figure 2: Field survey and monitoring pictures 15
Figure 3: Location Map of the Proposed 2D Seismic Survey in Sui North Block, DistrictRajanpur 19
Figure 4: Road access map of the Seismic Survey in Sui North Block (Rajanpur) 25
Figure 5: Dirt access track to the project site in Sui North Block (Rajanpur) 25
Figure 6: Vegetation Status of Project Area 26
Figure 7: Land Classification of District Rajanpur with Area & Percentage 26
Figure 8: Land Use Land Classification Map of District Rajanpur 27
Figure 9: Location map of project site 55
Figure 10: General topography of the project site surrounding 57
Figure 11: Topographic map of the project area 58
Figure 12: Geological Map of Proposed Project 60
Figure 13: Soil Map of Proposed Project 61
Figure 14: Seismic Zoning Map of Pakistan (Source: Pakistan Metrological Department) 62
Figure 15: Average High and Low Temperature of District Rajanpur (Sourceweathersparks.com) 63
Figure 16: Daily Chance of Precipitation in District Rajanpur (Source: weathersparks.com) 64
Figure 17: Daily The percentage of time spent at various humidity comfort levels, categorized by dew point. (Source: weathersparks.com) 64
Figure 18: The average of mean hourly wind speeds (dark gray line) (Source: eathersparks.com) 65
Figure 19: Annual wind directions (Source: weathersparks.com) 65
Figure 20: Irrigated Area of Rajanpur by the Year 2014-2015 69
Figure 21: Environmental Monitoring Location Map 73
Figure 22: Project Area Hydrology Map 74
Figure 23: Land Use Land Classification Map of District Rajanpur 82
Figure 24: Land Classification of District Rajanpur with Area & Percentage 83
Figure 25:Tehsil Wise Population Distribution (2017 Census) 83
Figure 26: Tehsil-wise Household Distribution in District Rajanpur (2017 Provisional Statistics 84
Figure 27: Irrigated Area of Rajanpur by the Year 2014-2015 85
Figure 28: Settlement Map of Project Area 92

List of Tables

Table 1: Tentative Location Coordinates of 2D Seismic Lines iv
Table 2: Tentative Location Coordinates of 2D Seismic Lines 2
Table 3: Sector wise Natural Gas Consumption (In million cubic feet per day) 5
Table 4: Members of EIA Study Team of EMC Pakistan (Pvt.) Limited 17
Table 5: Tentative Location Coordinates of 2D Seismic Lines 18
Table 6: Summary of expected average resources usage during seismic activities 24
Table 7: PEQS for Ambient Air 45
Table 8: PEQS for Municipal and Liquid Industrial Effluents 45
Table 9: PEQS for Industrial Gaseous Emissions 46
Table 10: Sulfur Dioxide Background Levels Microgram per cubic meter (ug /m^3) Standard 47
Table 11: Standards for motor vehicle exhaust and noise (for in-use vehicles) 47
Table 12: District Administration of Rajanpur 54
Table 13: Ambient Air Quality near Project Site (District Rajanpur) 66
Table 14: Noise Monitoring Result Location 1 67
Table 15: Noise Monitoring Result Location 2 68
Table 16: Surface Water Analysis Results 69
Table 17: Ground Water Sample 1 Analysis Result 70
Table 18: Ground Water Sample 2 Analysis Result 71
Table 19: Land Utilization 2019-2020 75
Table 20: Forest Area by Administration & Enactment 75
Table 21: Avifauna Species in the Project Area 78
Table 22: Mammals and Reptiles in the Project Area 80
Table 23: District Administration of Rajanpur 81
Table 24: Distribution of Health Facilities in District Rajanpur (2017) 86
Table 25: Education Facilities of District Rajanpur 86
Table 26: List of Proponent team members 88
Table 27: Environmental Impacts & Characterization Matrix 107
Table 28: Mitigation Management Matrix for Seismic Activities 114
Table 29: Environmental Monitoring Plan for Seismic Activities 129
Table 30: List of Different Types of Waste and Disposal Options 131
Table 31: Estimated Cost of Key Activities 134

Appendices and Annexures	
Appendix – 1	Source of data and List of reference material used
Appendix – 2	Term of reference
Appendix – 3	List of individuals and organization consulted with their written feedback
Appendix – 4	List of names, qualifications of team members carrying out EIA study
Annexure – I:	Project Location Map
Annexure – II:	Environmental Monitoring Reports
Annexure – III:	Petroleum Concession Agreement for Sui North Block
Annexure – IV:	Campsite Layout
Annexure – V:	Emergency Response Plan
Annexure – VI:	Written stakeholder feedback
Annexure – VII:	Map showing distances of project area and features

SECTION 1: INTRODUCTION

1.0 General Introduction

Project Title:	Seismic Activities in Sui North Block, District Rajanpur, Punjab
Proponent:	Pakistan Petroleum Limited
Consultant:	EMC Pakistan (Pvt.) Limited

Purpose of Report

This report presents the findings of an Environmental Impact Assessment (EIA) study conducted by EMC Pakistan Pvt. Ltd. for the Seismic Activities in Sui North Block, District Rajanpur, Punjab. The EIA study of the seismic survey site has been carried out in accordance with Section 12 of Punjab Environmental Protection Act, 1997 (amended 2012 and 2017) and rules and regulations enclosed thereunder.

1.1 Brief Description of the Project

This document presents the findings of an Environmental Impact Assessment (EIA) carried out by EMC Pakistan (Pvt.) Limited for the project "Seismic Survey in Sui North Block, District Rajanpur of Punjab Province", proposed by Pakistan Petroleum Limited (PPL). The proposed project includes 2D Seismic Surveys to acquire seismic data for the Exploration of Hydrocarbon in Sui North Block. The block lies in two districts i.e. Major part of the block lies in district Dera Bugti of Balochistan province however, remaining southeastern portion of the block lies in district Rajanpur of Punjab. The Proposed 2D seismic survey will be carried out in district Rajanpur of Punjab.

The proposed project includes 2D Seismic Survey which will be carried out in Sui North Block (SNB) District Rajanpur, Punjab. The total area of Sui North Block is approximately 812 sq. km. out which approx. 145 sq. km. falls in the district Rajanpur of Punjab province and 667 sq. km. falls in the district Dera Bugti of Balochistan province. The proposed project will be carried out in district Rajanpur of Punjab Province.

Tentative location coordinates for proposed 2D Seismic lines are given below in Table-1 while project location map of Sui North Block is given as Figure-1.

Table 2: Tentative Location Coordinates of 2D Seismic Lines					
COORDINATE SYSTEM: UTM42N/ WGS1984					
S. No	**Line No.**		**Coordinates**		**Length (km)**
			Latitude	Longitude	
1	PPL22-SuiN-08	Start	28°35'34.52"N	69°31'33.94"E	14.2
		End	28°43'15.82"N	69°31'32.95"E	
2	PPL22-SuiN-03	Start	28°37'39.64"N	69°34'43.90"E	12.8
		End	28°40'50.92"N	69°27'46.64"E	
Total					**27.0 Line.km**

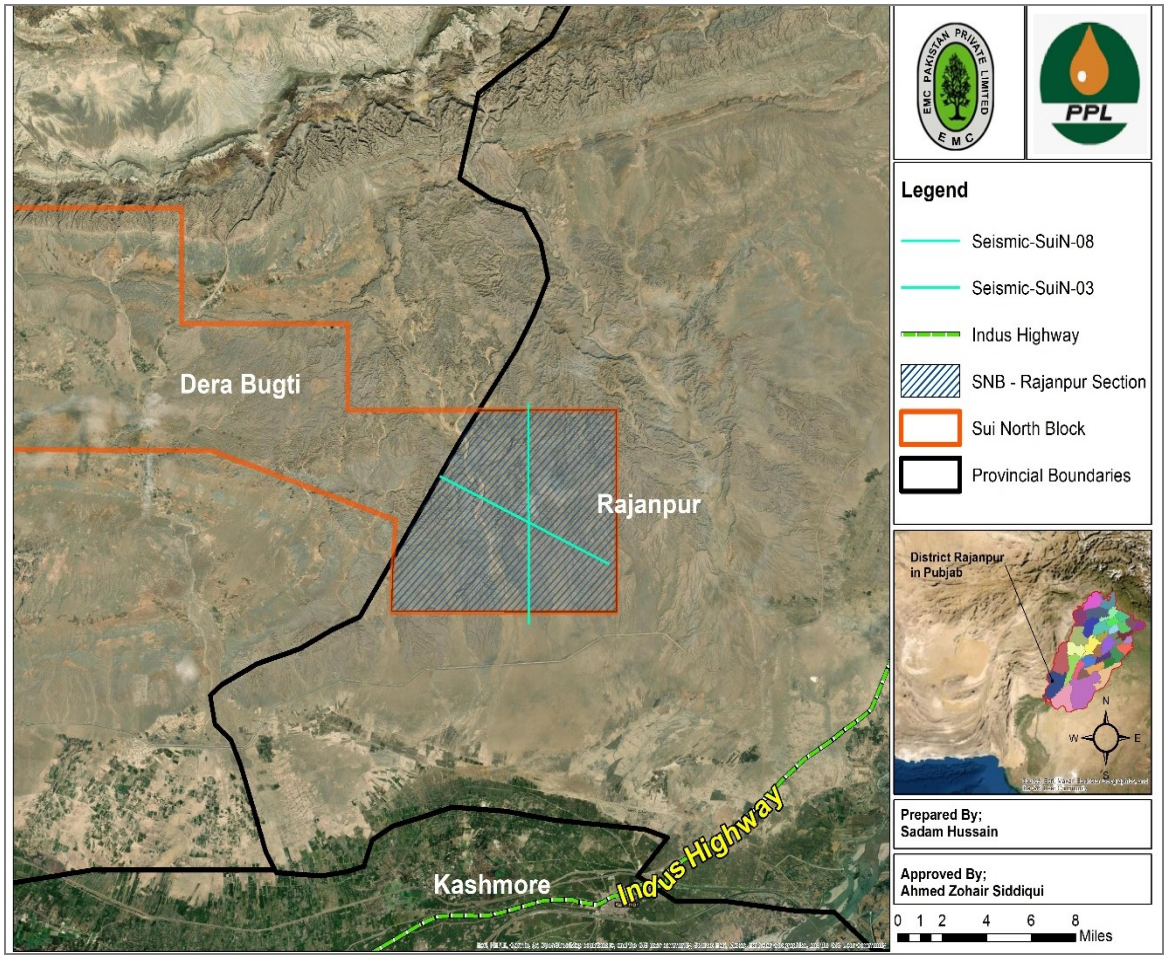


Figure 1: Location Map of Proposed Project Showing Sui North Block Rajanpur Section

1.2 Project Proponent – Contact details

Pakistan Petroleum Limited

Address: PIDC House, Zia Uddin Road, PO Box 3942, Karachi 75530,

Phone :(+) 9221-111 568 568

Fax: (+) 92- 21-35680005

Website: www.ppl.com.pk

Email: info@ppl.com.pk

1.3 EIA Consultant – Contact details

EMC Pakistan Pvt. Limited

Address: Office # 503, Anum Estate Building, Main Shahra-e-Faisal, Opposite Duty-Free Shop, Karachi, Pakistan.

Phone: +92-21-34311466, 34321532

Fax: +92-21-34311467

Website: www.emc.com.pk

Email: mail@emc.com.pk; info@emc.com.pk

1.4 Need of Environmental Assessment

Environmental Impact Assessment (EIA) of the project has been carried out in compliance with the mandatory requirement of Section 12 of Punjab Environmental Protection Act, 1997 (amended 2012 & 2017) which requires that: "No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof." In compliance with the above cited regulations, an EIA study has been prepared and its report is being filed with the Punjab Environmental Protection Agency for approval.

1.5 Screening of the Project

On the basis of categorization given in Schedules I and II of the Pakistan Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations, 2022, the proposed project falls in Schedule II requiring an EIA as the project is categorized as:

A. Energy:

Oil & gas extraction projects including exploration, production, gathering systems, separation and storage.

1.6 Scope of EIA Study

Spatial and Temporal Boundaries of Environmental Assessment

The EIA study assesses the environmental impacts of the activities associated with seismic survey in Sui North Block (Punjab portion) in District Rajanpur. The study covers assessment of all the project-related activities at project site till complete site restoration. Temporal limits of the study coincide with the "Schedule of Implementation" of the project, described in subsequent chapter. Environmental assessment for the proposed project commenced in October 2022 and completed in August 2023 with EIA report submission to Punjab EPA.

Important issues and concerns raised during Consultations

An important component of the EIA study is consultations with Stakeholders. This study identified the primary and secondary stakeholders of the proposed project and consultations sessions were carried out with the stakeholders to fetch their feedback on important issues pertaining to project and to note their concerns, if any. Details of consultations with the project stakeholders have been described in Section 5 "Stakeholder Consultation".

Significant impacts and factors to be determined

2D seismic activities can have adverse impacts on the environment if proper mitigation measures are not taken into consideration. The potential impacts usually occur in an area where activities can cause soil contamination, disturbances to residing local communities, loss to the wildlife, destruction of habitats or living sanctuaries, pollutions and erosion etc. With the thorough identification of potential impacts, development and practicing of mitigation measures, number of potential adverse environmental and social stressors can be reduced, creating the project environmentally and socially acceptable and friendly.

The EIA study goals to provide the environmental assessment of the project "Seismic Activities in Sui North Block, District Rajanpur, Punjab,", the deliverable of the project aims to provide the evaluation of the impacts from the project activities on the surrounding biological, physical and socio-economic environment. The points to make assured while carrying out EIA are mentioned below:

- Any of the substantial adverse impact on the environment in terms of biological, physical and socio-economic then mitigation measures should be given priority for their inclusive practices in the project.
- Negative impacts (if any) are correctly addressed and satisfactory mitigation measures are suggested for inclusion in the proposed activities of the project;

- Environmental Management Plan (EMP) has to be provided for the sustainable development and operational phase of the project

1.7 Project Alternatives

1.7.1 No project Alternative

Exploration for hydrocarbon (Oil & Gas) is an expensive and technologically complex process with an uncertain outcome, since not all exercises eventually lead to production and distribution. What, then, is the justification for undertaking such a risk-laden venture, and what are the issues likely to arise in the absence of any such activity.

The share of natural gas in primary energy supplies of the country is about 38% (Pakistan Energy Yearbook, 2020-21), and is the primary fuel used in the fertilizer industries, in addition to its uses in the residential, commercial sectors and in power generation.

Table 3: Sector wise Natural Gas Consumption (In million cubic feet per day)

Sector	Gas Consumption in MMCFD	Percentage
Power	610	22
Household	915	33
Commercial	65	2
Transport (CNG)	63	2
Fertilizer	687	25
General Industry	433	16
Total	**2,773**	**100**
Source: Economic Survey 2020-21		

The relative shares of oil and gas in energy supply have been changing over time, with petroleum products overtaking natural gas as the primary source of fuel. The increased use of petroleum products has implications for Pakistan's balance of payments accounts.

In view of Pakistan's balance of payments difficulties, it has become imperative for the country to explore indigenous resources in the energy sector, as a reliable supply of energy is crucial to alleviate some of the load of Pakistan's balance of payments. Natural gas is a particularly attractive option as the environmental effects associated with its usage are also minimal in comparison to other fossil fuels.

1.7.2 No Project Alternative specific for Seismic Survey

Geophysical investigation proposed by the proponent is necessary to determine the presence of an oil or gas reservoir in the area. Given the benefits to the economy of Pakistan in case of a significant gas discovery, the no-project option is not considered a desirable option. Success in exploring and developing another reservoir in the Punjab province will result in the country being less dependent on imported energy sources and being more self-reliant in the future. This is particularly important since the proposed operation is unlikely to lead to

large-scale environmental impacts that may in turn lead to the loss of valuable or irreplaceable ecological resources.

1.7.3 Alternatives with respect to Project Site, Location and alignment of survey line

Many national and multinational companies, in addition to public sector organizations, are actively engaged in oil and gas exploration activities in different concession areas and exploration sites in Pakistan. When a porous reservoir rock forms an anticline deep in the subsurface, it may trap migrating hydrocarbons. The presence of such a structure at depth is indicated by surface geological studies and confirmed by recording seismic surveys.

The alignments of the exploration area proposed by the proponent represent areas of highest potential. Given the low to medium significance of the impacts associated with the project, no change in alignment of the survey lines will be required. Moreover, the block has been awarded by GoP to PPL for exploration activities, hence, the proposed location for project is the preferred site alternative.

1.7.4 Design/Technology Alternatives

Execution of proposed exploration procedures needs to be carried out with extreme care bearing in mind the environmental sensitivities within the project area. The technology being adopted for the seismic survey has been grounded in Pakistan and the Proponent is committed to adopt the suggested mitigation measures in order to reduce, minimize or compensate for the negative impact as far as possible.

Two techniques are conventionally used for collection of seismic data, Vibroseis and dynamite. Depending on the terrain features and land use type of the project area, most suitable type will be selected for seismic survey. Vibroseis is generally suitable for terrain with gentle slopes, salt plains and flat sandy areas while dynamite is suitable in areas which are less populated e.g., agricultural lands and all other areas and where access or working of the Vibroseis will be difficult. Upholes may also be drilled at selected locations within the area of the seismic survey.

1.7.5 Environmental Alternatives

As the project would require significant quantity of water, it is expected that impacts on the water resources would be minimized by exploring the option of reuse of greywater in project activities. Number of waste disposal options will be considered based on type of waste and with aim of environmentally friendly disposal of waste and preferring hierarchy of reduce, reuse and recycle.

1.7.6 Economic Alternatives

The estimated cost of the project activity is 1 Million USD, keeping in view of technical, financial and environmental requirements of project. Environmental budget has also been allocated for the implementation of environmental measures.

1.8 The Proponent - Pakistan Petroleum Limited (PPL)[1]

The pioneer of the natural gas industry in the country, Pakistan Petroleum Limited (PPL) has been a frontline player in the energy sector since the mid-1950s. As a major supplier of natural gas, PPL today contributes over 20 percent of the country's total natural gas supplies besides producing crude oil, Natural Gas Liquid and Liquefied Petroleum Gas).

The company's history can be traced back to the establishment of a public limited company in June 1950, with major shareholding by Burmah Oil Company (BOC) of the United Kingdom for exploration, prospecting, development and production of oil and natural gas resources. In September 1997, BOC disinvested from the Exploration and Production (E&P) sector worldwide and sold its equity in PPL to the Government of Pakistan (GoP). Subsequently, the government reduced its holding through an initial public offer in June 2004, which was further decreased with the initiation of the Benazir Employees Stock Option Scheme (BESOS) in August 2009 when PPL employees were allotted 12 percent shares from the government's equity. More recently, GoP further disinvested its 5 percent shares, around 3.55 percent of the total paid-up capital, in PPL through Secondary Public Offering in 2014. Currently, the company's shareholding is divided between the government, which owns about 67.51 percent, PPL Employees Empowerment Trust that has approximately 7.35 percent — being shares transferred to employees under BESOS — and private investors, who hold nearly 25.14 percent.

PPL has acquired 100 percent shareholding of MND E&P Limited, a company incorporated in England and Wales. The name of the subsidiary has been changed to PPL Europe E&P Limited.

The company has also established a wholly-owned subsidiary, PPL Asia E&P B.V. with corporate seat in Amsterdam, Kingdom of Netherlands. The subsidiary will focus on exploration and production of oil and gas in the region.

In August 2021, a PPL-led consortium was awarded Offshore Block 5 in Abu Dhabi's second competitive exploration block bid round. Offshore Block 5 covers an area of 6,223 square kilometers and is located 100 kilometers north east of Abu Dhabi city. The consortium includes four leading national E&P companies, PPL as operator, Oil and Gas Development Company Limited (ODGCL), Mari Petroleum Company Limited and Government Holdings (Private) Limited (GHPL) with an equal shareholding of 25 percent. To this end, a new company Pakistan International Oil Limited (PIOL) has been incorporated in the UAE with PPL as the management shareholder and has entered into the concession agreement with Abu Dhabi National Oil Company.

[1] https://www.ppl.com.pk/content/corporate-profile-overview

PPL operates 16 producing fields across the country at Sui (Pakistan's largest gas field), Adhi, Kandhkot, Chachar, Mazarani, Adam, Adam West, Shadadpur, Shahdadpur West, Shahdadpur East, Zafir, Fazal, Kabir, Hadaf, Dhok Sultan and Benari and holds working interest in 24 partner-operated producing fields, including Qadirpur the country's second largest gas field.

As a major stakeholder in securing a safe energy future for the country, PPL pursues an aggressive exploration agenda aimed at enhancing hydrocarbon recovery and replenish reserves. PPL together with its subsidiaries has a portfolio of 50 exploration assets of which the company operates 29, including an offshore Block 5 in Abu Dhabi, UAE while 21 blocks, comprising an onshore concession in Yemen, are operated by joint venture partners.

As part of its diversification strategy, PPL has strengthened its mining operations through Bolan Mining Enterprises (BME), established in 1974 with an equal shareholding of 50 percent each between PPL and Government of Balochistan (GoB). To this end, PPL signed a mining lease (ML) deed for Lead and Zinc in District Khuzdar with GoB in December, 2021. According to the ML deed, PPL has been granted a large-scale mining lease over an area of 30 square kilometers for establishment of bayrite, lead and zinc (BLZ) processing/ beneficiation plant in District Khuzdar, Balochistan. The estimated recoverable reserves of BLZ are 69 million tonnes along with 32 years of life after commencement of production.

More recently, the company signed a non-binding framework agreement for the reconstitution of Reko Diq project by Government of Pakistan and Barrick Gold Corporation, PPL, OGDCL, GHPL as well as GoB in March 2022. Reko Diq is potentially one of the largest undeveloped copper-gold mine located in District Chagai, Balochistan.

Over the years, PPL has developed a reliable foundation and infrastructure for providing clean and safe energy through sustainable exploitation of indigenous natural resources while adhering to best practices of corporate governance and employee health and safety and constraining the ecological footprint of its operations. As a result, Sui, Kandhkot, Adhi and Hala, Gambat South and Mazarani assets, Purification Plant, Sui, Sui Field Gas Compressor Station, Sui Production, Sui Field utility, Sui Stores, Sui Field Hospital and Quality, Health, Safety and Environment, Drilling & Well Engineering, Construction, Projects, Production Technology and Medical Services departments stand certified for ISO 9001 Quality Management System.

Similarly, Kandhkot, Adhi and Hala, Gambat South, Mazarani assets, Sui Field Gas Compressor Station, Sui Production, Sui Field utility, Sui Stores, Sui Field Hospital and Exploration, Quality, Health, Safety and Environment, Drilling & Well Engineering, Construction and Projects departments have been certified for ISO

14001 Environmental Management System and ISO 45001 Occupational Health & Safety Management System. Purification Plant, Sui, is also certified for ISO 45001 Occupational Health & Safety Management System.

PPL has played a significant role as a responsible corporate citizen since the inception of its commercial activities in Sui by establishing the Sui Model School in 1957 for children of workers and local communities. In order to ensure geographical and thematic diversity, the company's CSR programme focuses on education, health, infrastructure development and socio-economic uplift of disadvantaged communities living in and around its operating areas as well as other parts of the country. More recently, the company also initiated Corporate Donations programme to reach deserving population in urban areas.

Vision[2]

To achieve energy self-sufficiency for Pakistan by becoming the most successful and efficient discoverer and producer of oil and gas.

Mission[3]

To serve the people of Pakistan in an area critical to their economic development by employing, training and developing the best people available and empowering them to deliver extraordinary results while insisting that they conform to the highest standards of professional and ethical conduct.

Corporate Social Responsibility[4]

Pakistan Petroleum Limited (PPL)'s Corporate Social Responsibility (CSR) programme dates back to the start of PPL's commercial operations in Sui in the 1950s when the company established a school for children of workers and local communities. Since then, CSR has been the centrepiece of PPL's corporate ethos.

In 2001, the PPL Welfare Trust (PPLWT) was founded to provide geographic and thematic diversity to the company's CSR programme, which includes education, health, infrastructure development, socio-economic uplift of disadvantaged communities, particularly those living in and around its operating areas, and post-disaster rehabilitation.

Need analysis, scoping, planning and execution of CSR projects is carried out through strategic local partnerships. To ensure swift delivery, maximum on-ground impact and sustainability of its social investments, all interventions occur after due consultation and mutual agreement with stakeholders, including community representatives, local governments and non-governmental organizations.

[2] https://www.ppl.com.pk/content/mission-vision
[3] https://www.ppl.com.pk/content/mission-vision
[4] https://www.ppl.com.pk/content/corporate-responsibility-sindh

To further strengthen PPL's CSR portfolio and access the underserved in non-operational urban areas, the company has initiated Corporate Donations Programme in 2016-2017.

As one of the leading corporate providers of social development and welfare services in some of the most remote swathes of the country, PPL has received Pakistan Corporate Philanthropy Award for 14 consecutive years from 2004 to 2017.

Having an oil producing field namely Adhi field in Punjab, lying at the border of district Rawalpindi and district Chakwal with major parts of the area in a tehsil Gujjar Khan which has been operational since 1980s while exploration is made in the provinces particularly in blocks/ areas/ allocated/ awarded to the company from time to time. Therefore, it is highly difficult to cater all the CSR/social welfare activities carried out in the province of Punjab. Few of the notable activities being observed are mentioned below:

PPL's Corporate Social Responsibility projects in Punjab
Completed Schemes with reference to Dhok Sultan block at tehsil Jand, District Attock
– Constructed and furnished with furniture academic block at Govt. Boys High School, Chhab. – Constructed and furnished with furniture academic block at Govt. Boys High School, Kani. – Constructed academic block at Govt. Girls High School, Jhammat – Provided School furniture to 08 Govt. Schools for 300 students at UC Dakhnair. Provided School bags to 08 Govt. Schools to some 800 students at UC Dakhnair.
Social Welfare at Adhi Field, Tehsil Gujjar Khan
Health: – Holding surgical eye camps annually nearby Adhi Field at BHU Dhong, RHC Daultala & RHC Pir Phullai (District Chakwal) – Constructed, furnished and operating medical dispensary at village Mastala. – Rehabilitation of BHU Dhong and BHU Sukku – Rehabilitation of Tehsil Head-Quarter Hospital, Gujjar Khan **Education:** – Construction of Educational Facilities and Provision of Furniture Near Adhi Field – Provided School furniture of approximately 6000 students to Govt. Schools of the area. – Provided 32 no. scholarships to local students for studying at high professional education during last 10 years.

- Construction of Examination Hall at Govt. Boys High School - Dhong, Govt. Kazmia High School - Chechi Noor, Govt. Boys High School - Naban Janjua and Govt. Boys High School - Nirali.
- Construction of academic block of 03 class rooms, boundary wall and toilet at Govt. Girls Primary School, Chechi Noor.
- Construction of academic block of 02 class rooms at Govt. Boys Middle School, Usman Zada Adra
- Constructed academic block consisting of 3 Classrooms at Govt. Boys Elementary School, Kanyal Bijrana.
- Constructed academic block of 2 Classrooms at Govt. Girls Elementary School, Rayian Gorcian.
- Constructed academic block consisting of 2 Classrooms at Govt. Boys Primary School, Kak.
- Constructed academic block consisting of 2 Classrooms at Govt. Girls Elementary School, Nata Gujjar Mall.
- Constructed Academic block consisting of 2 Classrooms at Govt. Girls Primary School, Chechi Noor.
- Constructed Computer Hall at Govt. Boys Elementary School, Langah (District Chakwal)
- Constructed academic block consisting of 2 classrooms at Govt. Girls Primary School, Dhongi Kalan.
- Constructed Science Laboratory at Govt. Girls High School, Miana Mohra.
- Constructed academic block consisting of 4 Classrooms at Govt. Girls Elementary School, Mastala.
- Construction of academic block consisting of 5 classrooms at Govt. Boys Primary School, Mastala .
- Constructed academic block Govt. Boys Primary School, Dhok Kyal.
- Construction of multi-purpose hall at Govt. Boys High School, Mohra Noori .
- Constructed academic block consisting of 2 classrooms at Govt. Girls Elementary School, Dhumali.
- Constructed academic block consisting of 2 classrooms at Govt. Boys Elementary School, Adhi.
- Constructed academic block consisting of 2 classrooms at Govt. Girls Elementary School, Takra Mohra.
- Construction of academic block consisting of 5 classrooms at Govt. Girls High School, Dhong.
- Construction of academic block consisting of 5 classrooms at Govt. Girls High School, Miana Mohra.
- Construction of academic block consisting of 2 classrooms at Govt. Boys High School, Naban Janjua.
- Constructed Computer laboratory at Govt. Girls High School, Dhong.
- Construction of sanitary facilities / toilet blocks in over 30 Govt. Schools during last 10 years.
- Constructed one classroom at over 20 no. Government Schools.
- Provided and fixed electric water coolers at 18 Government Schools.

Infra-structure Development:

- Re-conditioning of PCC road from Walk Gas to PPL Dispensary at Mastala
- Constructed 5 km black-top road from village Mastala to Naban Saeeda.
- Constructed road at village Thakra.
- Constrcted PCC road from Adhi to village Mastala.
- Constructed causeway and 3 culverts at village Dhong.
- Contributed financial support for construction of Daultala road from Mandra-Chakwal road to Takra Mohra morr

Livelihood generation:

- Operating Women Vocational Training Centre at Mastala since 2013.
- Constructed computer workshop and lavatory block, Technical Training Centre, Daultala.

Completed Schemes with reference to Dera Ismail Khan Block

- Provided gyne, pediatric, dental, emergency, surgical equipment & instrument at Tehsil Head-quarter Hospital, Karor Lalessan, District Layyah

Completed Schemes with reference to Karsal block

- Repaired, renovated and improvement works at BHU Karsal.
- Repaired, renovated and improvement works at BHU Roopwal.
- Provided school furniture for over 400 students at Govt. Boys High School, Karsal and Govt. Girls High School, Karsal.
- Constructed clasroom at Govt. Boys Primary School, Dhok Walana.
- Constructed clasroom at Govt. Girls Primary School, Dhok Sultan.
- Completed electrification of Govt. Boys High School, Karsal.
- Provided electric water coolers at Govt. Girls Primary School, Dheri Anwal.

Completed Schemes with reference to Hisal Block

- Construction of academic block consisting of 2 classrooms, toilet block and water bore at Govt. Primary Model School, Dhok Gujri
- Constructed street from Chakri byepass Ansaf chowk towards Chakri, UC Chakri
- Constructed streets with drain at village Dheri morr.
- Constructed street with drain at village Mohra
- Constructed 04 no. streets with drain at village Greela Kalan.
- Constructed 06 streets with drain at village Khilri., UC Kolian Hameed.
- Constructed 06 streets with drain at village Churah, UC Kolian Hameed.
- Constructed 04 no. streets with drain at village Dandi Gujran, UC Chakri.
- Constructed streets with drain at village Dehdar, UC Kolian Hameed.

– Constructed 0.5 km bye pass road with drain at village Parial, UC Parial.

PPL being a responsible corporate citizen tries to proactively work for development of project areas, betterment of communities and worthy social causes of the society to help improve lives of people, operational areas and country.

Quality, Health, Safety and Environment[5]

Pakistan Petroleum Limited (PPL) strives to maintain international standards and best industry practices to ensure consistency in provision of safe energy from indigenous sources. The company recognizes that operational safety and health for staff and contractors, maintaining quality of processes and outputs and constricting the ecological footprint of operations promotes excellence and corporate responsibility.

Quality, Health, Safety and Environment (QHSE) function was established to provide integrated support for assurance and control of technical and administrative operations, works performance and asset integrity besides, inculcating safety awareness and adopting best operational practices in strict compliance with statutory Health, Safety and Environment standards.

For consistency in implementation of standard QHSE practices, staff capacity building sessions on emergency response, asset integrity and process safety are regularly held. Moreover, safety guidelines are provided to staff, contractors and guests visiting fields and office locations. QHSE practices and tools are integrated into the management and operational processes, including SAP audit management and quality modules, to obtain tangible benefits through efficient monitoring. On the conservation front, reporting to relevant provincial environmental protection agencies or EPAs is carried out through the Self-Monitoring and Reporting Tool for compliance with the National Environmental Quality Standards. Initial Environment Examination and Environment Impact Assessment studies are mandatory prior to initiating new projects/ development work.

As a result, 13 assets and departments are certified for ISO 14001 Environmental Management System (EMS) and 17 for ISO 9001 Quality Management System (QMS) and 14 for ISO 45001 Occupational Health & Safety Management System (OHSMS).

In order to sustain and update compliance, all certified facilities and departments undergo regular internal and external surveillance audits, following which corrective measures are implemented, if required.

[5] https://www.ppl.com.pk/content/health-safety-environment-overview

Employees from various technical departments are qualified lead auditors for ISO 9001 QMS, ISO 14001 EMS and ISO 45001 OHSMS to assist in executing audits.

In recognition of its efforts to ensure operational health, safety and environmental conservation, PPL has received the Employers' Federation of Pakistan's prestigious Occupational Safety, Health and Environment Best Practices Awards in 2012 and 2014.

1.9 Methodology required for an Environmental Impact Assessment (EIA)

Various steps were undertaken in order to conduct, prepare and present this EIA report. Brief details of those steps are given below while their description is documented in the subsequent sections of this report.

1.9.1 Understanding of the Proposed Project

This step required collection of information from PPL for the proposed project and understanding the activities to identify potential impacts.

1.9.2 Review of National Legislation and Guidelines

National legislation, international agreements, environmental guidelines and best industry practices were reviewed to set environmental standards.

1.9.3 Collection of Secondary Data

Available published and unpublished information pertaining to physical, biological and socio-economic micro & macro environment was obtained and reviewed. It includes previous environmental studies and baselines conducted for seismic activities in Punjab.

1.9.4 Collection of Field Data

This study is based on the findings of the visits by the team. Team members visited the location and its neighborhood in the month of October 2022 to perform reconnaissance survey and to gather primary baseline data with reference to environmental (physical & biological) and social aspects. Discussions were also help with the members of the community residing in the area to collect area-specific primary information along with their views and concerns regarding the project and its activities

	
Consultation with With EPA (Rajanpur)	Consultation With TMA (Rajanpur)
	
Surface Water Sampling 28°30'13.4"N 69°41'20.1"E	Surface Water Sampling 28°35'14.31"N, 69°35'5.23"E
	
Amibient Air Quality Location-1 28°38'26.5"N 69°32'59.6"E	Ambient Air Quality Location - 2 28°36'48.8"N 69°31'33.6"E

Figure 2: Field survey and monitoring pictures

1.9.5 Baseline Studies

The environmental profile of the project area was established through secondary data as well as primary data (field surveys). The information was collected and compiled on environmentally important areas (Ambient Air Quality, Surface and Groundwater Resources, Existing and Proposed Roads, Local Communities, Agriculture, Public Services, and Sites of Archeological or Cultural Importance).

1.9.6 Impact Identification and Evaluation

Potential impacts which may arise from project related activities were identified. These include effects on physical, biological, socio-economic, archaeological and cultural environment. Impacts were identified and assessed on the basis of field data, secondary data, expert opinions and monitoring results of previous oil and gas exploration projects in Pakistan.

1.9.7 Recommendations to Mitigate Impacts

Keeping in view the baseline data collected and impacts identified; mitigation measures have been recommended to eliminate, minimize or compensate for the potential environmental and social impacts on the zone of influence of the project. Mitigation measures recommended here are based on past experience, best industrial practices, legislative requirements and professional judgments.

1.9.8 Environmental Management Plan (EMP)

Environmental Management Plan (EMP) is formulated for an effective and efficient implementation of the endorsed mitigation measures. EMP includes controls to lessen the identified impacts, and monitoring programs of residual impacts, if found any, during the operations. The EMP has been laid down with the procedures to be followed during the seismic activities and has catered all the identified roles and responsibilities for all concerned personnel.

1.9.9 Documentation, Review and Conclusion

Documentation, Review and Conclusion are the final steps to complete the Environmental Impact Assessment (EIA) study and compiles all work done in shape of this report. At the end of the study, the report is reviewed and then the conclusions and recommendations are framed in the light of the findings.

Structure of the EIA Report

The EIA report has been designed on the standardized format. The Report has been divided in the following sections:

Section 1: Delivers an introduction and overview of the Project and EIA process;

Section 2: Describes the proposed project i.e., the overall description of the project and its associated activities in detail;

Section 3: Highlighting the national & international policies and legislation along with guidelines relevant to the project;

Section 4: Provides description of the microenvironment and macro-environment of the targeted project area; explaining its biological, physical environment along with the socio-economic conditions of an area;

Section 5: Provides details of the consultations and feedbacks received from the stakeholders;

Section 6: It includes screening of potential environmental and socioeconomic impacts arising from the proposed project site and incorporates mitigation measures. General and project specific guidelines are used to assess the potential environmental impacts at various phases of the project;

Section 7: Presents a comprehensive Environmental Management Plan (EMP) and Monitoring Program for the project;

Section 8: Summarizes the report and presents its conclusions and deliverables.

The main text of the report is supported by a series of Annexures which provide added information including respective sections of prominent National and Provincial laws.

1.9.10 EIA Study Team

This EIA report has been prepared by the team of EMC Pakistan (Pvt.) Limited which includes of the following members as mentioned in Table 1.

Table 4: Members of EIA Study Team of EMC Pakistan (Pvt.) Limited

Sr. #	Name of Experts	Position in EIA Study Team
1.	Mr. Syed Nadeem Arif	Project Manager
2.	Mr. Ahmed Zohair Siddiqui	Environmental Engineer & Team Leader
3.	Mr. Sadam Hussain	Environmental Specialist
4.	Mr. Imran Khan	Environmentalist
5.	Mr. Nisar Khan	Environmentalist
6.	Mr. Khurram Shams	Sociologist
7.	Mr. M. Rizwan	HSE Advisor
8.	Mr. Zain Rafi	CAD/Graphics Designer

SECTION 2: DESCRIPTION OF PROJECT

2.1 The Project

This document presents the findings of an Environmental Impact Assessment (EIA) carried out by EMC Pakistan (Pvt.) Limited for the project "Seismic Survey in Sui North Block, District Rajanpur of Punjab Province", proposed by Pakistan Petroleum Limited (PPL). The proposed project includes 2D Seismic Surveys to acquire seismic data for the Exploration of Hydrocarbon in Sui North Block. The block lies in two districts i.e., Major part of the block lies in District Dera Bugti of Balochistan province however, remaining southeastern portion of the block lies in district Rajanpur of Punjab. The Proposed 2D seismic survey will be carried out in district Rajanpur of Punjab.

2.2 Project Location

The Sui North Block covers an area of approximately 812 sq. km. out which approx. 145 sq. km. falls in the district Rajanpur of Punjab province and 667 sq. km. falls in the district Dera Bugti of Balochistan province.

The Sui North Block, Rajanpur section is situated at the north-western of district Rajanpur near the provincial boundary of Balochistan and Sindh which is sedimentary rocks terrain with loose sediments therefore there is no nearby villages to the block.

The Sui North Block is at a distance of approximately 20 km from the River Indus. Indus River flows roughly along the eastern border of the block from north to south, the Indus Highway (N55) is at the distance of approximately 15 km in the eastern boundary of the block.

Tentative location coordinates for proposed 2D seismic lines are given below in Table-3 while project location map of Sui North Block is given as Figure-3.

Table 5: Tentative Location Coordinates of 2D Seismic Lines

COORDINATE SYSTEM: UTM42N/ WGS1984					
S. No	**Line No.**		**Coordinates**		**Length (km)**
			Latitude	Longitude	
1	PPL22-SuiN-06	Start	28°35'34.52"N	69°31'33.94"E	14.2
		End	28°43'15.82"N	69°31'32.95"E	
2	PPL22-SuiN-07	Start	28°37'39.64"N	69°34'43.90"E	12.8
		End	28°40'50.92"N	69°27'46.64"E	
Total					**27.0 Line.km**

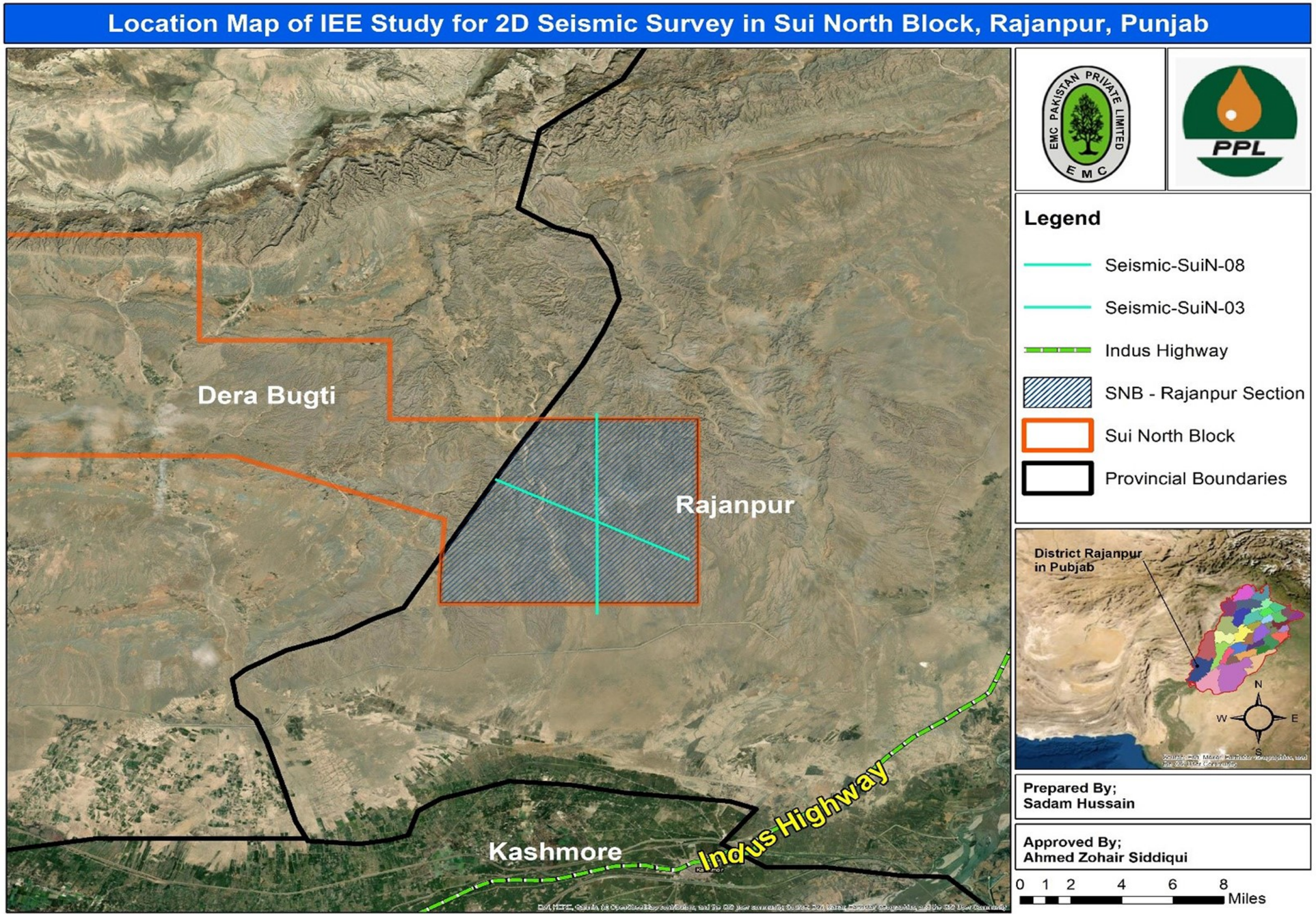


Figure 3: Location Map of the Proposed 2D Seismic Survey in Sui North Block, District Rajanpur

2.3 Objective of the project

Pakistan Petroleum Limited aims to Exploration of new hydrocarbon reserves through seismic surveys on the basis of promising geological features.

Above mentioned objective will help increase the prospects of finding new hydrocarbon resources.

2.4 Scope of Work

The project involves activities associated with seismic surveys for oil & gas exploration programs in the Sui North Block. The Project involves activities associated with 2D seismic surveys of approx. 27-line km which will be carried out in Sui North Block as presented in Figure 3 above. 2D seismic coverage may increase or decrease due to technical requirements based on processing results.

Seismic Survey

- Temporary Land acquisition (on rent)
- Construction of access track
- Development of campsites (Base Camp and Fly Camps (if required))
- Mobilization
- 2D Seismic Surveying
- Restoration and rehabilitation

2.5 Seismic Survey

During the seismic survey, information about subsurface geology is gathered by directing seismic (sound) energy into the ground and recording the time taken by it to reflect off the subsurface rock layers. The reflected energy is recorded using geophones or motion detectors (sensitive microphones), which receives sound signals generated either by a controlled impulsive source such as seismic explosive or by vehicle mounted vibrator trucks.

Seismic surveys can be conducted using a number of methods, including deep holes, shallow holes (also referred to as the pop shot methods) or using vibroseis. Factors that influence the selection of a particular method include land type, economics and environmental concerns. Dynamite technology will be used as a source of energy at places where less clearing of agricultural lands is required and in hilly / mountainous terrain.

2.5.1 Schedule of Implementation

Seismic survey will be carried out using dynamite or Vibroseis depend upon land type. A single base camp with accompanying fly camps (if required) may be established in Punjab Province to house the seismic crew. Area of campsite (Base Camp) will be about 200m x 200m.

The 2D seismic surveys are expected to take about 2 months. The tentative duration of key activities is provided below;

- Mobilization (if base camp is established): 15 days
- Seismic Survey: 45 - 60 days

2.5.2 Seismic Survey procedure

Various activities are involved in a typical seismic survey which is discussed as under:

i. Land Permitting

A seismic contractor's team will reach at site with crew's advance / first party. The team's early arrival will facilitate activities such as liaising with local landowners and authorities to inform them of operation and make necessary arrangements. The permitting team will identify the ownership of the land areas over which the seismic operation will be undertaken, and work out issues such as access roads, crop damage and compensation rates.

ii. Access and Transport

Access to seismic lines will be through existing tracks where possible. As four or six -wheel drive vehicles will be used during project activities, these tracks can be used without or minimal improvement. New tracks have to be prepared in areas where there is no existing access, however, the preparation of new tracks will be minimized as much as possible.

iii. Mobilization and Camp Establishment

Once the access track to approach the camp location is complete, mobilization and camp establishment activities will begin. Camps will be located and constructed such that minimum clearing of vegetation or land is involved. Campsite will include accommodation area including tents and portable cabins; staff's kitchens and mess; laundry area; toilets; workshops; vehicle parking area; equipment storage areas; fuel and oil storage area; generator area, septic tanks and soak pits and a waste storage / garbage pit. Camps will be fenced for security reasons. It will take around 30 days to complete camp establishment. The rest of the seismic crew will be mobilized once the camp is fully operational. Survey work will start only after satisfactory set up of the base camp. Water will be required during the operation for domestic and seismic survey activities.

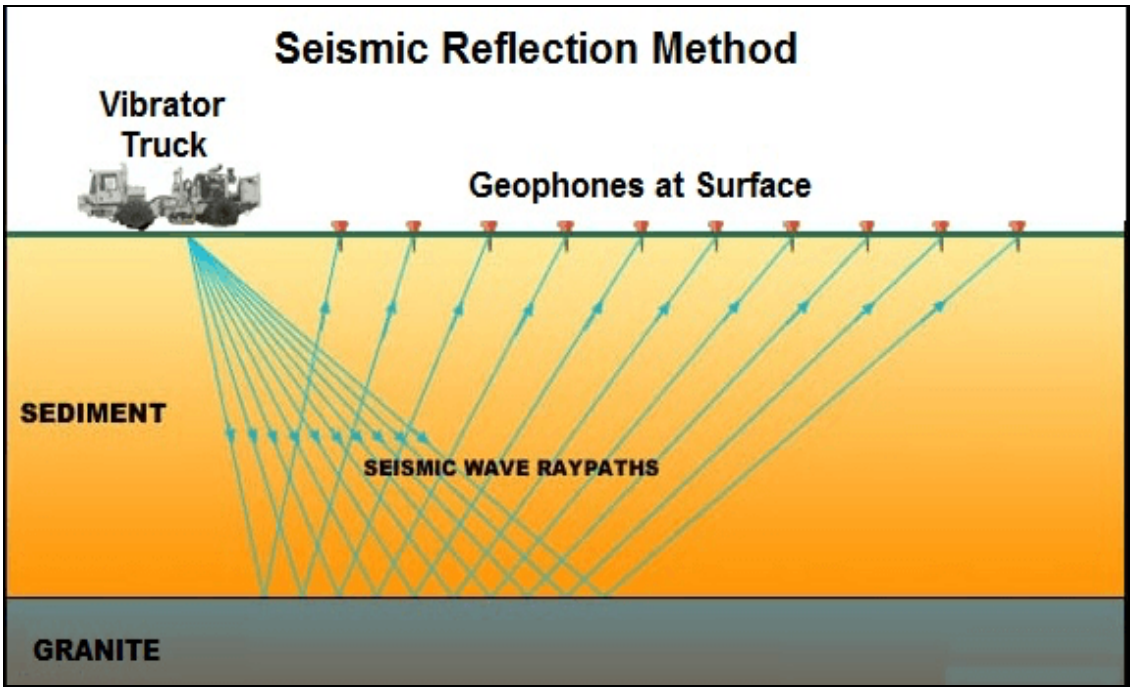
iv. Line Survey and Preparation

In this activity, the seismic lines will be marked on the ground by survey teams, each team comprising of 4 to 5 people. The survey teams will use a global positioning system (GPS) to mark shot points on the seismic lines at around every 50-meter interval with whitewashed stones or wooden peg.

Clearing of trees and dense patches of vegetation will be avoided. The material that is removed will be pushed to either side of the line creating low windrows along the length of the line.

v. Data Acquisition – Vibroseis

This technique will make use of vibrators as an energy source. The vibrator consists of a heavy mass (up to 50 tons) attached to a steel plate mounted on a truck. The truck will lower the steel plate to rest on the ground while suspending the body of the truck in air by means of hydraulic jacks. The steel plate will be made to vibrate for few seconds at each point, creating energy waves that will travel downwards into the earth's surface. The reflected waves will be received on the ground by cables and geophones laid along the seismic line. A series of 4 vibrators will follow each other along the line. All 4 vibrators will stop at a point called vibroseis point, and produce energy waves in the manner described above. With this technique approximately 3-5 kilometer of line can be recorded each day.





Vibroseis Truck



Seismic Recording Truck



Data Centre



Geophone

vi. Data Acquisition – Dynamite

Dynamite is the mostly used seismic source on land. It is labour intensive for making shot holes. Dynamite is a chemical compound which burns extremely fast when ignited.

vii. Explosives Storage

A bulk stock of dynamite will be transported to the project area. It will be stored in dynamite & detonators storage area located at a safe distance from communities and the seismic camps. Explosives will be stored in an excavated pit and covered with tarpaulins. Area will be fenced and guarded for security reasons.

viii. Cabling

Geophones (sensitive motion detectors or microphones) buried just below the ground are used to record the seismic waves generated by the vibroseis or the explosion. A cable is laid to join all geophones to the purpose-built recording truck that houses the main electronic hardware used for recording data. Approximately 70–80 labourers will be employed for lying and retrieving of cables.

ix. Equipment

The equipment used during a typical seismic survey program is as follows:

a) Land Survey

- GPS receivers
- Survey data processing system

b) Energy Source

- Dynamite with detonator

c) Recording

- Recording truck
- Cable station units

- Cables
- Geophones strings

d) Up-hole Equipment

- Up-hole rig / truck
- Water truck
- Portable recording system
- Manual energy source
- Downhole detectors.

x. Restoration and Rehabilitation

After work is completed in an area, a 'green team' for restoration and rehabilitation is mobilized to ensure that affected areas are left in a condition that is as close to the original state as possible. The team will inspect all holes and pits to make sure they are backfilled and that no debris or trash is left behind.

Restoration of seismic lines will include demobilization of all equipment and machinery, removal of all cables, geophones, station units, flags, stakes and wastes from the lines and back filling of all mud pits. For reference purposes a photographic record of selected sections of seismic lines could be taken before and after the operation.

2.6 Staffing & Supplies

Table 6: Summary of expected average resources usage during seismic activities[6]

Parameter	Rate
Utility water	25,000 ~ 30,000 liters per day
Drinking water	~ 1,000 liters per day
Fuel	3,000-3,500 liters per day (Diesel for vehicle and power generation)

For seismic survey a workforce of around 300 will be required. General supplies transported will include camp (food, etc.), fuels, oils and chemicals, and equipment maintenance parts. Water supplies will be outsourced / procured from locals / owner of tube wells and transportation will be done through bowsers. Proper and justified compensation will be paid to the owners of water well/ source for water utilized.

2.7 Road Access

The proposed project seismic survey is in Sui North Block which is at a distance of approximately 10 km in the south-east from the block boundaries to Indus Highway (N55) from where dirt road can be used to reach the project site. The

[6] as in Seismic Operation in Hisal Block

Figure 4 & 5 is showing the project access route map and road conditions respectively.

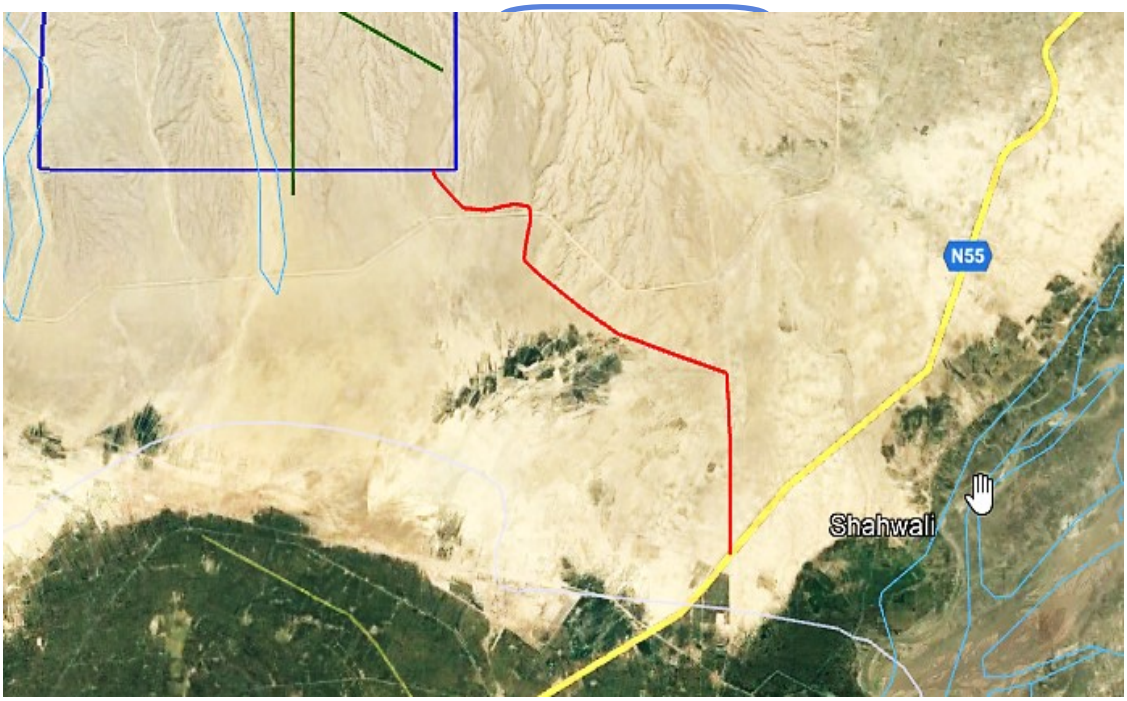


Figure 4: Road access map of the Seismic Survey in Sui North Block (Rajanpur)



Figure 5: Dirt access track to the project site in Sui North Block (Rajanpur)

2.8 Vegetation feature of the site

The Sui North Block, Rajanpur section is situated at the north-western of district Rajanpur near the provincial boundary of Balochistan and Sindh which is arid

area with only sedimentary rock terrain therefore there is no land clearing or vegetation cutting required. The proposed seismic survey activities will be carried out within the acquired land. No impact to the forest is anticipated.



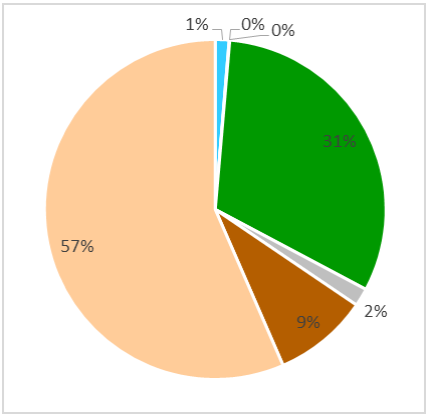
Figure 6: Vegetation Status of Project Area

2.9 Land Use of the project area

The land around the proposed seismic survey is hilly terrain and land type is barren with only sedimentary rocks. The vegetation is sparse due to warm weather, scarcity of rain and barren land conditions. The agricultural activity in the project area is not carried out due to no availability of water only dry stream founds. Figure 7 shows the project land classification with area and percentage. Figure 8 shows the land use land classification map of district Rajanpur which clearly indicates that major portion of proposed project area falls in the rangelands and a small portion falls in the bare grounds terrain.

Figure 7: Land Classification of District Rajanpur with Area & Percentage

Distribution of Land Cover in District			Land Cover in Percentage
LULC Type	**Area_km²**	**Area_%**	
Water	325.31	1.30	
Trees	14.68	0.06	
Flooded Vegetation	0.15	0.01	
Crops	7873.42	31.43	
Built Area	428.45	1.71	
Bare Grounds	2251.53	8.99	
Rangelands	14153.19	56.51	
Total Area (km²)		25046.714	



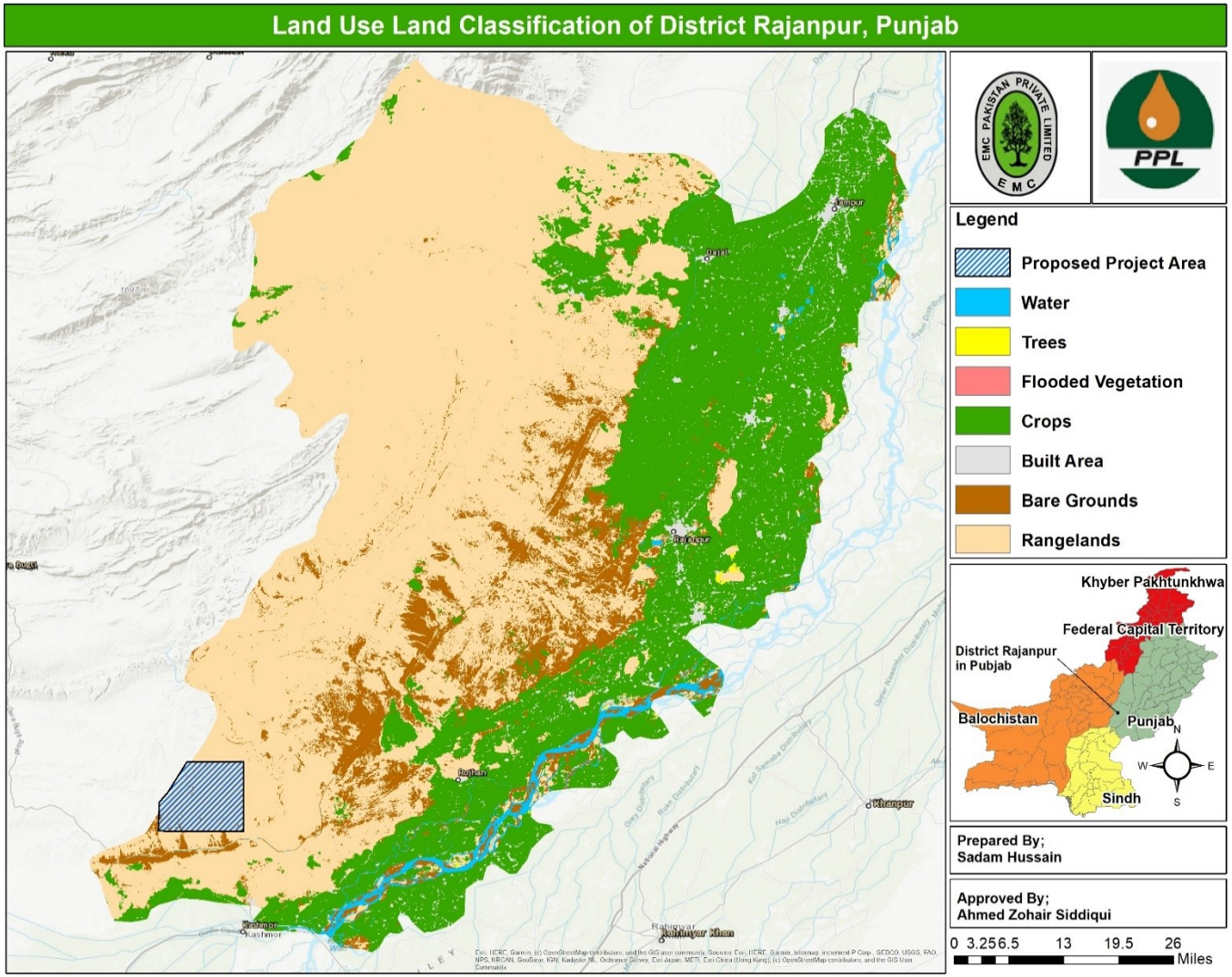


Figure 8: Land Use Land Classification Map of District Rajanpur

2.10 Site Suitability

Sui North Block has been granted to PPL for Oil and Gas Exploration by Government of Pakistan. The block lies in two districts i.e. Major part of the block lies in district Dera Bugti of Balochistan province however, remaining southeastern portion of the block lies in district Rajanpur of Punjab. The total area of Sui North Block is approximately 812 sq. km. out which approx. 145 sq. km. falls in the district Rajanpur of Punjab province and 667 sq. km. falls in the District Dera Bugti of Balochistan province. The Proposed 2D seismic survey will be carried out in district Rajanpur of Punjab.

The Sui North Block, Rajanpur section is situated at the north-western of district Rajanpur near the provincial boundary of Balochistan and Sindh, which is arid area with only sedimentary rocks terrain therefore there is no nearby villages to the block in radius of 5km. The sui north block is at a distance of 20 km from Indus River. Furthermore, there are no ecologically sensitive are located within the proposed project area.

2.11 Cost and Magnitude of the project

The magnitude of the project includes 2D seismic survey in the Sui North Block, Rajanpur section. Estimated cost of the project activity is 1 Million USD (expected).

2.12 Government approvals

The Petroleum Concession Agreement for Sui North Block between the President of Islamic Republic of Pakistan & Pakistan Petroleum Limited is attached as annexure – IV.

SECTION 3: POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 Introduction

The success of development projects also depends upon the ability of regulatory institutions to effectively manage their environmental and social issues. Sustainable development is a concept that has emerged over the past three decades to explain a new framework intended at economic and social development whilst maintaining the long-term integrity of the ecological and social system. The philosophy of sustainable development is in the course of being included into national policies and legislation in Pakistan through various statutory instruments.

Before initiation of any project, the mandatory legislations enacted by government and other regulatory agencies need to be studied. Different governments from time to time have enacted several environmental rules, regulations, laws and guidelines specifying different requirements for a diverse kind of projects. Therefore, it would be necessary to study the environmental laws pertaining to different projects before its execution so that protection of environment can be ensured.

In this section, same methodology would be followed by studying those rules, regulations and laws as well as the institutional set-up that are relevant to the environmental and social aspects of the "2D Seismic Survey Activities in Sui North Block, District Rajanpur, Punjab". The assessment has been carried out to comply with local, international as well as PPL's health and safety guidelines. The main among these are:

- Environmental Health and Safety Policy of PPL.
- National Environmental Laws & Legislations;
- Provincial Environmental Laws & Legislations;
- Environmental and Social Guidelines;
- International Treaties and Conventions;
- Institutional Setup for Environmental Management;
    - PPL's is commitment to the total integration of health, safety and social responsibility to environmental excellence in all aspects of its operations to:
- Protect the environment, preserve sustainable development;

- Implement all operations for disposal of all materials (hazardous and non-hazardous) safely and without causing any health, environment and safety threat;
- Adopt appropriate industry and corporate standards where adequate laws or regulations do not exist;
- Stop any operation if the health, environment or safety is at risk; and
- Attain high level of preparedness to manage emergency situation.

3.2 PPL's Policy and Commitment to Quality, Health, Safety and Environment[7]

Pakistan Petroleum Limited (PPL) is a frontline oil and gas exploration and production company in the country. At PPL, management is committed to maintaining and continually improving Quality, Health, Safety and Environment (QHSE) standards in all spheres of our business activities.

We firmly believe that implementation of QHSE Management System augment continual improvement in all business processes and add value to external stakeholders.

Function, Asset and Department Heads are accountable to ensure QHSE and legal compliance in their respective areas of responsibility and demonstrate pivotal leadership role in promoting QHSE culture within the organization. Whereas, all employees and contractor's staff are responsible to implement QHSE requirements in their own benefit as well as of colleagues, contractors, visitors and community.

To carry out this Policy, PPL shall:

- Define SMART QHSE objectives and targets aligned with organizational goals and monitor performance for continual improvement.
- Conduct risk assessments, incident reporting & investigations and occupational health surveillance to identify preventive measures and capture improvement opportunities.
- Fulfill its QHSE legal and other compliance obligations.
- Reward and recognize QHSE proactive efforts and initiatives of individuals.
- Protect environment and ensure minimum environmental footprint of its business activities.
- Ensure that seat belt is fastened on all seats of vehicle by employees, contractors, and visitors.

[7] PPL QHSE Policy, Oct 2022

- Permit smoking in designated areas only at PPL Fields and Locations.
- Continually improve QHSE standards by adopting new techniques, approaches and best industry practices addressing various business processes.

Working safely is a condition of employment at PPL.

3.3 National Legislations and Guidelines

3.3.1 National Conservation Strategy

The National Conservation Strategy (NCS) is the primary policy document of the Government of Pakistan (GoP) on national environmental issues. The policy was approved by the Federal Cabinet in March 1992. The Strategy also attained recognition by the international donor agencies, principally the World Bank. The NCS identifies 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage and recommends immediate attention to these core areas in order to preserve the country's environment.

A mid-term review of the achievement of the NCS in 2000 concluded that achievements under the NCS have been primarily awareness raising and institutional building rather than actual improvement to environment and natural resources and that the NCS was not designed and is not adequately focused as a national sustainable strategy (GoP, November 2000). The need therefore arose for a more focused National Environmental Action Plan (NEAP) required to bring about actual improvements in the state of the national environment with greater emphasis on poverty reduction and economic development in addition to environmental sustainability.

The National Environmental Action Plan was approved by the Pakistan Environmental Protection Council under the chairmanship of the President / Chief Executive of Pakistan in February 2001. NEAP also constitutes the national environmental agenda and its core objective is to initiate actions that safeguard public health, promote sustainable livelihoods, and enhance the quality of life of the people of Pakistan.

The Government of Pakistan and United National Development Program (UNDP) have jointly initiated an umbrella support program called the National Environmental Action Plan-Support Program signed in October 2001 and implemented in 2002. The development objective supported by NEAP-SP is environmental sustainability and poverty reduction in the context of economic growth. The objective of new policy has total 171 guidelines on sectorial and cross sectorial issues. The objectives of new policy include assurance of

sustainable development and safeguard of natural wealth of country. The following are the approved Sectoral Guidelines:

- Water Supply and Management.
- Air Quality and Noise.
- Waste Management.
- Forestry.
- Biodiversity and Protected Areas.
- Climate Change and Ozone Depletion.
- Energy Efficiency and Renewable.
- Agriculture and Livestock.
- Multilateral Environmental Agreements.

3.3.2 Hazardous Substances Rules, 2003[8]

These Rules were notified in 2003 to stream line procedures for issuance of licenses to industries/ businesses that generate hazardous substance / waste and device them methods for the removal of hazardous wastes in an environmental friendly manner. The rules also specify procedures to be adopted for disposal of hazardous waste and identify two hundred and forty-two hazardous substances and synthetic chemicals.

3.3.3 Self- Monitoring & Reporting Rules, 2001[9]

Pakistan Environmental Protection Council constituted an Environmental Standards Committee in 1996 to devise realistic modalities for NEQS enforcement and simplified monitoring procedures with the consultation of representatives of industrial interest groups, non-governmental organizations (NGOs) and other stakeholders. Their efforts succeeded in the bringing up of "Self-Monitoring and Reporting System for Industry" in 2001. As per the rules set by this system, industries have to monitor effluents and emissions in compliance with the NEQS and report it to provincial or federal EPAs. This system classifies industry into three categories A, B and C each corresponding to a specified reporting frequency.

3.3.4 Pakistan Penal Code, 1860[10]

Section XIV of PPC deals with the offences affecting the public health, safety, convenience, decency and morals. Person may be guilty of public nuisance if his act or omission causes common injury, danger or annoyance to the public or results in spread of infection of diseases dangerous to life. The section also deals with environmental pollution.

[8] *Hazardous Substances Rules, 2003, faolex.fao.org/docs/pdf/pak64438.pdf*
[9] *National Environmental Quality Standards (Self-Monitoring and Reporting by Industries) Rule, 2001*
[10] *Pakistan Penal Code (XLV of1860)6th October 1860*

Provisions under this Act relating to environment are no longer being enforced after promulgation of the Pakistan Environmental Protection Act, 1997. However, pollution offences can still be tried under the Pakistan Penal Code, 1860.

3.3.5 Antiquities Act, 1975[11]

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

The proponent will ensure safety of the archeological sites that lie within or immediately neighboring the project site and will also immediately stop and report the concerned department if during the excavation process any such discovery is made in future.

3.3.6 Land Acquisition Act, 1894[12]

The Land Acquisition Act (LAA) of 1894 amended from time to time has been de facto policy governing land acquisition, resettlement and compensation in the country. The LAA is the most commonly used law for acquisition of land and other properties of development projects. It comprises of 55 sections pertaining to areas notifications and surveys, acquisition, compensation and apportionment awards and disputes resolution, penalties and exemptions.

3.3.7 The Cutting of Trees (Prohibition) Act, 1992[13]

The Cutting of trees (prohibition) Act, 1992 mandates that no person shall, without prior written approval from authorized officer shall cut, fell or damage trees growing in:

- First Zone (Area adjacent to and beyond the external frontier of Pakistan to a line at four kilometers measured from the external frontiers of Pakistan) if the number of remaining trees in any field falls short of the number to be calculated at the rate of fifteen trees per acre; and
- Second Zone (Area adjacent to and beyond the first zone extending towards Pakistan to a line at four kilometers measured from the first zone) if the number of remaining trees in any field falls short of the number to be calculated at the rate off ten trees per acre.

[11] *Act VII of 1976(Gazette of Pakistan, Extraordinary, Part 1, 14th January, 1976*
[12] *The Land Acquisition Act 1894 (Act of 1894)*
[13] *The cutting of Trees (prohibition) Act, 1992, Act No. XVIII of 1992*

This does not apply to a tree growing on land occupied as the site of a town or village or in a dwelling-house.

Section 3: It prohibits any person, without prior approval, from cutting, felling or damaging any tree growing in first and second zones as mentioned above.

Section 4: It imposes penalty of fine which may extend to five thousand rupees for contravention relating to first zone and imposes penalty of fine which may extend to two thousand and five hundred rupees for contravention relating to second zone.

3.3.8 The Canal and Drainage Act, 1873[14]

The Canal and Drainage Act, 1873 prohibits corruption or fouling of water canals (defined to include channels, tube wells, reservoirs and watercourses), or obstruction of drainage.

PPL will accordingly pay due attention to addressing the canal and drainage integrity.

3.3.9 The Biodiversity Action Plan, 2000[15]

The Biodiversity Action Plan, 2000 has been the most significant direct step towards addressing the issue of biodiversity loss. It details the current status & trends and direct & indirect causes of biodiversity; its principles, goals and aims; proposals for action plan including planning & policies, legislation, identification and monitoring, in situ & ex situ conservation, sustainable use, research and training, public education and awareness, Environmental Impact Assessment, information extraction and financial resources etc.

The Wild Birds and Animals Protection Act 1992, the West Pakistan Wildlife Protection Ordinance 1959, the Wildlife Protection Rules 1972, provide for the protection of flora and fauna in the territory, including vegetation and protected forests. This EIA study has addressed all aspects of conservation, including wildlife, and forest.

3.3.10 Mines Act, 1923[16]

This Act relates to the regulation, inspection and occupational health and safety aspects of mines. The above Act has stipulations with respect to working hours, occupational diseases, periodic medical checkups, employment of female and children, employment of medical and welfare officers etc. Various provisions of this Act are discussed as under:

Section 4: A Chief Inspector (CI) and inspectors of mines are appointed.

[14] *The Canal and Drainage Act, 1873*
[15] *The Biodiversity Action Plan, 2000, www.iucn.pk*
[16] *Mines Act, 1923, (IV of 1923)*

Section 6: The Chief Inspector and Inspectors of mines have powers to enforce this Act and they may enter, inspect and examine any mine for ventilation, bye-laws, safety (health & welfare of staff) and may take any material and substance for analyses.

Section 12: Mining Board shall have powers of Civil Court for the purpose of deciding or reporting any matter referred to it.

Section 14, 15 & 16: Related to management of mining operations and fixes duties and responsibilities of managers, owners and agents of mines.

Section 17 to 22: Related to provisions of health and safety. These provisions require conservancy, canteens, shelters, medical appliances, first aid rooms etc. CI or Inspectors may give notice to mines if they find that any matter, thing or practice in or connected with mine is dangerous to human life, health or safety etc. and need to be remedied. Mine management is required to report any accident, loss of life or influx of inflammable or noxious gases etc. to appropriate authorities.

Section 22 (A&B): Limits the time of work for any person in a mine to a maximum of six days a week and not more than forty-eight hours in any week and not more than eight hours in a day.

Section 23-C: Bans the appointment of woman in any part of mine below ground. For above ground work, woman shall not work from 7 pm to 6 am.

Section 26: Prohibits child labor in a mine.

Section 34 to 44: Imposes penalties on any person who violates any of the provisions of this Act such as obstructs work of CI or Inspectors, falsifies records, omits to furnish plans, contravenes provisions regarding employment of labor, notice of accidents or disobeys orders etc. with imprisonment or fine or both.

3.3.11 The Forest Act, 1927[17]

The Act contains procedures for constituting and managing various types of forests, such as reserved forests, village forests and protected forests. The Act empowers the provincial forest departments to declare any forest area as reserved or protected. It also defines the duties of forest related public servants, and prescribes penalties for violation of any provision of the Act.

There are is no forest near the Sui North Block.

[17] *The Forest Act,1927(XVI of 1927)*

3.3.12 The Pakistan Environmental Policy, 2005[18]

The Pakistan Environmental Policy, 2005 provides an overarching framework for addressing the environmental issues facing Pakistan, particularly pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification, natural disasters and climate change. It also gives direction for addressing the cross sectorial issues as well as the underlying causes of environmental degradation and meeting international obligations.

The National Environmental Policy, 2005 while recognizing the goals and objectives of the National Conservation Strategy, National Environmental Action Plan and other existing environment related national policies, strategies and action plans, provide broad guidelines to the Federal Government, Provincial Governments, Federally Administrated Territories and Local Governments for addressing environmental concerns and ensuring effective management for their environmental resources.

The National Environmental Policy, 2005 aims to protect, conserve and restore Pakistan's environment in order to improve the quality of life for the citizens through sustainable development.

3.3.13 National Mineral Policy, 1995[19] and 2013[20]

Realizing the importance of minerals in the development of any country, the Government of Pakistan has formulated National Mineral Policy offering appropriate institutional arrangements, investment friendly regulatory regime and internationally competitive fiscal incentives. The main objectives from expansion of mineral sector activities are expansion of employment opportunities, sustainable development of mineral bearing area, expanded business opportunities, technology transfer and regional infrastructure development etc. Under Constitution, minerals are a provincial subject except oil, gas and nuclear minerals and those occurring in special areas (FATA and NA). Provincial Governments are responsible for development and exploitation of minerals, which fall in their domain. The main sections of National Mineral Policy, 1995 are as mentioned under:

Section 4.3.2: A Mineral Investment Facilitation Authority (MIFA) will be setup in each province headed by Chief Minister and other members such as Minister for Mineral Development, Chief Secretary and Secretary Mineral Development Department etc. MIFA shall ensure regular monitoring and direction of mineral related activities, periodic review of the new regulatory regime and ensure adequate protection of environment etc.

[18] *The Pakistan Environmental Policy, 2005, Govt. of Pakistan, Ministry of Environment*
[19] *National Mineral Policy, 1995*
[20] *National Mineral Policy, 2013*

Section 4.3.3: Each mineral rich province will establish a separate Department of Mineral Development under separate Secretary for development of mineral resources, consideration of applications and grant of license and leases, regulating and monitoring mining operations etc.

Section 4.4: Mineral Investment Facilitation Board (MIFB) headed by Prime Minister and members including Federal Minister for Petroleum & Natural resources, Governor KPK, all CMs etc. for development of mineral resources not only on fiscal policies but also in international contacts with donor agencies and negotiation of mineral agreements.

Other Sections: Section 4.5 refers to Public Sector Mineral Corporations, Section 4.6 refers to Geological Survey of Pakistan (GSP), Section 4.7 refers to Geo-Data Centre of Pakistan (GDCP), Section 4.8.3 mentions about Reconnaissance License (RL), Section 4.8.4 refers to Exploration License (EL), Section 4.8.6 enumerates conditions for Mining Lease (ML), Section 4.8.7 covers environmental issues and protection of environment from mining activities etc.

Major sections of National Mineral Policy, 2013 related to the proposed project are as described below:

Section 1: The main objective of National Mineral Policy, 2013 is to endeavor for increasing the economy, competitiveness, coordination & exploration, development & production of Pakistan's mineral resources and encouraging small scale mining.

Section 3: Mineral Investment Facilitation Authorities (MIFAs) are established at both Federal and Provincial level. A Licensing Division, the Provincial Directorates General of Mines & Minerals, exploration & Coordination Directorates, Exploration Promotion Divisions, the Directorates General of Mines and Minerals (which will provide interface with international investors; identify mineral prospects; compile, evaluate and disseminate geo-data etc.).

Section 4: A Mineral Investment Board (MIB) headed by Prime Minister (with all CMs as members) will be established as a consultative forum to encourage the flow of investments, assist Provincial Governments, recommend on fiscal and taxation policies etc.

Section 5: Geological Survey of Pakistan (GSP) is charged with the responsibility of availability of geological, geophysical and geochemical maps and reliable geo data and research.

Section 6: A Geo-data Centre of Pakistan (GDCP) will perform the functions such as managing and disseminating geo-data; creating a centralized digital map production and distribution facility; training; links with Provincial Departments etc.

Section 7: The Provincial Mineral Concession Rules, 2002 which flowed out of the 1995 National Mineral Policy, were a positive step towards modernizing the existing regulatory regime, providing for mineral titles, development and exploitation of any mineral deposits; eliminating discretionary powers, and ensuring simplicity and transparency; and updating the mining laws to deal with international mining practices in Pakistan such as open pit mining and working practices.

Companies will be expected to ensure that their mining operations are carried out in an environmentally acceptable and safe manner. The holder of a mineral title shall have certain exclusive rights for example the right to enter upon the licensed/leased area and to carry out reconnaissance etc. The Provincial Governments may enter into an agreement (Mineral Agreement) with an investor, with respect to certain matters relating to the carrying out of operations under license/lease. Any question or dispute shall be handled through dispute resolution mechanism. The award of mineral title would be made through a transparent process.

Section 8: Mining activities being carried out in Pakistan are mainly through small scale mining by sole proprietorships, association of persons (partnerships) and in certain cases by private limited liability companies. These would prepare their financial statements in accordance with International Financial Reporting Standards.

Section 9: Rate of royalty for minerals will be determined by respective governments from time to time.

Section 11: Development of Infrastructure in mineral bearing areas would be given due regard.

Section 17: Provincial Inspectorates of Mines will carry out the various functions such as enhancing health and safety, research and development.

Section 19: Miscellaneous Matters such as protection of Foreign Investment and insurance for mining operators.

Section 20: The respective Federal and Provincial Ministries/Departments will take all measures to give full effect to the provisions of this Policy.

3.4 National Legislation on Oil and Gas Exploration and Production

3.4.1 The Petroleum Act, 1934[21]

This Act deals with the import, transport, storage, production, refining and blending of the petroleum products (chapter 1: Control over petroleum). Chapter

[21] *The Petroleum Act, 1934*

3 of this Act tells about the general penalties for the offenses under this Act, reports of accidents with petroleum and inquiries into serious accidents with petroleum. This Act specifies the nature and condition of pipelines in which the petroleum may be transported and the forms and conditions of licensing for the transport and storage of petroleum products.

3.4.2 The Regulation of Mines and Oil-Fields & Mineral Development Act, 1948[22]

This Act is provided to make provisions for certain matters connected with the regulation of mines and oil-fields and mineral development. The appropriate Government[23] shall have power to make rules on different matters relating:

a) To the manner in which and authority to whom application for the grant or renewal of an exploration or prospecting license, a mining lease or other mining concession shall be made, and the prescribing of the fees to be paid on such application.

b) The condition in accordance with which the grant or renewal license, lease or concession may be made or refused; determination of rates of royalties, rents and taxes; the refinement of ores; control of production; fixation of prices and any such matter etc.

The Act also imposes penalties for breach of rule. The appropriate Government shall have power to exempt any mineral or mineral oil or any class or description thereof.

Furthermore, for the exploration, production and developmental measures of oil and gas, there are national policies, agreements, rules and standards which are followed out along with implementation of enforced environmental acts. Some are:

- Petroleum Policy, 2009
- The Pakistan Onshore Petroleum (Exploration and Production) Rules, 2013
- Petroleum Exploration and Production Policy, 2012
- Technical Standards for the Petroleum Industries, Depots for the Storage of Petroleum Products, 2005
- The Oil and Gas (Safety in Drilling and Production) Regulations, 1974
- The Petroleum Products (Development Surcharge) Rules, 1967
- The Pakistan Petroleum (Production) Rules, 1949

[22] *The Regulation of Mines and Oil-Fields and Mineral Development Act, 1948, XXIV OF 1948*
23 This Act defines appropriate Government as Federal Government in case of mines of nuclear substances, oil-fields, and gas fields, and development of such substances, mineral oil and gas, the Central Government and, in relation to the other mines and mineral development, the Provincial Government

3.4.3 The Regulation of Mines and Oilfields and Mineral Development (Government Control) (Amendment) Act, 1976

The Regulations of Mines and Oilfields and Mineral Development (Government Control) Act, 1948 and the Pakistan Petroleum (Production) Rules, 1949 and Pakistan Petroleum (Exploration and Production) Rules, 1986 empowers the Ministry of Petroleum to oversee the petroleum exploration, development and production operations.

3.4.4 The Model Petroleum Concession Agreement, 2013

As for safety, the Model Petroleum Concession Agreement implementing the 1986 Exploration and Production Rules, specifically required observance of the 1974 Safety regulations. The penalties imposed in the 1986 Exploration and Production Rules allow the Director General Petroleum Concession to revoke a license if the rules are not satisfied by the operator. The Mines and Oil Field Act also specifies penalties including imposition of fines and/or imprisonment.

3.4.5 The Pakistan Petroleum (Production) Rules, 2001

In exercise of the powers conferred by section 2 of the Regulation of Mines and Oil fields and Mineral Development (Government Control) Act, 1948 (XXIV of 1948), the Federal Government is pleased to make the following rules, namely: - The Pakistan Petroleum (Exploration and Production) Rules, 2001.

The rules state that Any area of Pakistan, may be divided into blocks of size and shapes the Government may from time to time, by notification in the official Gazette. Any petroleum company whether incorporated in Pakistan or abroad may apply in accordance with these rules for-

a. a reconnaissance permit;

b. an exploration licenses; and

c. a development and production lease.

3.4.6 The Pakistan Petroleum (Exploration and Production) Rules, 2013

In exercise of the powers conferred by section 2 of the Regulation of Mines and Oil fields and Mineral Development (Government Control) Act, 1948 (Amended 1976), the Federal Government Notified the following rules, namely: **The Pakistan Petroleum (Exploration and Production) Rules, 2013.**

The section 58 of the rule states “A holder of petroleum right shall undertake to execute all operations in a proper, prudent and diligent manner, in accordance with good international oilfield practices and shall not unreasonably obstruct or interfere with other activities such as navigation, fisheries and agriculture. All

reasonable precautions shall be taken to prevent pollution or damage to the environment and surroundings.

3.4.7 Petroleum Exploration and Production Policy, 2012

The purpose of this Petroleum Exploration and Production policy 2012 (Policy) is to establish the policies procedures, tax and pricing regime in respect of petroleum exploration and production (E&P) sector.

The principal objectives of this Policy are:

- To accelerate E&P activities in Pakistan with a view to achieve maximum self – sufficiency in energy by increasing oil and gas production.
- To promote direct foreign investment in Pakistan by increasing the competitiveness of its terms of investment in the upstream sector.
- To promote the involvement of Pakistani oil and gas companies in the country's upstream investment opportunities.
- To train the Pakistani professionals in E&P sector to international standards and create favorable conditions for their retaining within the country.
- To promote increased E&P activity in the onshore frontier areas by providing globally competitive incentives.
- To enable a more proactive management of resources though establishment of a strengthened Directorate General of Petroleum Concessions (DGPC) and providing the necessary control and procedures to enhance the effective management of Pakistan's petroleum reserves.
- To ensure the energy secure of the country by enhancing domestic exploration.
- To decrease reliance on imported energy by providing additional incentives to exploration and production companies for enhancing indigenous production.
- To undertake exploitation of oil and gas resources in a socially, economically and environmentally sustainable and responsible manner.

3.4.8 The Pakistan Onshore Petroleum (Exploration & Production) Rules, 2013

These rules contain provisions related to reconnaissance surveys; license for petroleum exploration, lease for petroleum development and production; accounts, records, inspection, reports; and, miscellaneous matters. The rules allow any company incorporated inside or outside Pakistan to apply for reconnaissance permit, exploration license or a development and production

lease. The manner in which application may be made has also been prescribed i.e. in writing, mentioning principle place of business of applicant, furnishing of guarantee and deposit of fees etc. The petroleum right, if not exercised within three months, shall lapse. Every permit, license or lease shall be subject to terms and conditions mentioned in these rules included in second schedule and any other conditions which Government may deem fit to insert.

Permit for reconnaissance survey, petroleum exploration would be granted by the Government to any company in accordance with the rules and the holder must perform the work program stipulated in the license. The holder would not be entitled to extract any petroleum from discoveries other than such test production as the Government may in its discretion permit. Initial period of license shall not exceed three years.

The grant of lease for development and production, not exceeding twenty-five years, with certain terms and conditions including the work program shall be granted by the Government on being satisfied that the deposit can be commercially produced. The lease holder shall have exclusive right to perform activities in connection with the development and production including the right to undertake transportation subject to approval. The holder shall pay royalty at the rate of 12.5 percent of the wellhead value of the petroleum produced and saved. In addition to these powers of Government for recovering yearly lease rent, surface rent and revocation of lease have also been described.

The lease or license holder shall maintain full and accurate accounts, and shall submit periodic or occasional reports to DG, Petroleum Concessions. Any person authorized by Director General, Petroleum Concessions, or any other competent authority shall have power to examine the wells, plants, appliances etc. The lease or license holder shall maintain safety in operations including non-interference with navigation, fisheries and agriculture. All reasonable precautions shall be taken to prevent pollution or accumulation of trash and to prevent damage to the environment and surroundings. Pakistani goods and services should be used subject to their quality, employment and training of Pakistani personnel to develop the capability should be ensured. Indemnity and force majeure have also been provided.

3.4.9 The Oil and Gas (Safety in Drilling and Production) Regulations, 1974

The 1974 Safety Regulations requires operators to send to the Chief Inspector of Mines, Ministry of Labor and Manpower information on safety issues including provisions of protective equipment and identification of safety personnel and emergency measures, designation of safety personnel including Warfare and Safety Officer, and accident reporting.

The regulation identifies and explains issues that should be taken into consideration by the proponent for a project involving exploration or production of oil and gas.

3.4.10 Sectoral Guidelines for Environmental Reports – Oil and Gas Exploration and Production

These guidelines identify and explain issues that should be addressed for a proposal involving exploration for, or production of, oil and gas. It is important to focus on key issues for specific proposals. The matters identified in this guideline should provide guidance for the preparation and assessment of most exploration and production proposals. It is intended that Companies involved in Oil and Gas Exploration and Production will self-regulate and undertake monitoring to meet or exceed the provisions of the Package and these sectorial guidelines; the Responsible Authority reserves the right to spot check field operations from time to time.

3.5 Provincial and Local Environmental Laws and Legislations

3.5.1 Punjab Environmental Protection Act 1997, (Amended 2012 & 2017)

Punjab Environmental Protection Act, 1997 (amended 2012 & 2017) is the principal provincial legislation in Punjab for the:

- Protection, conservation, rehabilitation and improvement of the environment,
- Prevention and control of pollution, and
- Sustainable development.

The salient features of the Act are mentioned below:

1. Prevention of polluting discharges and Emissions: Section 11 of the Punjab Environmental Protection Act, amended 2012 & 2017 requires a person to ensure that no release is done to the environment in the form of harmful discharges / effluents or emissions which could cause degradation of the ambient environmental quality. However, release of effluents/air emissions is allowed if the concentration of its constituents is within the limits as prescribed in the National Environmental Quality Standards.
2. Environmental Quality Standards: The Act provides for fixing the Punjab Environment Quality Standards (PEQS) and their strict enforcement. For default, the Government has been empowered to levy a pollution charge.
3. IEE/EIA: Under Section 12, no project including construction activities or any change in the existing physical environment can be started unless

the IEE or EIA has been conducted and its approval obtained from the Responsible Authority, in the present case from Punjab EPA.

4. The imports of hazardous waste into the country has been banned and the transport of hazardous substances and dangerous chemicals or toxic material or explosive substances etc. has been regulated, through licenses, under prescribed rules and procedure.
5. For the effective implementation of the provisions of the law, the Pakistan Environmental Protection Agency, headed by a Director General with other staff has been constituted. This Agency is responsible for enforcing the policy and implementing the provisions of the law. On the same pattern, Provincial Environmental Protection Agencies have been created in each province.

3.5.2 Environmental Protection Agency (Review of EIA/IEE) Regulations, 2022[24]

These regulations were prepared by Pakistan EPA. These regulations divide projects in different Schedules depending upon the severity of environmental impact of the project. The project would fall in Schedule I, if the project has lower environmental impacts and thus requiring an IEE. And, the project would fall in Schedule II, if the project has significant environmental impacts and thus requiring an EIA. But, all projects located in environmentally sensitive areas would require an EIA under these regulations.

The project "*Seismic Activities in Sui North Block, District Rajanpur, Punjab*" falls in Schedule II requiring an EIA as the project is categorized as:

A. *Energy*
5. *Oil & gas extraction projects including exploration, production, gathering systems, separation and storage.*

3.5.3 Punjab Environmental Quality Standards, 2016[25]

In exercise of the powers conferred under clause (c) of subsection (1) of section 4 of the Punjab Environmental Protection Act, 1997 (XXXIV of 1997), the Environmental Protection Council has approved the PEQS for Municipal and Liquid Industrial Effluents, Drinking Water, Motor Vehicle Exhaust and Noise, Ambient Air, Noise, and Industrial Gaseous Emissions, with Notification No. SO (G)/EPD/7-26/2013 which were issued in 2016.

[24] *Pakistan Environmental Protection Agency (Review of EIA and IEE Regulation), 2000*
[25] *National Environmental Quality Standards, 10th February 2000, section 33 of the XXXIVS.R.O. 258-(1)/2000*

Table 7: PEQS for Ambient Air			
Pollutant	**Time-weight average**	**Concentration in ambient air**	**Method of measurement**
Sulfur dioxide (SO2)	Annual average*	80 µg/m^3	Ultraviolet Fluorescence method
	24 hours**	120 µg/m^3	
Oxides of nitrogen as (NO)	Annual average	40 µg/m^3	Gas phase Chemiluminescence
	24 hours **	40 µg/m^3	
Oxides of nitrogen as (NO_2)	Annual average	40 µg/m^3	Gas phase Chemiluminescence
	24 hours **	80 µg/m^3	
Ozone (O_3)	1 hours	130 µg/m^3	Non dispersive UV absorption method
Suspended particular matter (SPM)	Annual average	360 µg/m^3	High volume sampling (Average flow rate not less than 1.1 m^3 /min)
	24 hours**	500 µg/m^3	
Respirable particulate matter PM_{10}	Annual average	120 µg/m^3	Preferably β-Ray absorption method
	24 hours**	150 µg/m^3	
Respirable particulate matter $PM_{2.5}$	Annual average	15 µg/m^3	Preferably β-Ray absorption method
	24 hours**	35 µg/m^3	
Lead (Pb)	1 hours	15 µg/m^3	AAS method after sampling using EPM 2000 or equivalent filter paper
	24 hours**	1 µg/m^3	
	1 hours	1.5 µg/m^3	
Carbon Monoxide (CO)	8 hours	5 µg/m^3	Non dispersive infrared (NDIR) method
	1 hours	10 µg/m^3	
* annual arithmetic means of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval * 24 hourly /8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days Table 3.2 shows Punjab environmental quality standards for municipal and liquid industrial effluents (mg/l, unless otherwise defined)			

Table 8: PEQS for Municipal and Liquid Industrial Effluents			
No	**Parameter**	**Into in land water (PEQS Limits)**	**In sewage treatment (PEQS Limits)**
1	Temperature or temperature increase	≤3 C	≤3 C
2	pH value (H+)	6-9	6-9
3	Biochemical oxygen demand (BOD5) at 20 C (1)	80	250
4	Chemical oxygen demand (COD)(1)	150	400
5	Total suspended solids (TSS)	200	400
6	Total dissolved solids (TDS)	3500	3500
7	Grease and Oil	10	10

8	Phenolic compounds (as phenol)	0.1	1.3
9	Chloride (as Cl-)	1000	1000
10	Fluoride (as F-)	10	10
11	Cyanide (as CN-)total	1.0	1.0
12.	An-ionic detergents (as MBAs)(2)	20	20
13.	Sulfate (SO_4^{-2})	600	1000
14.	Sulfide (S^{-2})	1.0	1.0
15.	Ammonia (NH_3)	40	40
16.	Pesticides (3)	0.15	0.15
17.	Cadmium (Cd)(4)	0.1	0.1
18.	Chromium (trivalent and hexavalent)(4) (1)	1.0	1.0
19.	Copper(Cu)(4)	1.0	1.0
20.	Lead (Pb)(4)	0.5	0.5
21.	Mercury (Hg)(4)	0.01	0.01
22.	Selenium (Se)(4)	0.5	0.5
23.	Nickel (Ni)(4)	1.0	1.0
24.	Silver (Ag)(4)	1.0	1.0
25.	Total toxic metals	2.0	2.0
26.	Zinc (Zn)	5.0	5.0
27.	Arsenic (As)(4)	1.0	1.0
28.	Barium (Ba)(4)	1.5	1.5
29.	Iron (Fe)	8.0	8.0
30.	Manganese(Mn)	1.5	1.5
31.	Boron (B)(4)	6.0	6.0
32.	Chlorine (Cl_2)	1.0	1.0

Table 9: PEQS for Industrial Gaseous Emissions

No	Parameter	Source of emission	Standard (PEQS Limits)
1	Smoke	Smoke opacity not to exceed	40% or 2 Ringlemann scale or equivalent smoke number
2	Particulate matter (1)	(a)boilers and furnaces	
		(i) Oil fired	300
		(ii) Coal fired	500
		(iii) Cement kilns	300
		(b) grinding crushing clinker coolers and related processes metallurgical processes converters blast furnaces and cupolas	500
3	Hydrogen chloride (HCl)	Any	400
4	Chlorine	Any	150
5	Hydrogen fluoride (HF)	Any	150
6	Hydrogen	Any	10

	sulphide (H_2S)		
7	Sulphide oxides (2x3)	Sulfuric acid /sulfonic acid plants	5000
		Other plants except power plants operation on oil and coal	1700
8	Carbon monoxide (CO)	Any	800
9	Lead (Pb)	Any	50
10	Mercury (Hg)	Any	10
11	Cadmium	Any	20
12	Arsenic	Any	20
13	Copper(Cu)	Any	50
14	Antimony (Sb)	Any	20
15	Zinc (Zn)	Any	200
16	Oxides of nitrogen	Nitric acid manufacture unit 3000	
		Other plants except power plants operating on oil or coal	

Table 10: Sulfur Dioxide Background Levels Microgram per cubic meter (ug /m^3) Standard

Background air quality (SO_2 Basis)	Annual average	Max.24 hour interval	Criterion I Max. SO_2 emission (ton per day per plant)	Criterion II Max. allowable ground level increment to ambient (ug/m^3) (one year average)
Unpolluted moderately polluted	<50	<200	500	50
Low	50	200	500	50
High	100	400	100	10
Very polluted**	>100	>400	100	10

* For intermediate value between 50 and 100 µg/m^3 linear interpolations should be used
**No project with sulfur dioxide emission will be recommended

Table 11: Standards for motor vehicle exhaust and noise (for in-use vehicles)

No.	Parameter	Standards (PEQS Limits)	Measuring methods	Applicability
1	Smoke	40% or 2 on the Ringlemann Scale during engine acceleration mode	To be compared with Ringlemann Chart at a distance of 6 meters or more	Immediate effect
2	Carbon monoxide	6%	Under idling conditions: non-dispersive infrared detection through gas analyzer	
3	Noise	85 dB(A)	Sound-meter at 7.5m from the source	

3.5.4 Punjab Local Government Act, 2013

Under Clause 48 of the 8th Schedule of this Act, the local governments are empowered to restrict any project causing pollution to air, water or land. They may also initiate schemes for improving the environment vide this legislation. The local government offices at union council level are given the authority through this law, to monitor any polluting activity and issue instructions to the responsible person for undertaking pollution prevention measures.

PPL's Exploration Dept. will be responsible to ensure that the proposed activities in Sui North Block are undertaken in accordance with the environmental management requirements and recommendations given in this EIA as well as the NOC which will be issued for this project.

3.5.5 The Punjab Wildlife (Protection, Preservation, Conservation, and Management) Act, 1974

The Punjab Wildlife (Protection, Preservation, Conservation, and Management) Act, 1974 caters to the protection of wildlife resources in the province. Besides ensuring an environment conducive for their rearing and livelihood, the Act also regulates hunting, poaching, possession, and trade in birds and animals. Government can notify and amend lists of protected ecosystems, national parks, wildlife sanctuaries, safari parks, and game reserves. The updated lists of the protected and special areas can be obtained from the National Council for Conservation or alternatively from the Forest and Wildlife Department, Government of Punjab.

Key features of the Punjab Wildlife Protection Act include:

1. Ban on hunting of protected animals unless permitted otherwise in accordance with the requirements of the Act.
2. Prohibition of any activity (residence, cultivation, land use that could damage vegetation, hunting, killing or capturing of any wild animal etc.), inside a wildlife sanctuary or National Park.
3. Prohibition of any activity (hunting and shooting etc. of a wild animal) in the game reserve, except under a special permit.
4. Penalties for those who contravene the provisions of the law.

Under the powers conferred to the government of Punjab through this Act, the government can declare certain areas reserved for the protection of wildlife and control activities within in these areas. In Punjab, currently there are 58 wildlife protected areas which include national parks, game reserves and wildlife sanctuaries. None of this wildlife protected area lies in or near the Sui North Block.

3.5.6 The Punjab Special Premises (Preservation) Ordinance, 1985

The Punjab Special Premises (Preservation) Ordinance, 1985 provides a legal framework for preservation of premises of historical, cultural, archaeological, and architectural value in the province. The Ordinance specifically prohibits implementation of developmental schemes or new constructions within a radius of two hundred feet from notified special premises. The number of protected sites notified under the Punjab Special Premises Ordinance is 246. The proposed activities in project area will be in compliance with the requirements of this ordinance; no activity will be initiated by PPL in the premises of any site protected under this Ordinance. There are no such sites at or near the proposed project area.

3.6 Environmental and Social Guidelines

The environmental as well as social guidelines related to the proposed project are as discussed under:

Policy & Procedures for the Filing, Review and Approval of Environmental Assessments, 2000[26]

The Policy & Procedures for the Filing, Review and Approval of Environmental Assessments, 2000, prepared by the PEPA under the powers conferred upon it by the Pakistan Environmental Protection Act, provide the necessary details on the preparation, submission, and review of the Initial Environmental Examination (IEE) and the Environmental Impact Assessment (EIA).

This EIA Study has followed the procedures defined in the PEPA, 1997 and Review guidelines, 2000, and the EIA will be submitted to the Punjab EPA in whose jurisdiction the project will be implemented. The PEPA has, however, been given the right to review any environmental report at any time and the power to revoke the decision of the provincial EPA, if it deems this to be necessary.

Guidelines for Preparation & Review of Environmental Reports[27]

These guidelines require proponents to prepare terms of reference for the environmental assessment reports. It requires that all studies should contain baseline data on the area and must contain an assessment of the potential environmental impacts and the recommended mitigation measures.

Guidelines for Operational Health, Safety and Environmental Management, 1996[28]

These guidelines are the outcome of a study commissioned by the Directorate General Petroleum Blocks, Ministry of Petroleum and Natural Resources,

[26] *Policy and Procedure for the Filing, Review and Approval of Environmental Assessments, Government of Pakistan, November 1997*
[27] *Guidelines for Preparation & Review of Environmental Reports*
[28] *Guidelines for Occupational Health, Safety and Environmental Management, 1996*

Government of Pakistan. The guidelines list down the relevant laws related to the operational health, safety and environmental management and also recommends environmental controls and management practices to be adopted in Oil & Gas exploration projects. These guidelines are extensive and fully supportive of the Environmental Protection Act of 1997.

Guidelines of the American Petroleum Institute (API) and Louisiana Statewide Order 29-B (LSO 29-B)[29]

The American Petroleum Institute (API) guidelines for disposal of oil and gas exploration and production wastes and the Louisiana Statewide Order 29-B (LSO 29-B) deal with the disposal of oil and gas exploration and production wastes. Both API and LSO 29B standards recognize land treatment techniques, which include land spreading i.e. spreading of the waste over a land area and dilution by mixing with native soil, land farming i.e. mixing of the waste with soil and encouraging natural remediation and burial on-site i.e. burial of the waste into unlined waste pits after dilution with native soil, as feasible options for the treatment and disposal for drilling wastes. The two standards also specify maximum permissible levels (MPL) for various parameters (including pH, metals, oil and grease, sodium adsorption ratio etc.) in the waste or the waste soil mixture.

3.7 National Fire Protection Association (NFPA)

NFPA 30 is applied for the safe storage, handling, and use of flammable and combustible liquids by the manufacturers, producers, distributors, and end users and is enforceable under OSHA and many state & local regulations. Design, material of construction, installation, ventilation, drainage, inspection of tank building, detection and alarm for tank building, piping system, etc. are prescribed to safeguard against fire hazards and explosion. In case of emergency caused by eruption of fire, training to employees is also recommended.

NFPA 58 helps to mitigate risks during safe installations, failures, leaks, storage, handling, transportation, and use that could lead to fires and explosions.

3.8 International Treaties

International environmental treaties and conventions, endorsed by Pakistan are mentioned below;

3.8.1 Climate Change

- United Nations Framework Convention on Climate Change, 1992
- Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1997 aims to reduce emissions of six greenhouse gases, including CO_2, methane (CH_4), and nitrous oxide (N_2O) by 2008-2012 and Pakistan has signed and acceded to the agreement.

[29] *Guidelines of the American Petroleum Institute (API) and Louisiana Statewide Order 29-B (LSO 29-B)*

3.8.2 Waste and Pollution

– Basel Convention on the Control of Trans boundary Movement of Hazardous Wastes and their Disposal, 1989.

3.8.3 The Convention on Biological Diversity

The Convention on Biological Diversity was adopted during the Earth Summit of 1992 at Rio de Janeiro. The Convention requires parties to develop national plans for the conservation and sustainable use of biodiversity, and to integrate these plans into national development programs and policies. Parties are also required to identify components of biodiversity that are important for conservation, and to develop systems to monitor the use of such components with a view to promoting biological diversity.

3.8.4 The Convention on Conservation of Migratory Species of Wild Animals, 1979

The Convention of Conservation of Migratory Species of Wild Animals, 1979

The Convention on the conservation of Migratory Species of Wild Animals (CMS), 1979, requires countries to take action to avoid endangering migratory species. The term “migratory species refer to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. These parties are also required to promote or co-operate with other countries in matters of research on migratory species.

The Convention contains two appendices. Appendix I contain the list of migratory species that are endangered according to the best scientific evidence available. For these, species the member states to the Convention are required endeavor to:

- Conserve and restore their habitats
- Prohibit their hunting, fishing and capturing, harassing and deliberate killing.
- Remove obstacles and minimize activities that seriously hinder their mitigation.
- Control other factors that might endanger them, including control of introduced exotic species.

Migratory species that need or would significantly benefit from international cooperation are listed in Appendix II of the Convention. These species, either individually or by taxonomic group, are the basis for establishing instruments – regional or global – under CMS. For this reason, the Convention encourages the Range States to conclude global or regional Agreements.

3.8.5 Cultural Heritage

Convention concerning the Protection of the World Cultural and Natural Heritage, 1972 obligates the states to ensure identification, protection and transmission of natural heritage to future generations.

3.8.6 ILO Conventions

Pakistan has been a member of the ILO since 1947 and has thus far ratified 36 conventions. Of these, 33 are in force, whereas 3 have been denounced. The fundamental conventions which are being implemented across Pakistan through applicable labor laws include:

- C029 - Forced Labor Convention, 1930 (No. 29);
- C100 - Equal Remuneration Convention, 1951 (No. 100);
- C105 - Abolition of Forced Labor Convention, 1957 (No. 105);
- C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111);
- C138 - Minimum Age Convention, 1973 (No. 138) Minimum age specified: 14 years;
- C182 - Worst Forms of Child Labor Convention, 1999 (No. 182)

SECTION 4: ENVIRONMENTAL AND SOCIAL BASELINE

4.1 General Introduction

Sui North Block has been awarded to PPL by the Government of Pakistan for the purpose of oil and gas exploration. PPL plans to carry out 2D Seismic Survey activities which are situated in Sui North Block. Although, Sui North Block's major portion lies in district Dera Bugti of Balochistan and small portion lies in the district Rajanpur of Punjab province. The Proposed 2D Seismic Survey will be carry out only in district Rajanpur of Punjab Province thus this EIA study focus on the impacts of activities associated with seismic survey activities on the physical, biological and socioeconomic environment of district Rajanpur.

The physical, biological and socioeconomic environment of the project is described with respect to watershed, air shed, geology, soil characteristics and seismicity. The air shed describes the climatic conditions and quality of the air, the water shed describes the water quality of surface and ground water. The terrestrial environment is described by its geology, geomorphology, wild life habitat, vegetation and soil characteristics in terms of stability and seismicity. Description of the socioeconomic condition includes details of the area's population, demography and households, education and health institutes present in the area, water supply and sewage system, agriculture, transport and communications facilities available and major occupations and source of income.

4.1.1 The Aim of Baseline Study

This section provides a comprehensive profile of the micro and macro environment of the proposed seismic survey in Sui North Block in District Rajanpur, Punjab. The micro environment of the project location is the immediate surrounding that is the sedimentary rock hills and sediments. The Macro environment is the district and province. The study will cover the physical, biological and socio-economic situation of the micro and macro environment prior to the beginning of its various project activities.

This categorization would aid in understanding the prevalent macro and micro environment of this project and would enable assessment of possible environmental impacts that may arise as a result of the activities associated with the project. It would also assist the design team in defining the mitigation measures that would be required to minimize, if not eliminate, the negative impacts which are identified in this study.

4.1.2 Methodology

Information for this section was collected from different sources including primary and secondary data sources. Primary date was collected via

questionnaire survey, FGDs and key Intervies (KI) while secondary data was collected through electronic and print media, Published maps prepared by the Geological survey of Pakistan and Soil survey of Pakistan, published literature; District Census Reports (DCRs), previously conducted studies in district and archives of the experts.

4.2 Physical Environment

4.2.1 District Rajanpur Location & History at a Glance

Previously Tehsil of Dera Ghazi Khan, Rajanpur was given the status of district in 1982 and lies in the southwest of the Punjab Province at 29°06' N latitude and 70°19' E longitude. The district lies towards the west bank of Indus River. The district was named after headquarter town Rajanpur, which was founded by Makhdoom Sheikh Rajan in 1772. The district comprises of three Tehsils namely Rajanpur in the center, Tehsil Jampur in the North and Tehsil Rojhan in the South.

The district lies entirely towards the west bank of River Indus. The Rajanpur town is approximately 15 to 20 kilometers from the west bank of the river. The district has vital historical, cultural and geo-strategic position as it is a gateway to Sindh as well as Baluchistan Province. Until 1862, it remained a small village located on the road from Dera Ghazi Khan in Punjab to Sukkur. It became a municipality and tehsil headquarter in 1873. It was given the status of independent District in 1982.

Total household and total population of the three tehsil are given in Table 12.

Table 12: District Administration of Rajanpur[30]

Tehsil	Union Council	Revenue Estates / Mouzas	Area (acres)	No of Households (2017)	Population (2017)
Jampur	32	183	573,789	107,607	849,086
Rajanpur	21	219	576,453	92,801	706,868
Rojhan	15	89	719,095	56,891	405,774
Tribal Area (De Excluded area)	01	43	988,421	5,191	34,230
Total	**69**	**534**	**2,857,758**	**262,490**	**1,995,958**

4.2.2 Geography of District Rajanpur at a Glance

District Rajanpur was formed in 1982 by separating two tehsils Rajanpur & Jampur, of the then district D.G. Khan. Covering an area of 12,3182, the district is situated between River Indus and hilly territories of Baluchistan. To the North of it is located Dera Ghazi Khan District. In the South, it touches Kashmore district of Sindh Province. Districts Dera Bugti of Baluchistan is located towards West of Rajanpur. The enormous Indus makes Eastern boundary of the district

[30] https://www.pbs.gov.pk/sites/default/files/population/2017/results/06801.pdf

separating it from districts of Muzaffargarh and Rahim Yar Khan. The Indus is main river flowing on the eastern border of the district begins to rise during the month of May when the melting of the snow on the Himalaya commences and gradually swells till it fills its bed for as much as a breadth of 14 kilometers in places, driving flood waters down the depression and filling the inundation canals. It continues high till the end of August and then begins to subside reaching cold weather at the end of September.

Sui North Block is located in district Rajanpur, of Punjab province. As mentioned earlier, Sui North Block lies in the district Dera Bugti of Balochistan and small portion lies district Rajanpur. The project sites i.e., the proposed seismic survey will be carried out in district Rajanpur, of Punjab province. The Sui North Block covers an area of approximately 812 sq. km. out which approx. 145 sq. km. falls in the district Rajanpur of Punjab province.

The main feature of the block is sedimentary rocks mountains (hills). The runoff from the hills drains into the streams and ultimately into river Indus through its tributaries and other streams.

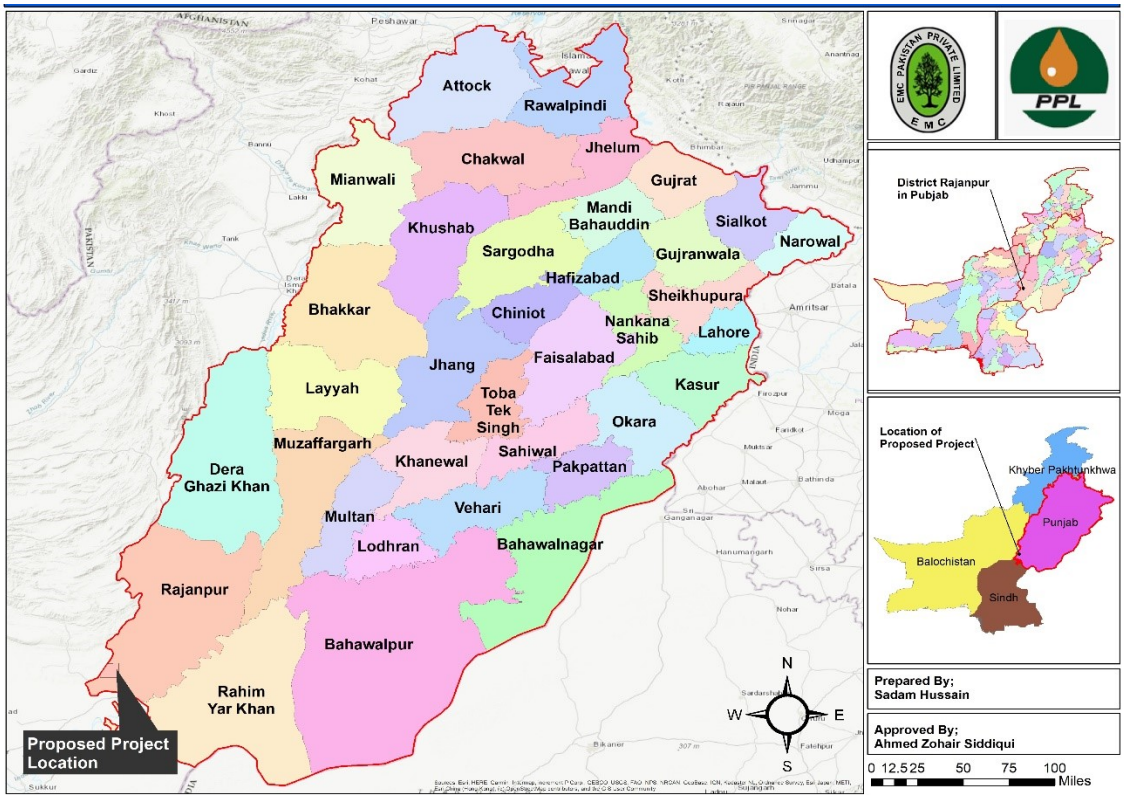


Figure 9: Location map of project site

4.2.3 Topography

Predominantly, Punjab comprises of a leveled plain, in addition to some mountainous and hilly areas, which are mostly situated in its northwest and extreme southwest. Adjacent to these mountains is a plateau, known as the

Potwar, Potohar, or Potowar Plateau. A desert belt, known as Cholistan, lies in the southeastern side of the province.

Punjab can be divided into 4 broad topographic regions as follows:

- Mountainous and Hilly areas
- Potowar Plateau
- Plain Areas
- Desert Areas

The mountainous/ hilly areas of Punjab consist of a number of important mountain tracts:

The first tract of mountains and hills is located in the northwest of the province and consists of the sub-Himalayas or Siwaliks Range in the northeast, and the Salt Range in the south of this tract

- The Suleiman range of mountains (southwestern Punjab),
- Kala Chitta Range
- Kirana Hills

The mountains and hills in the north of Attock and northeast of both Rawalpindi and Jhelum districts consist of an extension of the sub-Himalayas or Siwaliks Range. The height of these mountains varies from 2,000 meters to 2,500 meters above Mean Sea Level (MSL).

The Salt Range is located in the central part of Jhelum and the northern part of Sargodha district. These hills run in an east-west direction, reaching heights varying from 500 to 1,000 meters above MSL.

The Suleiman Mountains are the southern extension of the Hindu Kush Mountain system, located in southwestern Punjab. The highest peak is the Takht-e-Suleiman in Khyber Pakhtunkhwa, which is 3,382 meters high. The proposed project falls in Suleiman Mountain ranges.

The Kala Chitta Range of mountains is located in the Attock district in northern Punjab. This range rises to an average height of 450-900 meters (3,000 ft) above MSL and extends for about 72 km (45 mi) in the provinces of Punjab and Khyber Pakhtunkhwa. The Kala Chitta Range extends eastward across the plateau towards Rawalpindi.

The Kirana Hills is a small mountain range which spans approximately 64 km (40 mi) across the districts of Sargodha and Jhang.

Rajanpur District in the far southwestern part of Punjab, Pakistan. The district lies entirely at the west of the Indus River. It is a narrow, 32 kilometres (20 mi) to 64 kilometres (40 mi) wide strip of land sandwiched between the Indus River on the east and the Sulaiman Mountains on the west. The topography within 10 miles of project area contains very significant variations in elevation, with a maximum elevation change of 112 m and an average elevation above sea level of 230 m. the large variations in elevation range of project area having

heights 357 m to 112 m above sea level. The Figure 9 shows the general topography of project surrounding and topographic map of Sui North Block is given below as Figure 10.





Figure 10: General topography of the project site surrounding

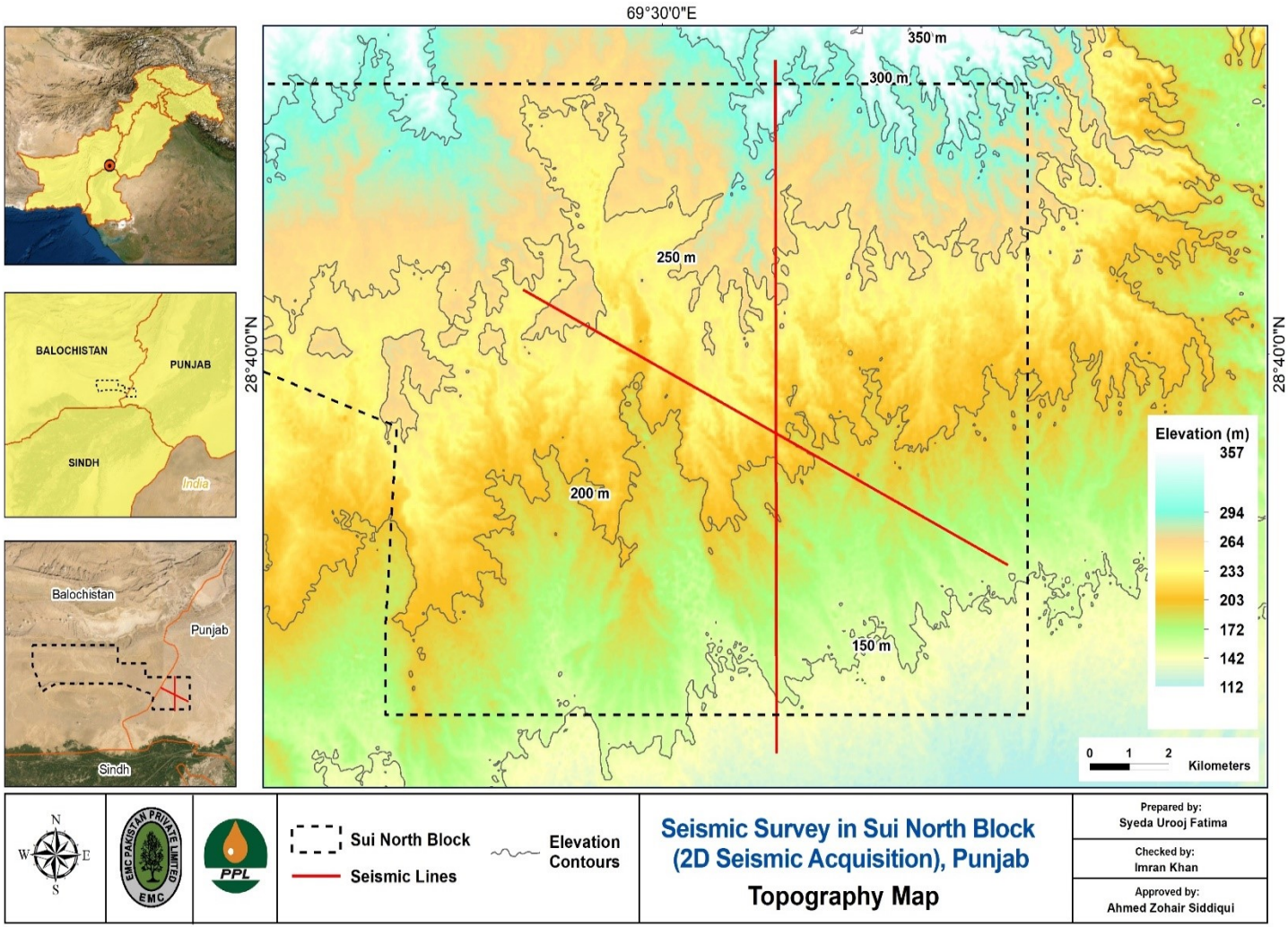


Figure 11: Topographic map of the project area

4.2.4 Geological Setting

The study area lies at frontal part of Sulaiman Foldbelt, having Indus River in the east. Mostly it is a syncline, which lies in between Sui and Loti anticlines, extending to the east of Sui structure. Structural Styles are trending East-West. The sediments of the Siwalik Formation, ranging in age from Miocene to Pleistocene and alluvium (recent sediments) are exposed at the surface as shown by the Geological map (Figure-12).

4.2.5 Soil Setting

The soil of the Punjab Province is alluvial in nature and sand is everywhere in the subsurface. According to FAO UNESCO Soil Classification the soil of the project area is lithosols and haplic yermosols as showing in Figure 13. The project site in District Rajanpur is sedimentary rocky hills (mountains) and loose sediments predominantly deposits of older River, as showing in pictures below.

	
Loose Sediment Soil	Sedimentary Rock Hills

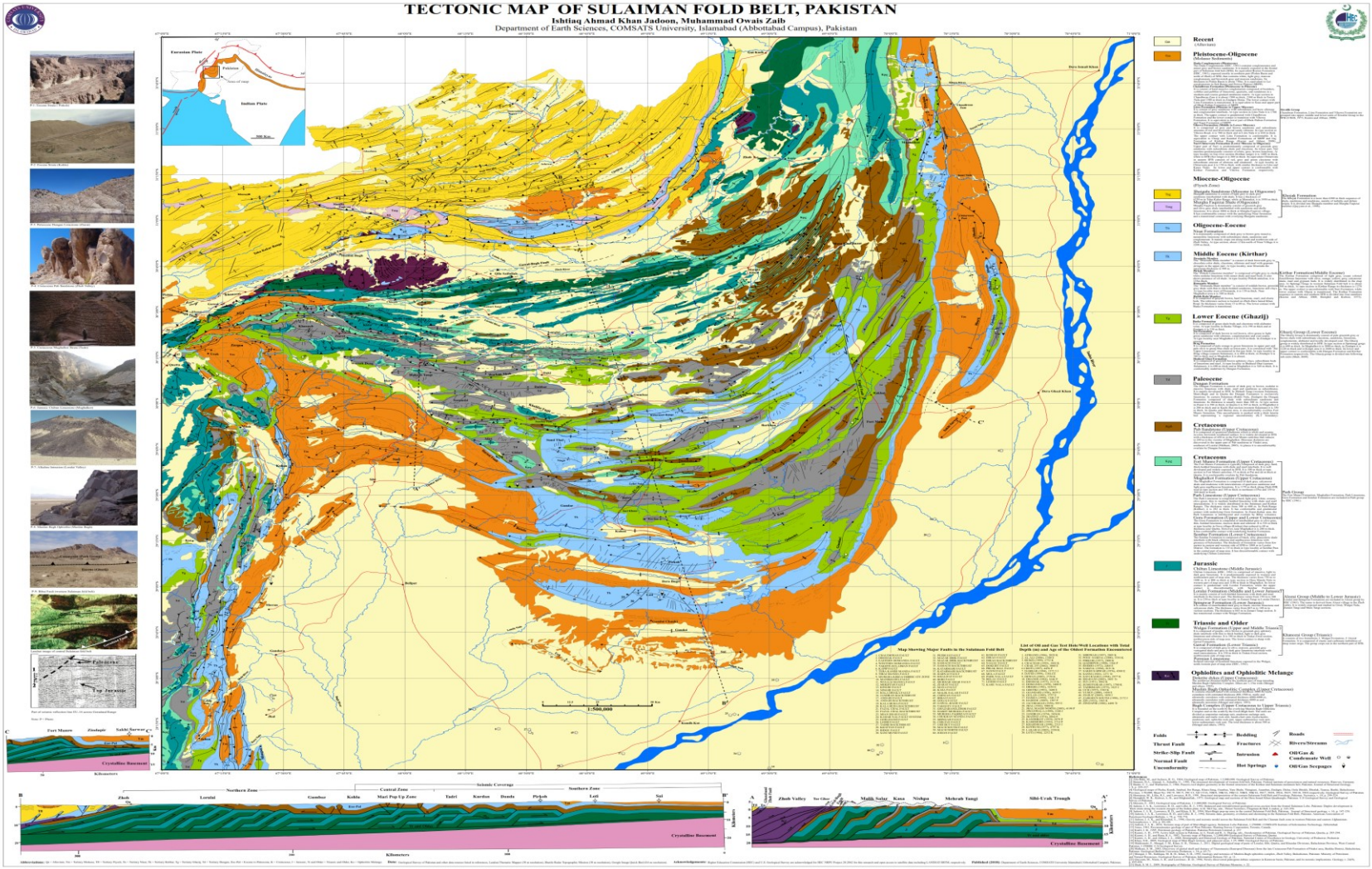


Figure 12: Tectonic map of Sulaiman Fold Belt

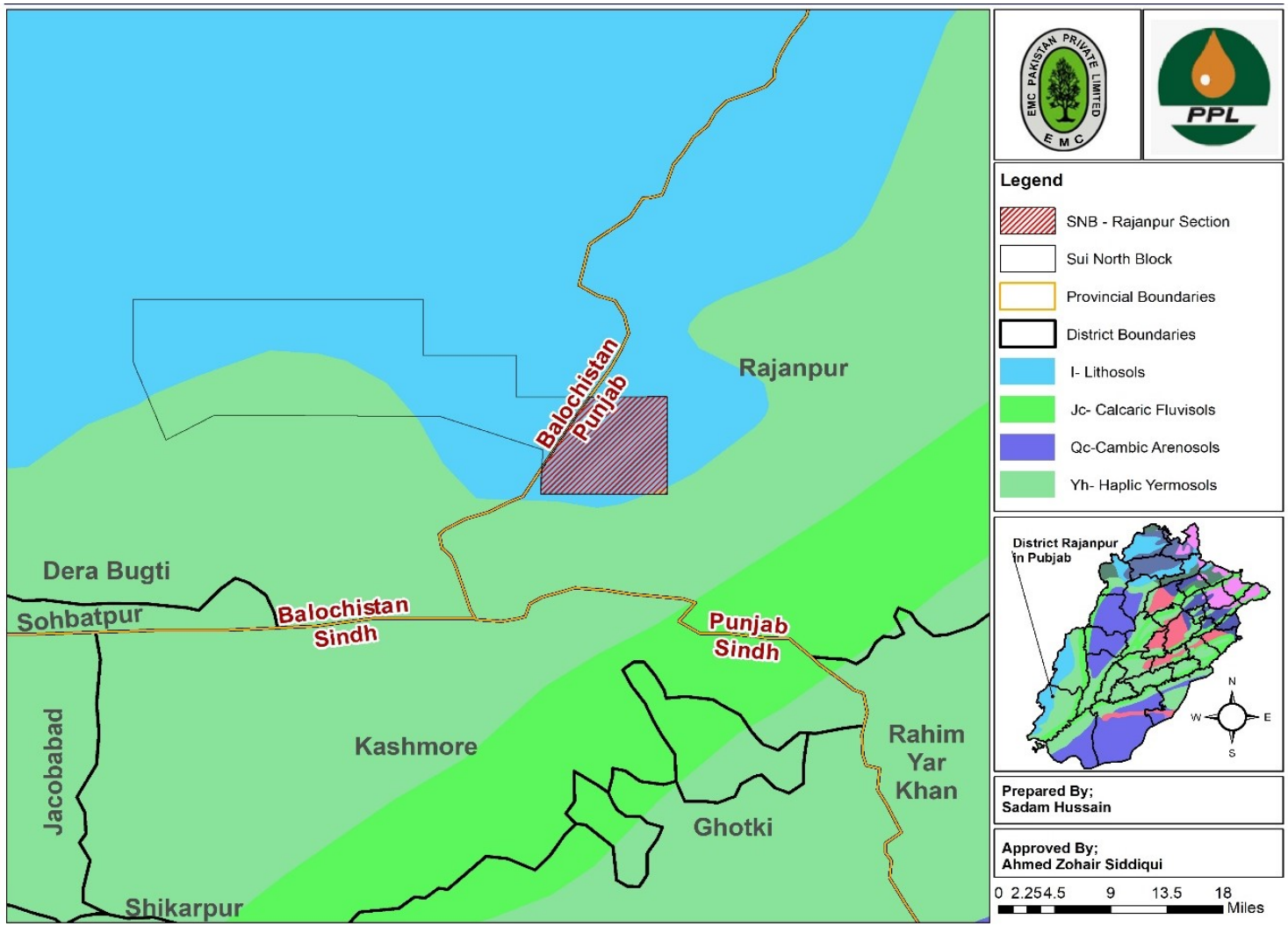


Figure 13: Soil Map of Proposed Project

4.2.6 Seismicity

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

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

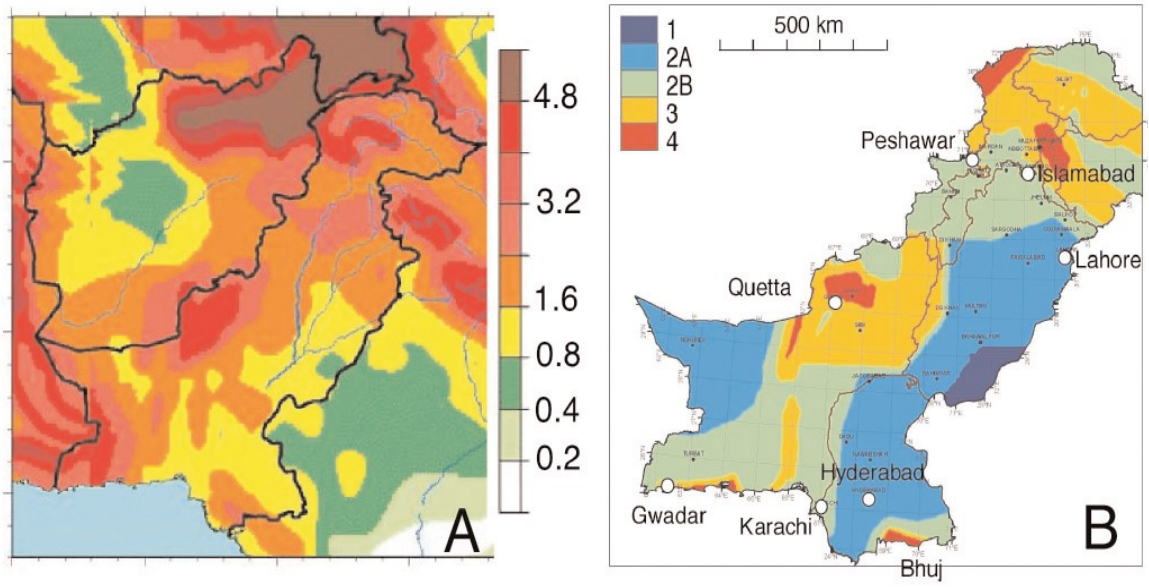


Figure 14: Seismic Zoning Map of Pakistan (Source: Pakistan Metrological Department)

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

4.2.7 Climate of District Rajanpur

District Rajanpur's climate has extremes. It is very hot in summer while it is very cold in winter in the vicinity of Koh-e-Suleman range. Elevation map shows that north-eastern part of the district has low mountain regions while most of the area is situated as a plain area. At Rajanpur, there is no weather forecasting station available. However, the weather and climate data available for the nearby district i.e. Faisalabad, Multan and Bahawalpur have been taken and considered for Rajanpur District.

A. Temperature

The hot season lasts for 3.4 months, from April 22 to August 3, with an average daily high temperature above 100°F. The hottest month of the year in Rajanpur is June, with an average high of 106°F and low of 84°F.

The cool season lasts for 2.6 months, from December 5 to February 23, with an average daily high temperature below 77°F. The coldest month of the year in Rajanpur is January, with an average low of 47°F and high of 71°F.

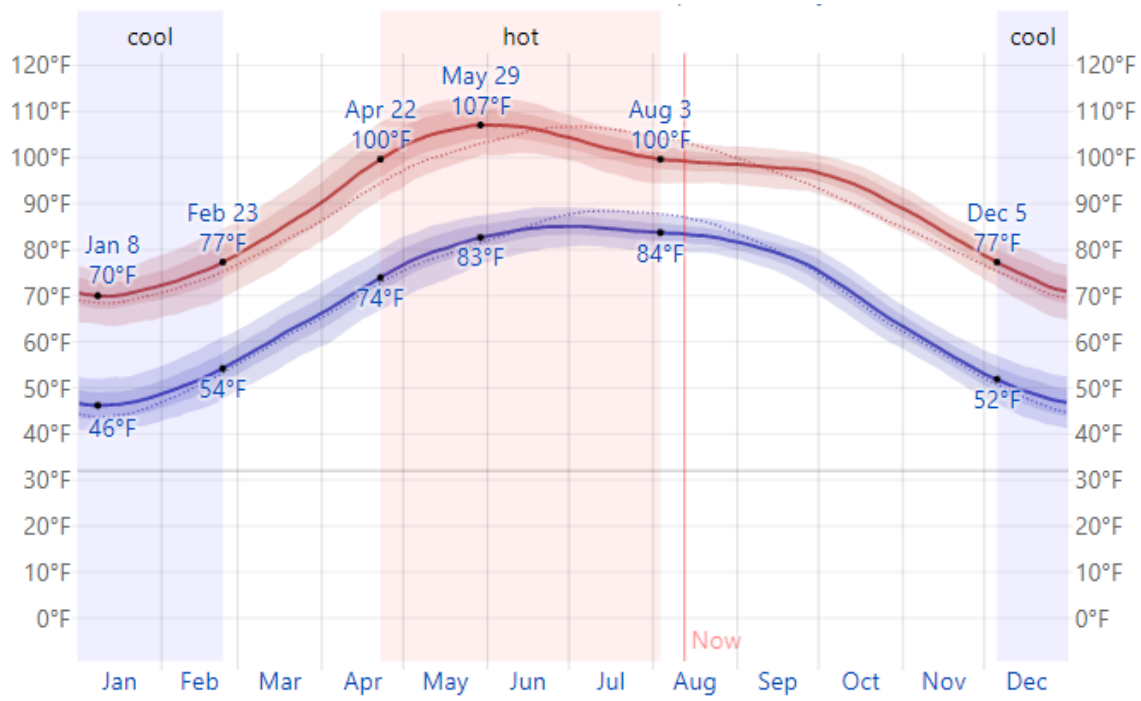


Figure 15: Average High and Low Temperature of District Rajanpur (Source: weathersparks.com)

B. Precipitation

The wetter season lasts 2.5 months, from June 22 to September 6, with a greater than 8% chance of a given day being a wet day. The month with the most wet days in Rajanpur is July, with an average of 4.3 days with at least 0.04 inches of precipitation.

The drier season lasts 9.5 months, from September 6 to June 22. The month with the fewest wet days in Rajanpur is November, with an average of 0.3 days with at least 0.04 inches of precipitation.

Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. The month with the most days of rain alone in Rajanpur is July, with an average of 4.3 days. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 16% on July 25.

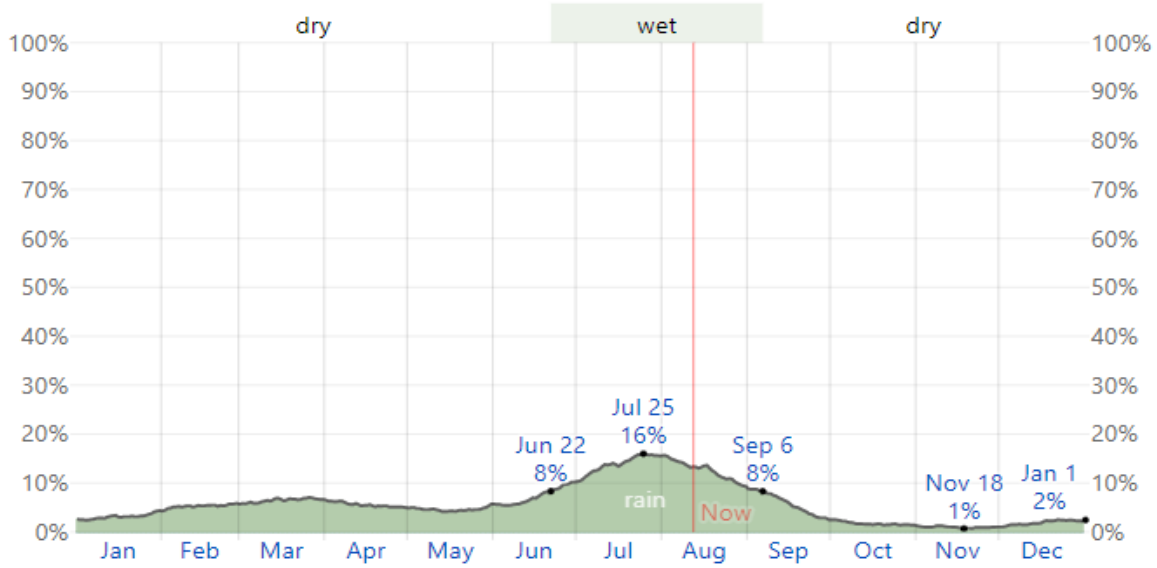


Figure 16: Daily Chance of Precipitation in District Rajanpur (Source: weathersparks.com)

C. Humidity

Rajanpur experiences extreme seasonal variation in the perceived humidity. The muggier period of the year lasts for 3.0 months, from June 14 to September 13, during which time the comfort level is muggy, oppressive, or miserable at least 18% of the time. The month with the muggiest days in Rajanpur is July, with 19.8 days that are muggy or worse. The least muggy day of the year is January 28, when muggy conditions are essentially unheard of.

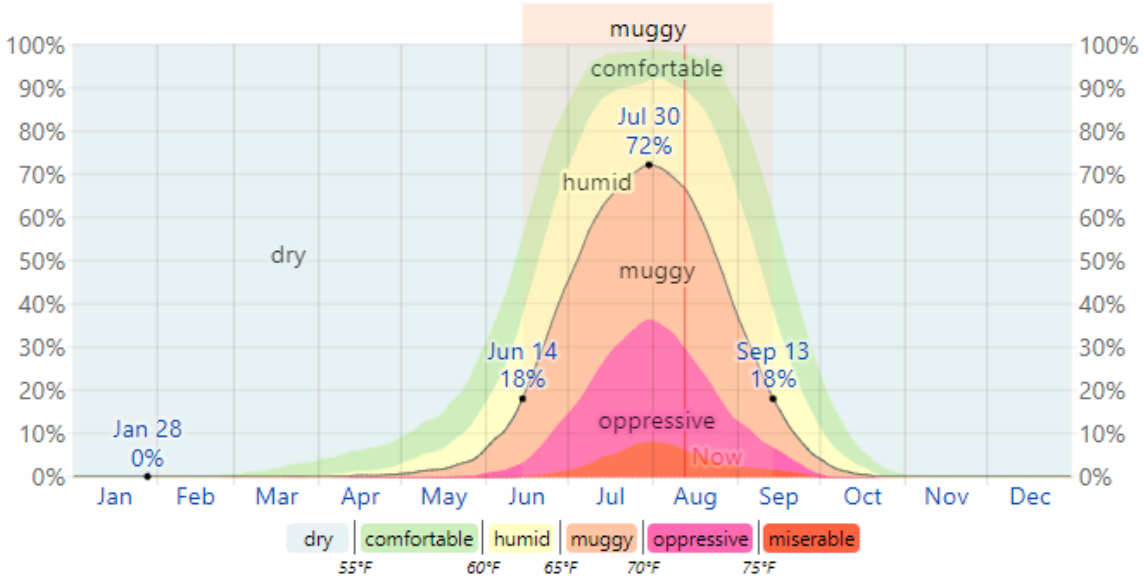


Figure 17: Daily The percentage of time spent at various humidity comfort levels, categorized by dew point. (Source: weathersparks.com)

D. Wind

The average hourly wind speed in Rajanpur experiences significant seasonal variation over the course of the year. The windier part of the year lasts for 3.8 months, from May 11 to September 5, with average wind speeds of more than 7.8 miles per hour. The windiest month of the year in Rajanpur is June, with an average hourly wind speed of 9.5 miles per hour.

The calmer time of year lasts for 8.2 months, from September 5 to May 11. The calmest month of the year in Rajanpur is December, with an average hourly wind speed of 5.7 miles per hour.

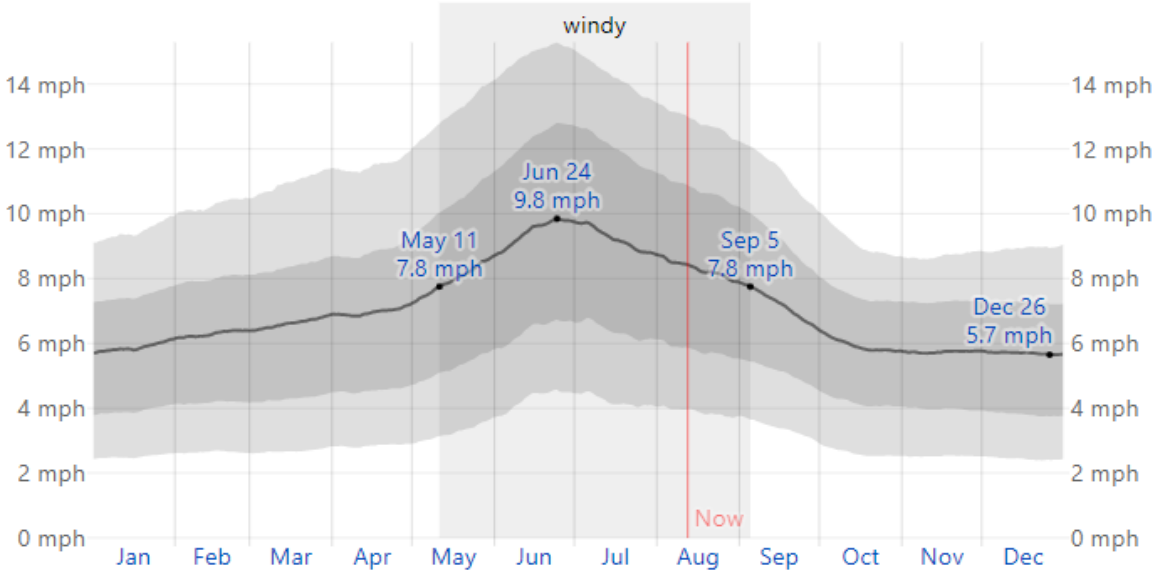


Figure 18: The average of mean hourly wind speeds (dark gray line) (Source: weathersparks.com)

The predominant average hourly wind direction in Jand varies throughout the year. The wind is most often from the south for 4 months, from later May to October, with a peak percentage of 73% during late July.

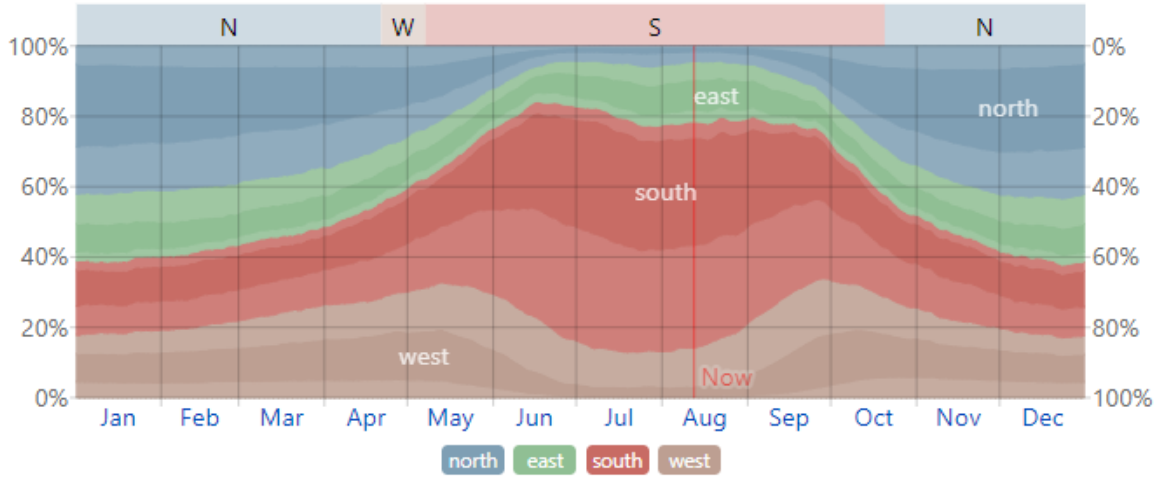


Figure 19: Annual wind directions (Source: weathersparks.com)

4.2.8 Ambient Air Quality & Noise Level Monitoring

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

24-hour ambient air quality was monitored conducted by EPA approved Laboratory (i.e. Green Crescent Private Limited) at 02 locations near the seismic lines. Location map where ambient air and noise level monitoring was conducted is shown in Figure 20 below. Average results of the monitoring have been presented below and the complete analysis report is attached in Annexure III.

Table 13: Ambient Air Quality near Project Site (District Rajanpur)

Coordinates of the monitoring location: Location 1: 28°38'26.5"N 69°32'59.6"E Location 2: 28°36'48.8"N 69°31'33.6"E										
	SO_2 µg/m^3	NO µg/m^3	NO_x µg/m^3	NO_2 µg/m^3	CO mg/m^3	O_3 µg/m^3	TSP µg/m^3	PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	Lead µg/m^3
PEQS Limits	120	40	120	80	5	130	500	150	35	1.5
Location 1 Average Results	13.4	10.28	24.66	14.38	0.71	13.19	167.83	19.04	116.97	0.12
Location 2 Average Results	12.62	10.86	25.21	14.35	0.84	12.74	176.34	122.88	21.46	0.138

Ambient Air quality monitoring results show that the air quality of the project areas is in good condition and all the parameters monitored are within the limits of PEQS. The reason for this is that the project areas (surroundings of proposed seismic lines) are very sparsely populated. There are no industrial unit or other similar anthropogenic source of pollutant that could damage the air quality. No settlements exist near project area. Natural forces i.e., strong winds give rise to dust which added dust pollutants (suspended particulate matter) in the air.

The proposed project (2D Seismic Survey) will not produce significant amount of pollutants (dust, emissions from vehicles and machinery) that can cause significant impact on the air quality of the project area.

4.2.9 Noise Level Monitoring

Noise monitoring was also conducted 24-hour noise level monitoring at the same location where ambient air monitoring was carried out and also at other locations within the block.

The observations of the noise monitoring at location 1 shows that the average noise level during night time (11 pm to 6 am) is 41.7 dB and day time average (07 am to 10 pm) is 45.1 dB.

The observations of the noise monitoring at location 2 shows that the average noise level during night time (11 pm to 06 am) is 41.41 dB and day time average (07 am to 10 pm) is 44.96 dB.

Complete analysis report of noise level monitoring is attached in Annexure III.

The noise level monitoring at the project sites revealed that noise levels are within the prescribed limits of PEQS. The reason for this is that the project area is scarcely populated and no permanent source of noise exists. Generally moving vehicles and high wind create some noise in the area.

Table 14: Noise Monitoring Result Location 1

Sr. #	Time Method/Technique		Unit	Results	PEQS
				LAavg	(Residential)
Night Time					
1	23:00	Noise Meter	dB	40.1	45
2	0:00	Noise Meter	dB	42.5	45
3	1:00	Noise Meter	dB	41.5	45
4	2:00	Noise Meter	dB	42.6	45
5	3:00	Noise Meter	dB	41.9	45
6	4:00	Noise Meter	dB	40.8	45
7	5:00	Noise Meter	dB	42.5	45
8	6:00	Noise Meter	dB	41.4	
Night Time Average				**dB**	**41.7**	**45**
Day Time						
9	7:00	Noise Meter	dB	43.4	55
10	8:00	Noise Meter	dB	42.7	55
11	9:00	Noise Meter	dB	49.4	55
12	10:00	Noise Meter	dB	48.1	55
13	11:00	Noise Meter	dB	47.2	55
14	12:00	Noise Meter	dB	48.2	55
15	13:00	Noise Meter	dB	44.2	55
16	14:00	Noise Meter	dB	45.3	55
17	15:00	Noise Meter	dB	47.1	55
18	16:00	Noise Meter	dB	45.3	55
19	17:00	Noise Meter	dB	44.8	55
20	18:00	Noise Meter	dB	43.5	55
21	19:00	Noise Meter	dB	43.9	55
22	20:00	Noise Meter	dB	44.1	55
23	21:00	Noise Meter	dB	44.9	55
24	22:00	Noise Meter	dB	39.2	55
Day Time Average				**dB**	**45.1**	**55**

Table 15: Noise Monitoring Result Location 2

Sr. #	Time Method/Technique		Unit	Results	PEQS
				LAavg	(Residential)
Night Time					
1	23:00	Noise Meter	dB	42.4	45
2	0:00	Noise Meter	dB	40.2	45
3	1:00	Noise Meter	dB	42.1	45
4	2:00	Noise Meter	dB	42.6	45
5	3:00	Noise Meter	dB	39.3	45
6	4:00	Noise Meter	dB	40.8	45
7	5:00	Noise Meter	dB	41.5	45
8	6:00	Noise Meter	dB	42.4	45
		Night Time Average	**dB**	**41.41**	**45**
Day Time					
9	7:00	Noise Meter	dB	42.4	55
10	8:00	Noise Meter	dB	41.4	55
11	9:00	Noise Meter	dB	48.3	55
12	10:00	Noise Meter	dB	48.1	55
13	11:00	Noise Meter	dB	45.6	55
14	12:00	Noise Meter	dB	49.2	55
15	13:00	Noise Meter	dB	45.3	55
16	14:00	Noise Meter	dB	43.5	55
17	15:00	Noise Meter	dB	44.9	55
18	16:00	Noise Meter	dB	45.3	55
19	17:00	Noise Meter	dB	43.5	55
20	18:00	Noise Meter	dB	44.2	55
21	19:00	Noise Meter	dB	43.9	55
22	20:00	Noise Meter	dB	45.3	55
23	21:00	Noise Meter	dB	44.9	55
24	22:00	Noise Meter	dB	43.5	55
		Day Time Average	**dB**	**44.96**	**55**

4.2.10 Hydrology

Agriculture and livestock are main source of livelihood for rural population of the district. The district is famous for cotton and sugarcane crops, while wheat and rice are also cultivated. The geographical location and climatic conditions makes the agriculture production more vulnerable to various hazards. Agriculture in Rajanpur depends solely upon canal irrigation since rainfall is negligible in the region. The following are the main canals in Rajanpur district:

a) Link No. III
b) Kadra Canal and
c) Dajal Branch

According to the Punjab development statistics by the year 2014-2015, the total reported sown area was 349,000 hectares, actual area sown was 319,000 hectares, canal tube wells used for irrigation purposes were 189,000 hectares, canals were 68,000 hectares, wells were 11,000 hectares while other sources used for 8 irrigation purposes were 6,000 hectares (Figure 21).

River Indus flows along the district with a distance of 10 km to 15 km. However, the water of the main rivers is not available for the area. There is no river fed irrigation canal system within project area however, one surface water canal is identified outside the project area at distance of 2km which is built for the supply of water for agricultural needs. Hence, the project area is dependent on rainwater and groundwater. Due to hilly terrain of the project area, there are numerous natural drainage pattern of rainwater that discharges in the Indus River.

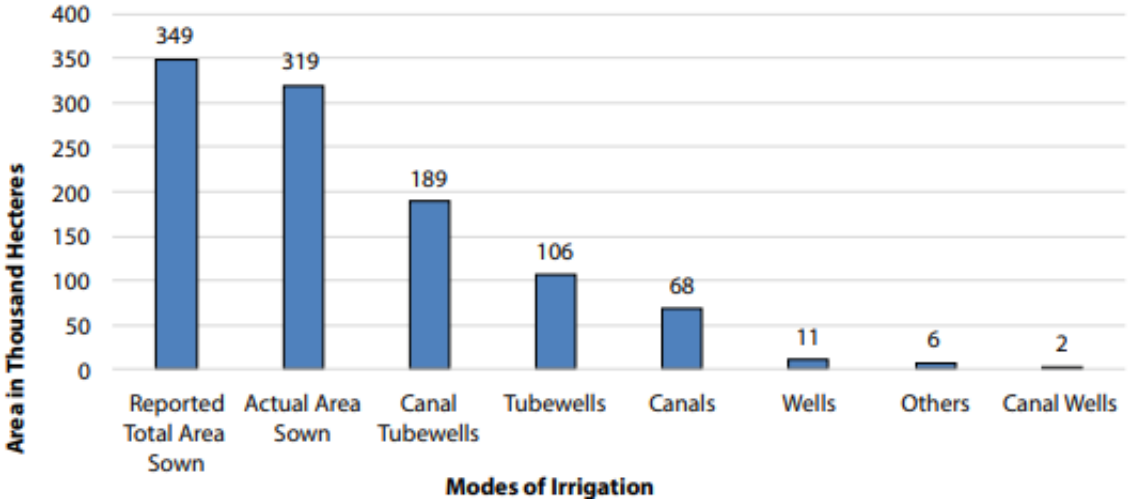


Figure 20: Irrigated Area of Rajanpur by the Year 2014-2015

A. Surface water analysis

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

Table 16: Surface Water Analysis Results

Parameters	Analysis Method	Unit	LOR	Result
pH**	APHA-4500-H+ B	-	0.01	7.73
Temperature	-	0C	-	24.3
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1	2417
Total Suspended Solid**	APHA-2540-C	mg/l	1	1361
Biological Oxygen Demand	APHA-5210	mg/l	1	5.6
Chemical Oxygen Demand**	APHA-5220-D	mg/l	1	14
Oil and Grease**	USEPA-1664	mg/l	0.2	<0.2
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0..01
Chloride (Cl)**	APHA-4500 B	mg/l	0.24	212.7
Fluoride (F)**	APHA-4500F- D	mg/l	0.01	<0.01
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01
Detergent	APHA-5540 B	mg/l	-	ND
Pesticides	APHA-6630 B	mg/l	-	ND

Sulphate**	APHA-4500-SO42-C	mg/l	0.41	34
Sulphide	APHA-4500-S2-E	mg/l	0.4	<0.4
Ammonia	APHA-4500-NH3-B	mg/l	0.002	<0.002
Zinc**	APHA-3111 B	mg/l	0.0033	1.5936
Manganese**	APHA-3111 B	mg/l	0.0016	<0.0016
Silver	APHA-3111Ag-B	mg/l	0.0032	0.0043
Chlorine	APHA-4500Cl-B	mg/l	0.1	<0.1
Iron**	APHA-3111 B	mg/l	0.1	9.058
Cadmium**	APHA-3111 B	mg/l	0.0028	0.0029
Chromium**	APHA-3111 B	mg/l	0.0054	<0.0054
Copper**	APHA-3111 B	mg/l	0.0045	0.0048
Lead**	APHA-3111 B	mg/l	0.013	<0.013
Mercury	APHA-3112 Hg B	mg/l	0.0008	<0.0008
Nickel**	APHA-3111 C	mg/l	0.008	0.0071
Arsenic	APHA-3111 As B	mg/l	0.01	<0.01
Barium	APHA-3111 Ba B	mg/l	0.031	<0.031
Boron	APHA-4500B-C	mg/l	0.1	<0.1
Selenium	APHA-3111 Se-B	mg/l	-	ND
Total Toxic Metals	By Calculation	mg/l	-	0.0231

PEQS do not define standards for surface water. Results of canal water testing show significant values of Total dissolved solids and total suspended solids. Oil and grease concentration appears very low (<0.2 mg/l) in canal water.

B. Ground Water Quality

Ground water sample was collected from a bore water near the proposed project area which is at a distance of 14 km. The sample was collected in the month of October 2022 and analyzed to assess its quality. The analysis results are presented below and the complete analysis report is attached in the Annexure III.

Table 17: Ground Water Sample 1 Analysis Result

Parameters	Analysis Method	Unit	LOR	Result	PEQS
pH**	APHA-4500H+ B	-	0.01	7.37	6.5-8.5
Odor	In-house	-	-	Odorless	Non-Objectionable
Taste	In-house	-	-	Sweet	Non-Objectionable
Color	APHA-2120 B/C	Pt/Co	1	<1.0	≤15 TCU
Turbidity**	APHA-2130 B	NTU	-	16.73	<5 NTU
Total Hardness**	APHA-2340 B&C	mg/l	0.1	132	< 500 mg/l
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1	233	< 1000
Chloride**	APHA-4500 B	mg/l	0.24	30.13	< 250
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	≤ 0.05
Fluoride (F)**	APHA-4500F- D	mg/l	0.01	<0.01	≤ 1.5
Nitrite	APHA-4500NO2 B	mg/l	0.01	0.064	≤ 3 (P)
Nitrate**	APHA-4500NO3 C	mg/l	0.1	<0.1	≤ 50
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.01	-
Residual Chlorine	APHA-4500Cl G	mg/l	0.1	<0.1	0.2-0.5

Aluminum (Al)	APHA-3111Al B	mg/l	0.028	<0.028	≤ 0.2
Cadmium**	APHA-3111 B	mg/l	0.0028	<0.0028	0.01
Copper**	APHA-3111 B	mg/l	0.0045	<0.0045	2
Chromium**	APHA-3111 B	mg/l	0.0054	<0.0054	≤ 0.05 (P)
Mercury	APHA-3112Hg B	mg/l	0.0008	<0.0008	≤ 0.001
Antimony (Sb)**	APHA-3111 B	mg/l	-	ND	≤ 0.005 (P)
Nickel**	APHA-3111 C	mg/l	0.008	<0.008	≤ 0.02
Zinc**	APHA-3111 B	mg/l	0.0033	<0.0033	5
Arsenic	APHA-3111As B	mg/l	0.01	<0.01	≤ 0.05 (P)
Barium	APHA-3111Ba B	mg/l	0.031	<0.031	0.7
Manganese**	APHA-3111 B	mg/l	0.0016	<0.0016	≤ 0.5
Iron**	APHA-3111 B	mg/l	0.1	<0.1	-
Boron	APHA-4500-B (C)	mg/l	0.1	<0.1	0.3
Lead**	APHA-3111 B	mg/l	0.013	<0.013	≤ 0.05
Selenium	APHA-3111Se B	mg/l	-	ND	0.01 (P)
Pesticides	APHA-6630 B	mg/l	-	ND	0.15
MICROBIOLOGICAL ANALYSIS					
Total Coliforms	APHA:9222 B	CFU/100ml		Absent	0/100ml
Faecal Coliforms (Ecoli)	APHA:9222 D	CFU/100ml		Absent	0/100ml

Table 18: Ground Water Sample 2 Analysis Result

Parameters	Analysis Method	Unit	LOR	Result	PEQS
pH**	APHA-4500H+ B	-	0.01	7.37	6.5-8.5
Odor	In-house	-	-	Odorless	Non-Objectionable
Taste	In-house	-	-	Sweet	Non-Objectionable
Color	APHA-2120 B/C	Pt/Co	1	<1.0	≤15 TCU
Turbidity**	APHA-2130 B	NTU	-	16.73	<5 NTU
Total Hardness**	APHA-2340 B&C	mg/l	0.1	132	< 500 mg/l
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1	233	< 1000
Chloride**	APHA-4500 B	mg/l	0.24	30.13	< 250
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	≤ 0.05
Fluoride (F)**	APHA-4500F- D	mg/l	0.01	<0.01	≤ 1.5
Nitrite	APHA-4500NO2 B	mg/l	0.01	0.064	≤ 3 (P)
Nitrate**	APHA-4500NO3 C	mg/l	0.1	<0.1	≤ 50
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.01	-
Residual Chlorine	APHA-4500Cl G	mg/l	0.1	<0.1	0.2-0.5
Aluminum (Al)	APHA-3111Al B	mg/l	0.028	<0.028	≤ 0.2
Cadmium**	APHA-3111 B	mg/l	0.0028	<0.0028	0.01
Copper**	APHA-3111 B	mg/l	0.0045	<0.0045	2
Chromium**	APHA-3111 B	mg/l	0.0054	<0.0054	≤ 0.05 (P)
Mercury	APHA-3112Hg B	mg/l	0.0008	<0.0008	≤ 0.001
Antimony (Sb)**	APHA-3111 B	mg/l	-	ND	≤ 0.005 (P)
Nickel**	APHA-3111 C	mg/l	0.008	<0.008	≤ 0.02
Zinc**	APHA-3111 B	mg/l	0.0033	<0.0033	5.0
Arsenic	APHA-3111As B	mg/l	0.01	<0.01	≤ 0.05 (P)

Barium	APHA-3111Ba B	mg/l	0.031	<0.031	0.7
Manganese**	APHA-3111 B	mg/l	0.0016	<0.0016	≤ 0.5
Iron**	APHA-3111 B	mg/l	0.1	<0.1	-
Boron	APHA-4500-B (C)	mg/l	0.1	<0.1	0.3
Lead**	APHA-3111 B	mg/l	0.013	<0.013	≤ 0.05
Selenium	APHA-3111Se B	mg/l	-	ND	0.01 (P)
Pesticides	APHA-6630 B	mg/l	-	ND	-
MICROBIOLOGICAL ANALYSIS					
Total Coliforms	APHA:9222 B	CFU/100ml		Absent	0/100ml
Faecal Coliforms (Ecoli)	APHA:9222 D	CFU/100ml		Absent	0/100ml

Results of groundwater sampling show high turbidity in both samples while rest of the parameters are within PEQS limits for drinking water.



Surface Water Sampling
28°30'13.4"N 69°41'20.1"E



Surface Water Sampling
28°35'14.31"N, 69°35'5.23"E



Amibient Air Quality Location-1
28°38'26.5"N 69°32'59.6"E



Ambient Air Quality Location - 2
28°36'48.8"N 69°31'33.6"E

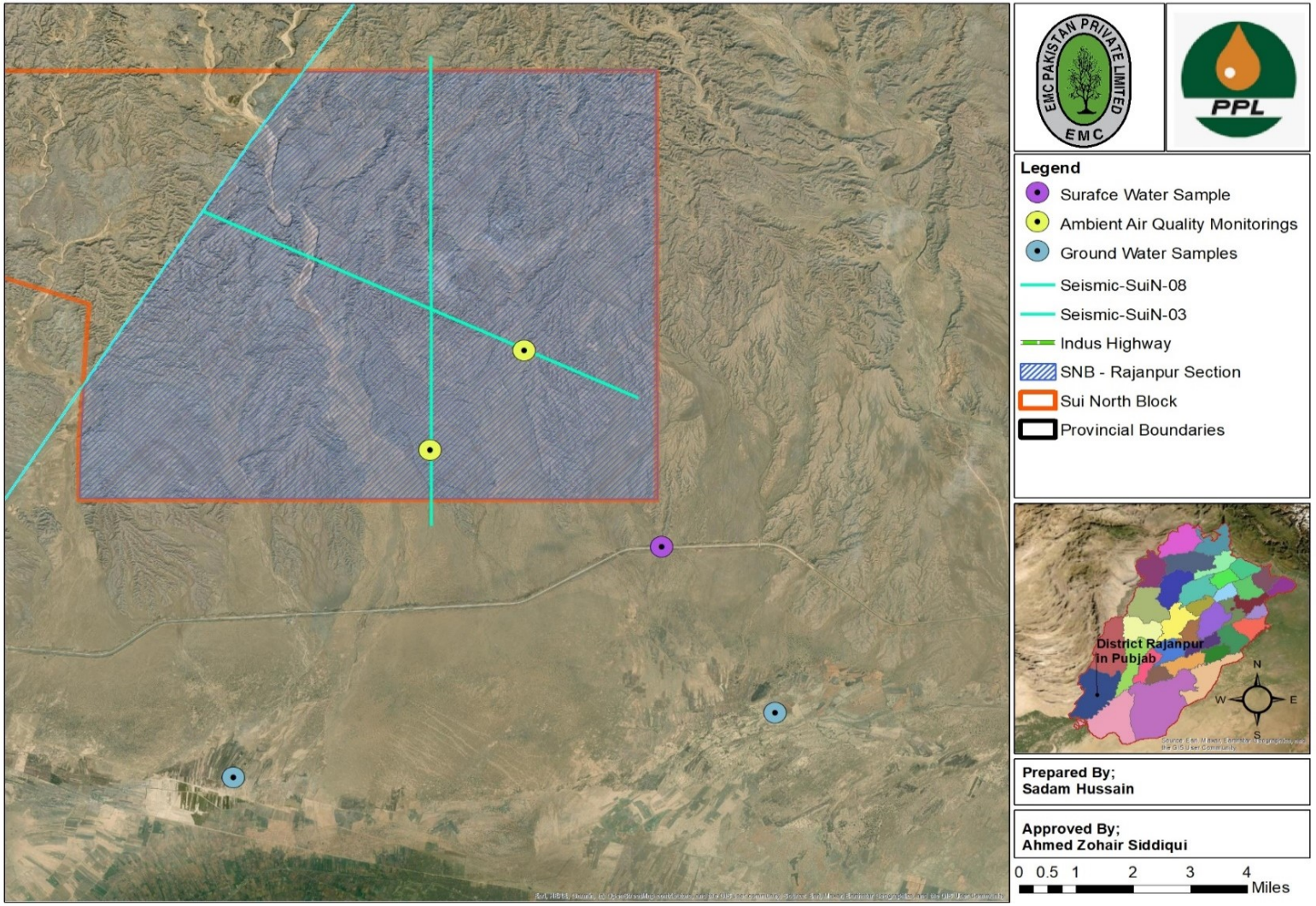


Figure 21: Environmental Monitoring Location Map

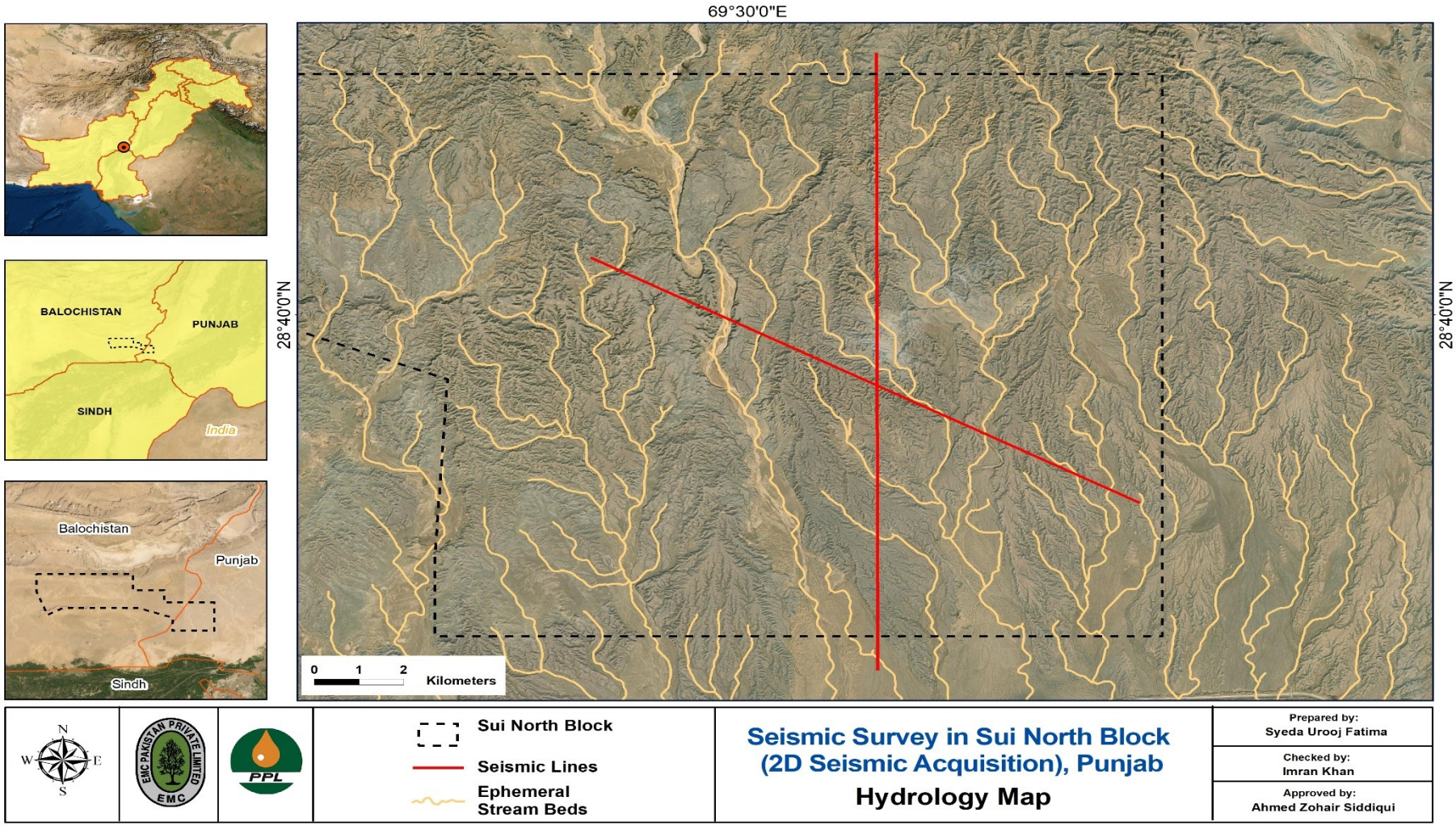


Figure 22: Project Area Hydrology Map

4.2.11 Land-use

The project area is in the "Pothwar plateau". The rocks which underline the "Pothwar" are the soft grey sand stones and orange to bright red shades of the Siwalik Range system.

The Jand tehsil alongside fertile agricultural land has barren lands with sandy and clayey soils. Agriculture in this area depends on rainfall, except the area which have irrigation waters from mini / small dams.

The agricultural land use is as follows:

Table 19: Land Utilization 2019-2020

Land Utilization 2019-2020						
Tehsil / District	Reported Area (acres)	Cultivated Area (acres)	Un-Cultivated Area (acres)			
			Total	Cultivable Waste	Forest	Not-Available for Cultivation
Rajanpur	576,453	373,485	202,968	137,070	7,367	58,531
Source: Revenue Department, Government of the Punjab						

4.2.12 Forestry

About 34,701 acres of the total area of the district Rajanpur is covered with forest. As mentioned above forests are located in the mountains and there are no major forests in the Sui North Block (Rajanpur Section) except some bushes or cluster of bushes known as "Rakh". The trees in Rakhs are mostly 'Keekar'. These Rakh or vegetation have been designated as classes and unclassed reserved forest.

Table 20: Forest Area by Administration & Enactment

Forest Area by Administrative Jurisdiction & Enactment 2018-19 (Acres.)				
District	Total Compact (Col.4 to 9)	Protected Forest		Reserved Forests Area
		Total Linear (Running K.M.)	Compact Area Under Provincial Govt.	Under Provincial Govt.
Rajanpur	34,701	1,335	34,212	-
Source: Punjab Development Statistics 2020				

4.3 Ecological Environment[31]

The river Indus originates from the Himalayan Mountains, adjoining the Mount Kailash in Western Tibet. The Lake Rakhshesh is fed by River Indus, situated at an altitude of c.a. 18000 feet. Traversing about 500 miles in NW direction, it is joined by Shyok River near Skardu (elevation about 9000 feet). Over 100 miles in the same direction to west, it reaches Nanga Parbat and joined by the Gilgit River at an elevation of 5000 feet. Flowing about 200 miles further in SW direction, the river enters into the plains of the Punjab province at the Kalabagh (800 feet). The Kabul River, a major western flank tributary, joins with Indus River. The Kunar (pronounced as Kunerh) River joins Indus below Warsak, another stream called Haro River drains into the Indus River from the North Eastern direction. About seven miles upstream of Jinnah Barrage, another stream called Soan River joins the Indus.

The Indus is main river flowing on the eastern border of the Rajanpur district begins to rise during the month of May when the melting of the snow on the Himalaya commences and gradually swells till it fills its bed for as much as a breadth of 14 kilometers in places, driving flood waters down the depression and filling the inundation canals. It continues high till the end of August and then begins to subside reaching cold weather at the end of September.

Sui North Block

Sui North Block is located in district Rajanpur, of Punjab province and lies in the District Dera Bugti of Balochistan and small portion lies in District Rajanpur. The Sui North Block covers an area of approximately 812 sq. km.

The project area in Punjab mainly comprises of sedimentary rocks mountains hills covered in homogenous grasses with little to no taller vegetation; wild cereals and grasses with no obvious human plotting (i.e., not a plotted field); natural meadows and fields with sparse to no tree cover, open savanna with few to no trees.

In addition to this soil classification according FAO UNESCO the project area is mainly comprises of lithosols and haplic yermosols which are loose sediments predominantly deposits of older River, as showing in pictures below. There is no protected area within or near the project area.

[31] Initial Environmental Examination "Seismic & Multiple drilling activities in sui mining lease (2020).

	
Loose Sediment Soil	Sedimentary Rock Hills

4.3.1 Floral Attributes of the Project Area

The climate conditions of project area and of the district are not conducive to the growth of dense forests or jungles. The lack of soil fertility does not allow the natural growth or even the under growth to take root in the sandy areas and barren hills. Commonly found flora in project area and in district includes Acacia nilotica (Keekar), Eucalyptus camaldulensis (Safaida), Phoenix dactylifera (Date Palm), Dalbergia sissoo (Shisham). Azadirachta indica (Neem), Salvadora oleoides (Peelu) and Ficus religiosa (Peeple). Common grasses include Arislidade pressa (Lumb), Eleusine compressa (Chemmer), lasiuruss indicus (Gorkha) and Saccharum bengalensis (Kana) are found in the project area[32].

4.3.2 Faunal attributes of the Project Area

a) Birds

The project site is located in hills and rangeland. The surface water body is absent in the study area, avian density and diversity is scares in the area. Based upon previous studies conducted in the area, very limited number of species of birds were found in the project area. Most common species include common sparrow, House crow, and Bank Myna. A complete list of birds was prepared by using secondary data which is presented in the form of Table 22.

[32] District Rajanpur Agriculture (Flora and Fauna) from https://rajanpur.punjab.gov.pk/agriculture and IEE of Shikarpur - Rajanpur Section of N-55 from https://nha.gov.pk/uploads/topics/16408523292514.pdf





Avifauna Status of Project Area





Avifauna Status of Project Area

Table 21: Avifauna Species in the Project Area[33]

S. No	English Name	Scientific Name	Status		Occurrence				Listing	
			Migratory	Resident	Common	Abundant	Less Common	Rare	Provincial Laws	IUCN
1.	Bank Myna	*Acridotheres Ginginianus*		x	x					
2.	Bay-backed Shrike	*Lanius vittatus*		x		x				
3.	Black Drongo/King Crow	*Dicrurus macrocercus*		x	x					
4.	Black Kite	*Milvus migrans*		x	x					
5.	Black Redstart	*Phoenicurus ochruros*		x		x				

[33] https://rajanpur.punjab.gov.pk/agriculture

6.	Blue Rock Pigeon	*Columba livia*		x			x			
7.	Common Myna/Indian Myna	*Acridotheres tristis*		x			x			
8.	Common Pochard	*Aythya ferina*		x			x			
9.	Common Redstart	*Phoenicurus Phoenicurus*		x		x				
10	Desert lark	*Ammomanes deserti*		x	x					
11	Desert Wheatear	*Oenanthe deserti*		x			x			
12	Great Cormorant	*Phalacorcorax carbo*		x			x			
13	Great Grey Shrike	*Lanius excubitor*		x	x					
14	Great Reed Warbler	*Acrocephalus Arundinaceus*	x	x			x			
15	Grey Heron	*Ardea cinerea*		x			x			
16	House Crow	*Corvus splendens*		x	x				x	
17	House Sparrow	*Passer domesticus*	x			x			x	
18	House Swift	*Apus affinis*		x			x			

b) Mammals and Reptiles

Most of the study area comprises rangeland, 6 mammalian species have been recorded during previous studies conducted in the project area out of which 4 are wild species and 2 are commonly found. All the 6 species are commonly found in the project areas as well as in country and not any significant threat can be expected from any activity.

Several types of burros and droppings were found which indicate the presence of respected reptiles. Indian monitor lizard, Indian sand swimmer, and Indian cobra, were observed in the area.

None of the reptiles and mammalian species found here are listed under any category of the IUCN Red List. Nine species of reptiles were also recorded including snakes and lizards. Only 1 species i.e. Indian cobra is listed as Data Deficient in the IUCN Red List. A complete list of mammals and reptiles is provided in Table 23.





Foot Prints of Reptiles in Project Area

Table 22: Mammals and Reptiles in the Project Area[34]

S. No	English Name	Scientific Name	Occurrence				Listing	
		-	Common	Abundant	Less Common	Rare	Provincial Laws	IUCN
Mammals								
1.	Desert Cat	*Felis silvestris ornate*			x			
2.	Red Fox	*Vulpes vulpes*				x		
3.	Indian Desert Jird	*Meriones hurrionae*			x			
4.	Balochistan Gerbil	*Gerbillus nanus*			x			
5.	House Mouse	*Mus musculus*			x	x		
6.	House Rat	*Rattus rattus*				x		
Reptiles								
7.	Indian Cobra	*Naja naja naja*	x					x
8.	Garden Lizard	*Calotes versicolor*						
9.	Indian Desert Monitor	*Varanus griseus*	x					
10.	Indian sand swimmer	*Ophiomorus raithmai*			x			
11.	Indian Sand	*Eryx johnii johnii*			x			
12.	Pakistan Ribbon Snake	*Psammophis leithii*			x			
13.	Sindh Sand Gecko	*Crossobamon Orientalis*			x			
14.	Spotted Indian House Gecko	*Hemidactylus brookii Brookii*			x			
15.	Yellow Bellied House Gecko	*Hemidactylus flaviviridis*			x			

4.4 Socio- Economic Environment[35],[36]

The district lies entirely towards the west bank of River Indus. The Rajanpur town is approximately 10 to 15 km from the west bank of the river. The district has vital historical, cultural and geo-strategic position as it is a gateway to Sindh as well as Baluchistan Province. Until 1862, it remained a small village located on the road from Dera Ghazi Khan in Punjab to Sukkur. It became a municipality and tehsil headquarter in 1873. It was given the status of independent District in 1982.

[34] https://rajanpur.punjab.gov.pk/agriculture
[35] Pakistan Bureau of Statistics, Islamabad, 2017; "District and Tehsil level population summary with region breakup"; available at http://www.pbscensus.gov.pk/sites/default/
[36] Bureau of Statistics, Planning and Development Department, Government of the Punjab; "Punjab Development Statistics, 2016: available at http://aidsdatahub.org/sites/default/

District Rajanpur is divided into three tehsils namely Rajanpur, Jampur, and Rojhan with a total of 69 union councils (Table 22). Figure 23 shows the land use land classification of district Rajanpur.

Table 23: District Administration of Rajanpur[37]

Tehsil	Union Council	Revenue Estates / Mouzas	Area (acres)	No of Households (2017)	Population (2017)
Jampur	32	183	573,789	107,607	849,086
Rajanpur	21	219	576,453	92,801	706,868
Rojhan	15	89	719,095	56,891	405,774
Tribal Area (De Excluded area)	01	43	988,421	5,191	34,230
Total	**69**	**534**	**2,857,758**	**262,490**	**1,995,958**

[37] //www.citypopulation.de/en/pakistan/distr/admin/727__rajanpur/

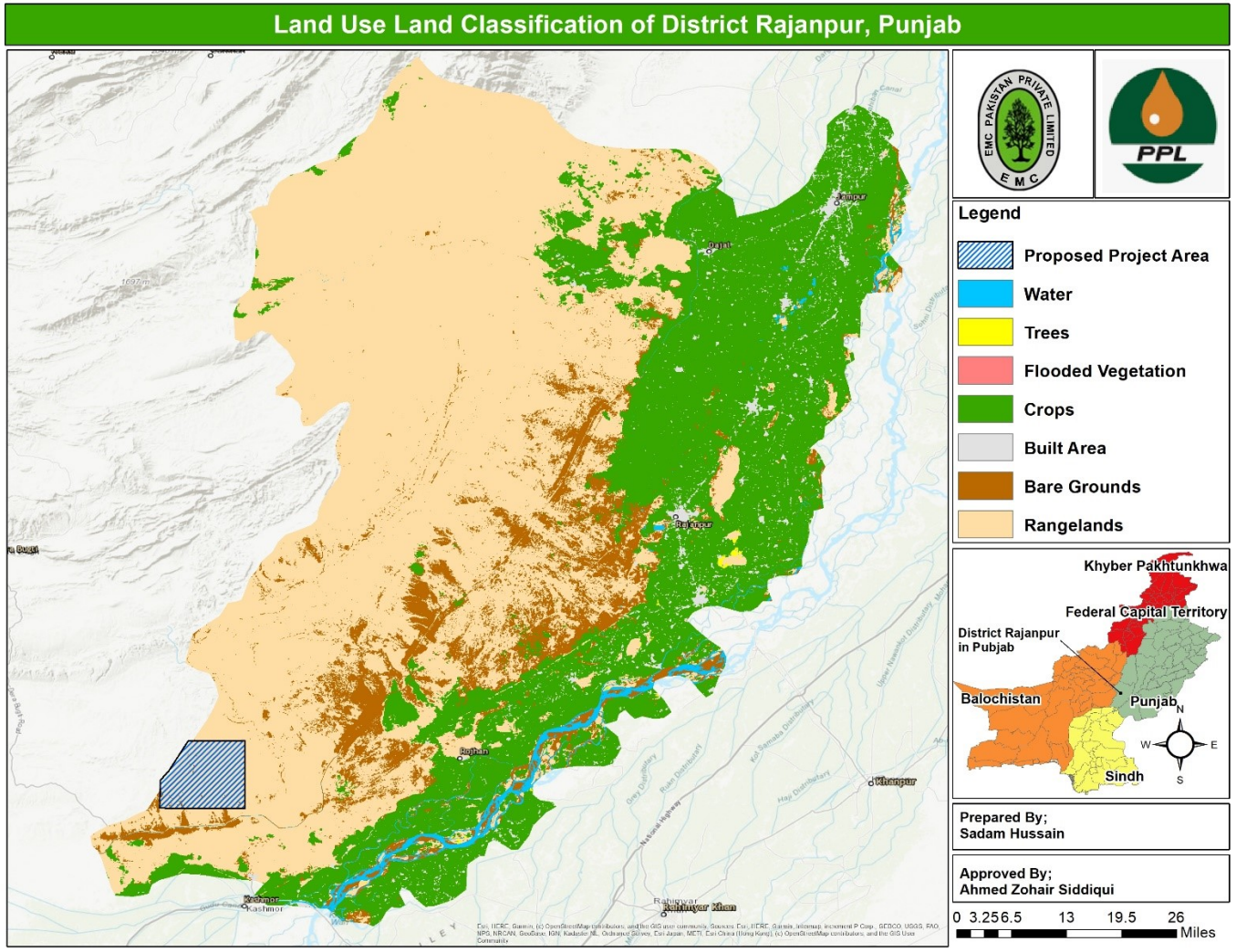


Figure 23: Land Use Land Classification Map of District Rajanpur

Distribution of Land Cover in District		
LULC Type	**Area_km²**	**Area_%**
Water	325.31	1.30
Trees	14.68	0.06
Flooded Vegetation	0.15	0.01
Crops	7873.42	31.43
Built Area	428.45	1.71
Bare Grounds	2251.53	8.99
Rangelands	14153.19	56.51
Total Area (km²)	**25046.714**	

Land Cover in Percentage

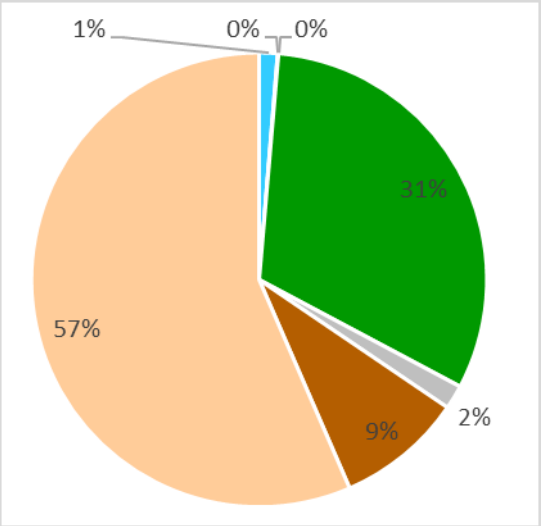


Figure 24: Land Classification of District Rajanpur with Area & Percentage

4.4.1 Population and Administration

According to the provisional population census of 2017, total population of Rajanpur District is 1,995,958, out of which 337,202 (16.9%) population are living in urban areas, while rest of population of 1,658,756 (83.1%) are living in rural areas. Figure 22 shows Tehsil-wise population distribution of District Rajanpur. Tehsil Jampur and Rajanpur have majority of the population contributing 78% of the total population.

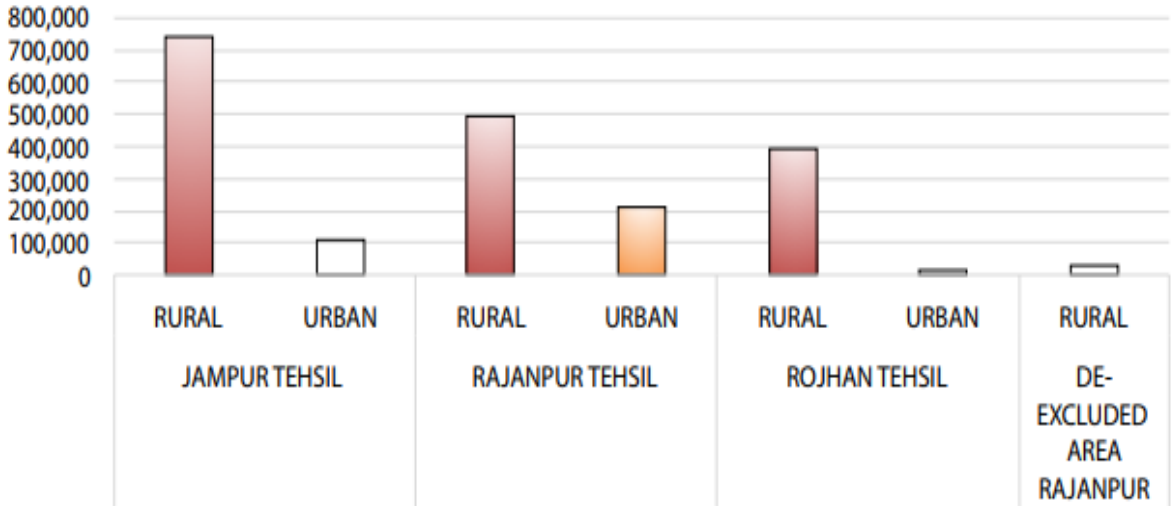
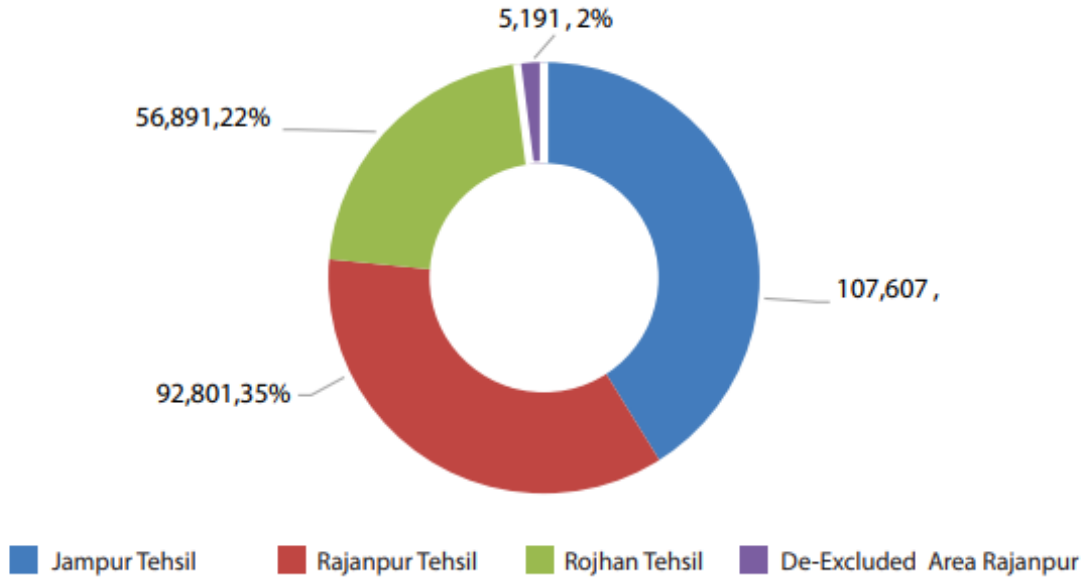


Figure 25:Tehsil Wise Population Distribution (2017 Census)

4.1.2 Household Distribution

According to 2017 provincial statistics, the total number of households in District were 262,490. Tehsil Jampur and Rajanpur have majority of the population contributing 78% of the total population.

Figure 26: Tehsil-wise Household Distribution in District Rajanpur (2017 Provisional Statistics



4.1.3 Agriculture and Irrigation[38]

Agriculture and livestock are main source of livelihood for rural population of the district. The district is famous for cotton and sugarcane crops, while wheat and rice are also cultivated. The geographical location and climatic conditions make the agriculture production more vulnerable to various hazards. Agriculture in Rajanpur depends solely upon canal irrigation since rainfall is negligible in the region. The following are the main canals in Rajanpur district:

- Link No. III
- Kadra Canal and
- Dajal Branch

According to the Punjab development statistics by the year 2014-2015, the total reported sown area was 349,000 hectares, actual area sown was 319,000 hectares, canal tube wells used for irrigation purposes were 189,000 hectares, canals were 68,000 hectares, wells were 11,000 hectares while other sources used for irrigation purposes were 6,000 hectares.

38 https://info.undp.org/docs/pdc/Documents/PAK/DDMP%20District%20Rajanpur%20(New%20Design.pdf

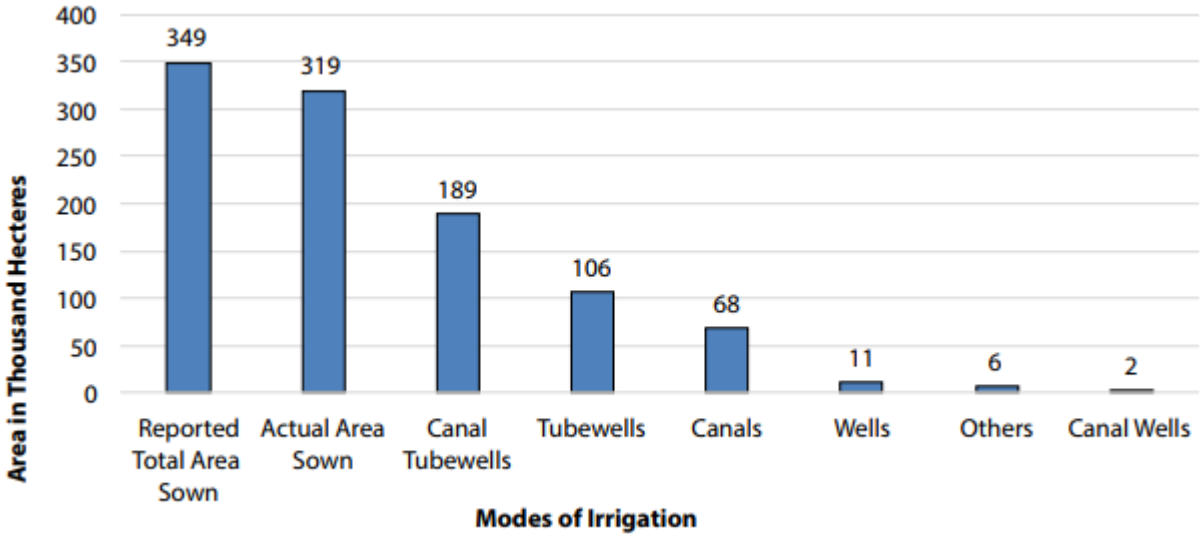


Figure 27: Irrigated Area of Rajanpur by the Year 2014-2015

4.1.4 Industry and Trade

Small scale industries in District Rajanpur include carpet weaving, cotton ginning, pressing rice, husking, ice factories, brick kilns and flour mills. Number of reported factories in the district are 31. Rajanpur is the commercial and industrial epicenter for both Rajanpur and Dera Ghazi Khan District. It has a good rail and road networks with the rest of the country. Industries include cotton production and processing, flour mills, sugar mills and oil mills are present in District Rajanpur. Mangoes and oranges are two main fruits of this city. The rate of development in the district is very low due to the lack of the resources and education but the Government along with civil societies are working to improve the living standards of the local population.

4.1.5 Health

The health care coverage of the district shows a big gap between service providers and population they supposed to serve. On the face of the rapid population growth, 1,995,958 heads have access to only one District Head Quarter (DHQ) hospital, 2 Tehsil Head Quarter (THQ) hospitals, 06 Rural Health Centre (RHC) and 33 Basic Health Units (BHU). The following Table describes the existing health facilities in District Rajanpur.

Table 24: Distribution of Health Facilities in District Rajanpur (2017)[39][40]

Health Facilities	Number
Basic Health Unit (BHU)	33
Rural Health Centers (RHC)	06
Tehsil Head Quarters (THQ	02
DHQ/Tertiary Care Hospital	01
40-Bedded Civil Hospital Shahwali (CH)	01
Mother & Child Health Center (MCH)	01
Medical Officer	80
Male Paramedics	170
Female Paramedics	106
SH & NS	25

4.1.6 Education

Janpur has a total of 1,190 government schools out of which 41% (488 schools) are available for girl students. The total number of enrolment (male and female) in these Government schools are 155,751 students. The number of male and female teachers in the government schools are 2,541 and 2001 respectively.

Table 25: Education Facilities of District Rajanpur[41]

Level Wise School			Enrollment		Teachers	
Level	**Boys Schools**	**Girls' Schools**	**Boys Students**	**Girls Students**	**Male Teachers**	**Female Teachers**
Higher Secondary	7	4	6,527	3,102	213	113
High	40	19	18,964	11,431	213	375
Middle	88	52	14,639	6,995	672	350
Primary	567	413	57,029	37,064	442	1,163
Total	702	488	97,159	58,592	2,541	2,001

[39] https://pshealthpunjab.gov.pk/Upload/Downloads/ykefptsj.vo420220106.pdf
[40] https://dhqrajanpur.punjab.gov.pk/
[41] http://www.aserpakistan.org/images/DRC/Rajanpur.pdf

SECTION 5: STAKEHOLDER CONSULTATION

5.1 General

This section provides an overview of the stakeholder and public consultation process adopted by consultant M/s EMC and presents the findings of the stakeholder consultations. Public involvement is one of the key features of environmental assessment, which ensures to better and more acceptable decision-making. The overall objective of the consultation with stakeholders is to identify the environmental and social concerns that have been presumed to arise and to identify those which are not known or are unique to area near the project site. Stakeholder consultation presents an opportunity for mutual information-sharing and dialogue between the project proponent and stakeholders. An effective public consultation process provides concrete suggestions that can help improve project design resolve conflicts at an early stage, identify management solutions to mitigate potentially adverse consequences and enhance positive impacts, and develop guidelines for effective monitoring and reporting of project activities throughout the project cycle. Providing the public with adequate reliable information of the planned project is of significant importance in creating public trust and acceptance. Moreover, experience reveals that unexpected project impacts on the local community generally give rise to significant issues and concerns. Such problems can be avoided if people are properly informed and consulted about the project and given the opportunity to raise their concerns. Thus, the main objectives of the Consultation process are:

- Information dissemination, education, and liaison;
- Identification of problems and needs;
- Collaborative problem solving;
- Reaction, comment and feedback on proposed project; and
  Documenting mitigation measures proposed by the stakeholders.

5.1.2 Aims and Objectives of the Stakeholder Consultation

The main aims and objectives of this exercise were to disseminate information on proposed project activities to local people and other stakeholders so that any feedback received could be used to address the issues at an early stage.

5.1.3 Proponent

PPL being the proponent of the project shared the project related details with Environmental Consultant M/s EMC Pakistan Pvt. Ltd.

5.1.4 Consultation Methodology

EMC team carried out consultations with the local residents in the vicinity (primary stakeholders) of the project and with the relevant departments (secondary stakeholders). The consultation approach included:

- Communication of project scope and objectives to the stakeholders
- Identification of values held by the residents/departments and their concerns regarding the development activities in the project area.
- Obtaining their feedback and suggestions on the proposed project activity.

Identification of stakeholders is one of the major steps for designing an effective consultation process. For this purpose, a site visit was carried out by EMC social team to identify the villages and the relevant stakeholders for consultation. Consultation meetings were conducted with the identified stakeholders residing or working in the villages near the project area and with relevant departments by EIA team. The stakeholders were briefed about background and scope of oil and gas field activities at the beginning of the meeting sessions. Queries regarding the project were responded by EIA team during the session. Concerns and suggestions of the respondents were noted down by the team and pictures of the session were taken with the consent of the stakeholders

5.1.5 Response from the Proponent

PPL (the proponent) has a comprehensive QHSE Management System to continuously improve its performance in the areas of Quality, Health, Safety & Environment.
PPL QHSE Management System will facilitate the proposed project to implement formal systems for performance improvements in achieving the health and safety of its employees and other personnel as well as minimize the environment footprint in the proposed project. PPL will follow the mitigation measures during project execution to reduce the environmental impacts as far as reasonably practicable.
Below is the list of senior staff of PPL involved in the proposed project.

Table 26: List of Proponent team members

S No.	Name	Designation
1.	Mr. Jamil Akhtar	Senior Manager (Quality, Health, Safety & Environment)
2.	Mr. Umar Farooq	Senior Manager (Exploration Frontier)
3.	Mr. M. Shifaat Alam	Manager Exploration (Subsurface Technologies & SS, STSS)
4.	Mr. Naveed Inayat Khan	Chief Operations Geophysicist (Exploration, STSS)
5.	Mr. Abid Hussain	Chief Geologist (Exploration Frontier)
6.	Mr. Syed Habib Shah	Senior Geologist (Exploration Frontier)
7.	Mr. Mustajab Ahmad	Geologist (Exploration Frontier)
8.	Mr. Sajjad Munir	Geophysicist (Exploration, STSS)
9.	Mr. Zeeshan Raza	Senior Engineer (Health, Safety & Environment)

10.	Mr. Abid Hussain	Deputy Chief Engineer (Quality, Health, Safety & Environment)

PPL provided feedback (through emails and telephonic calls) to M/s EMC on project scope. Draft EIA report was also reviewed by PPL and consolidated comments were shared with EMC for incorporation in the report.

5.2 Response of Institutional Stakeholder

5.2.1 District EPA Officer – District

Date: Wednesday, 05, October, 2022.

Venue: EPA Rajanpur

Name of the designated person: Mr. Arif Hussain (MI)

Summary of Discussion:

EPA Officer in District Rajanpur, Mr. Arif. Hussain (MI) was contacted for his valuable suggestions and recommendations for the proposed seismic activities in Sui North Block (Rajanpur). He was briefed about the scope of the project and activities involved.

Suggestions and recommendations by EPA Officer are as follows:

- No waste should be discharge in Kacchi canal by PPL Operators or Contractors during the Seismic Survey.
- During Seismic survey, the damages to native flora by land clearing should be minimized.
- The waste produced should be disposed of environmentally friendly manner.
- Plantation should be done by PPL after seismic activities.



5.2.2 TMA Officer

Date: Wednesday, 05, October, 2022.

Venue: TMA Rajanpur

Name of the designated person: Mr. Riaz Mizari (MFO TMA)

Summary of Discussion:

TMA Officer in District Rajanpur, Mr. Riaz Mazari (MFO TMA) was contacted for his valuable suggestions and recommendations for the proposed seismic activities in Sui North Block (Rajanpur). He was briefed about the scope of the project and activities involved.

Suggestions and recommendations are as follows:

- Waste generated should be treated as per law and PPL.
- PPL should contact TMA prior to waste disposal.
- The proposed study area is political unstable. It is recommended that PPL should engage both tribes Bughtis and Mazaris to avoid conflicts.



5.2.3 Quaid I Azam university

Date: Wednesday, 05, October, 2022.

Venue: Quaid I Azam University

Name of the designated person: Dr. Hamid (Research Associate)

Summary of Discussion:

Dr. Hamid from Environmental Sciences department (Quaid-I-Azam University), was contacted for his valuable suggestions and recommendations for the proposed seismic activities in Sui North Block (Rajanpur). He was briefed about the scope of the project and activities involved.

Suggestions and recommendations are as follows:

- Usually, the seismic study does not have a significant impact if its extent is low but if it is carried out on a large area, then such activities have the potential to disturb vegetation, soil, terrain and of wildlife habitat on a localized scale. Therefore, it is recommended that in case of any damage to the vegetation, a plantation should be carried out in the study area.
- The PPL should ensure that implementation of the EMP proposed to mitigate the impacts.
- If the contractors encountered any wildlife den, nests or offspring during the survey, they should inform the local wildlife department for the safe removal and relocation.

5.3 Responses of Primary Stakeholders

5.3.1 Settlement near project site

There is no settlement in the project vicinity, the project area is barren land. Sometimes people from the nearby area come to feed their herds. Proper drainage and sewerage system are absent in the area. Smaller settlements are present at a distance of over 6 to 9km southwards of the proposed project, as shown in the Figure below.

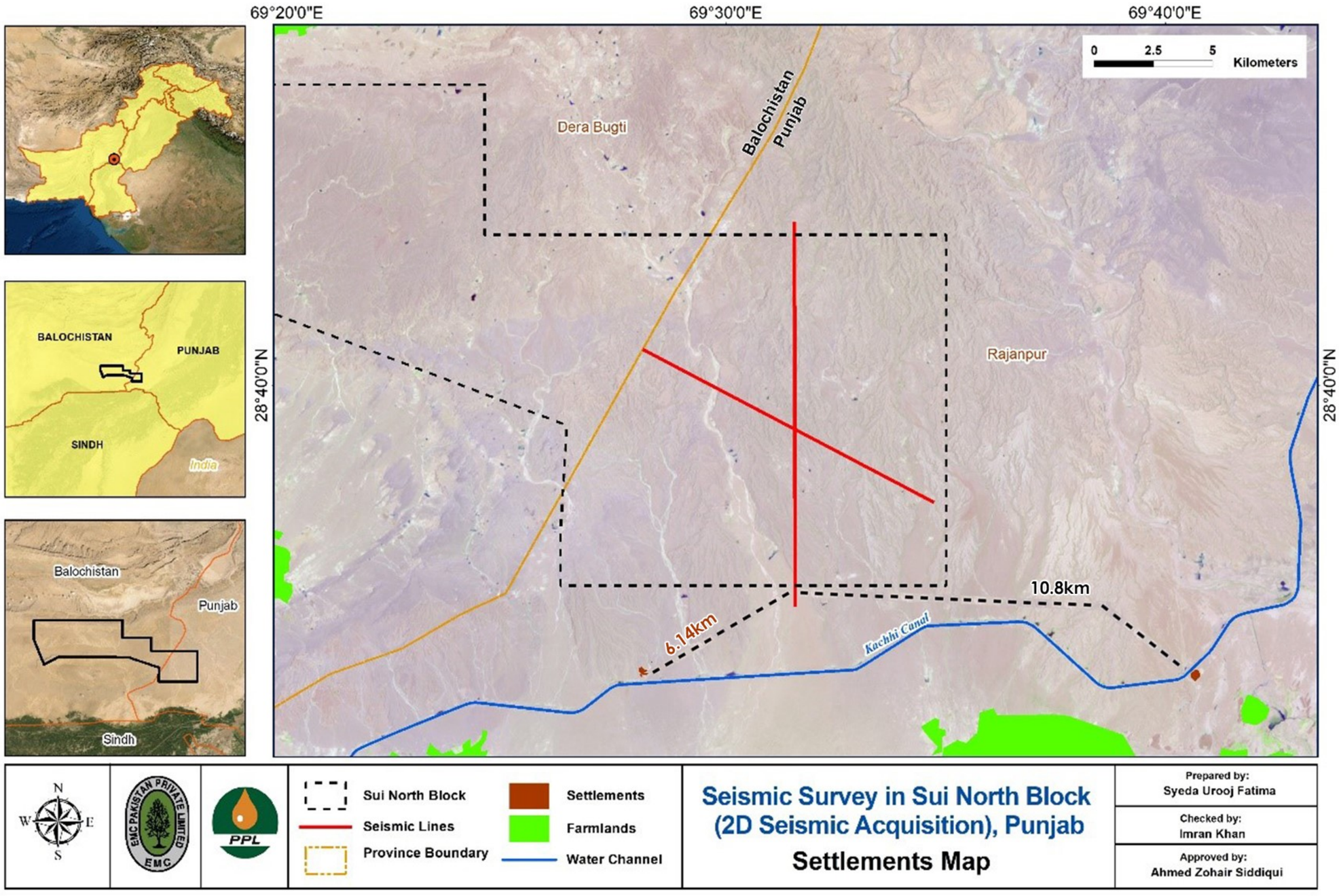


Figure 28: Settlement Map of Project Area

The basic profile of the nearby settlement which at 9km away from proposed project have following attributes:

Ethnic Groups: Two caste i.e., Mazari and Bughtis dominates in the study area.

Transport: Both Public and private transport is available and limited to in the District Headquater, Rajanpur. No transport facility available in the project area.

Industries: There was no industry located in the vicinity of the project area.

Source of Living: Majority are farmers and also involved in livestock farming business.

Educational System: Government Girls High school is located in Rajanpur, but for higher education, D.G Khan is best and suitable option.



Health Facilities: No hospital is available on the project site except for one basic healthcare facility. People have to visit DG Khan for better health facilities.

Cast's: Mostly Mazaris, Bughtis and Baloch live in the study area

Fire Brigade: No Fire Brigade System is located on the project site. For emergencies, people use the facility from D.G Khan. **Railway Station:** No railway station is located at project site.

Cultural or Heritage Site: No Archaeological site exists near project area.

Inhabitants of the settlements were consulted for their opinion, concern and suggestion on the proposed project. The villagers were briefed about the project proponent, project background and proposed project activities that will be carried out during the seismic activities and their potential impacts on humans and socioeconomic environment.

The inhabitants expressed that there are issues of electricity and water in the area, more importantly clean drinking water. Road infrastructure is poor. Health facilities are scarce. They expressed that livelihood options should be available in the area for the local inhabitants.

SECTION 6: POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 Introduction

This section discusses the potential environmental and socioeconomic impacts that would result due to 2D seismic survey, access tracks, waste management (e.g., wastewater and solid waste); and restoration of sites after completion of proposed activities in Sui North Block, Rajanpur, Punjab and suggests appropriate mitigation measures in order to reduce, overcome or compensate negative impacts associated with the proposed project.

The likely impacts of the proposed activities on the area, its water (surface & ground), air quality, ecological resources (flora & fauna), noise level, and socio-cultural environment that may affect employment, agricultural land, health, etc. have been described in the following subsections.

6.2 Methodology

The potential environmental and socioeconomic impacts related to the proposed project have been identified through literature review, scrutinizing baseline data, professional opinions, experience, understanding of the proposed 2D seismic activities and field observations. The risks then identified have been addressed by recommendations of various mitigation measures to reduce the severity of each impact.

The evaluation of environmental and socioeconomic impacts of the proposed project activities have been made by using strict rating and by judgement based on experience and professionalism.

6.3 Screening of Potential Environmental and Social Impacts

Screening of potential environmental and socioeconomic impacts resulting from seismic survey activity reveals that majority of the impacts will be temporary and will be reduced with adaptation of good practices, mindful planning, design and control of operations in each phase.

Various impacts from seismic survey operations along with their mitigation measures are as discussed under:

Impacts on land use for project siting

Land use impacts are linked with land disturbance, habitat destruction, and soil erosion due to proposed project activities include changes in runoff patterns, project emissions and sediment runoff due to preparation of camp site,

construction of an access road, use of project access road, off-road travel and development of new access tracks. Many impacts can be reduced or avoided when considered during siting and design of the project.

Construction of Access Track

Access tracks will be prepared to access the seismic lines (where required). Construction of the access tracks will involve cutting and filling. The topping can be done with in-situ gravels or gravels brought from nearby areas. Mitigation measures to minimize chances of soil erosion or land slippage during the entire length of the road have been recommended at the end of this section. This will primarily be due to wind erosion from earth-fill stockpiles and loose road surface during construction.

Construction of Campsites

For seismic survey activities campsites may be established (in Punjab Province) to house the survey crew and equipment/machinery. This will require level and clear land which is easily accessible. This could have impact on soil and landscape due to movement of vehicle and construction activities.

Clearing of Land for Seismic Line

Land clearing for seismic lines will be kept to the minimum required. Unnecessary clearing within the corridors along the access track or on the periphery of the campsites will be avoided.

Road Travel During Project

The use of the tracks during the project may result in erosion of soil from the track surface. In semi-arid environment this form of erosion is quite common and noticeable on dirt tracks.

Quarrying for Gravel and Sand

Gravel and sand required for the construction phase of the project will be quarried from project area. Potential of soil erosion exists if quarrying is done on unstable slopes or along a water channel. Therefore, quarry site should be carefully selected.

Mitigation Measures

- Clearing of vegetation will be kept to a minimum. Cutting of trees will be avoided.
- Where it is necessary to cut down trees in government land, relevant departments will be taken on board before cutting of trees. In case of private land, compensation will be paid to the land owner.
- In case trees are to be cut then their record should be maintained.

- Total land uptake by the camps and access tracks will be kept to the minimum required.
- During the project, movement of survey vehicle/equipment will be restricted to work areas only to avoid unnecessary disturbance of soils in the project area.
- Clearing of vegetation will be kept to a minimum. Access tracks will move around patches of vegetation and trees to avoid unnecessary clearing of vegetation.
- The amount of access routes used will be kept to a minimum and road travel will be minimized.
- Preparation of new access tracks will be minimized and use of existing routes will be preferred as much as possible. Where improvement of existing tracks or development of short lengths of new tracks is unavoidable the width of the access track will not exceed 5 m.
- Vehicle speed will be regulated and monitored to avoid excessive dust emissions.
- Seismic camps will be located in existing clearing and levelled land, if possible. If this is unavoidable then the campsites will be located where minimum, land clearing is required.
- While travelling on banks of streams and watercourses slow speeds (not exceeding 20 km per hour or even lesser) will be maintained to avoid damage to the banks. Photographs will be taken before any activity to record the conditions of campsites, roads and seismic lines at locations that are likely to undergo soil erosion. Similar photographs will be taken at intervals throughout the survey to monitor any changes and soil conditions.
- Good engineering practices will be adopted during construction activities to ensure that unnecessary clearing of vegetation and disturbance to soils outside work areas are avoided.
- Seismic lines in undulating areas will be planned such a way to minimize disturbance to natural topography.
- Septic tank & soak pit for disposal of black water and separate soak pit for disposal of grey water will be constructed if ground water table (seasonally high) from the bottom of soak pit is greater than 10 ft.
- If ground water table depth is not greater than 10 ft from the bottom of Soak Pit then black water will be disposed of through septic tank followed by disposal at TMA approved drain (or in an environmentally friendly manner), whereas for grey water the holding tank will be constructed which can be sprinkled on access tracks for dust suppression provided that it meets PEQS standards.

- Septic Tank will have concrete construction such that wastewater will not infiltrate into the ground. Septic tank will be provided with inlet and outlet baffle plates.
- Excess grey water from Soak Pits can be sprinkled provided that it is meeting PEQS limits.
- Restore soak pit/holding tank after removal of wastewater & cover and backfilling it with at least 1 metre of soil cover.
- Concrete structure can be disposed off after being broken down into nonporous septic tank (below main rooting zone, 1 - 1.5 m).
- Contaminated bricks of black/grey water & others shall not be given to locals for any purpose.
- During the construction phase, a single track shall be identified and approved along sections of the main track on which work is in progress. Vehicles shall be allowed to travel only on the approved track.
- During construction stage, gravel should not be dumped on or close to the access track being improved or constructed such that it causes a hindrance in the movement of vehicles and pedestrians.

6.3.1 Soil and Water Contamination from Spills

Fuel or oil stains, leakage or spill during seismic activities can result in contamination of soil and water. From a management perspective these have been categorized as minor, moderate or major and detailed below along with the recommended mitigation measures.

- **Minor Spills:** Leaks from vehicles, equipment, or storage containers at campsites or work areas outside the campsite or oil or fuel stains produced during handling and transfer operations such that the area and depth of soil contaminated is less than 1 square meter and 0.3 m respectively.
- **Moderate Spills:** Oil spills during transfer or handling operations resulting in spillage of no more than 200 liters of fuel or oil.
- **Major Spills:** These may occur during transportation of oil to the camp sites or failure of the oil containment arrangement at the camp sites resulting in spillage of oil significantly more than 200 liters in volume.

Mitigation Measures

- Implement plans for hazardous materials management, waste management.
- Camps will be located such that runoff from the campsite does not contaminate downstream surface water bodies. Sewage will be disposed off into the septic tank system comprising of septic tank and soak pit.

- Soak pits will be built in absorbent soil and located preferably 300 m away from a surface water body or water well.
- Soak pits will be constructed such that surface runoff cannot enter the pits.
- Soak pits will be designed to accommodate wastewater generated during the total duration of the operation.
- In case the soak pits get filled up, grey water can be sprinkled over access tracks if grey water meeting PEQS limits. Sprinkling of grey water will be done in a manner such that accumulation of water is avoided.
- Sprinkling of sewage will not be allowed;
- Food waste will not be disposed off in an open land. Food waste collected in waste segregation units will be buried on the site or disposed off through contractor.
- Combustible packaging wastes that have no re-use will be stored temporarily within designated waste segregation areas and will be handed over to waste contractor/vendor for appropriate disposal.
- Recyclable wastes including glass, tin and metal scrap will be recycled.
- Medical wastes will temporarily be stored onsite separately and incinerated at a suitable location through Punjab EPA approved waste contractor.
- Vehicles will be checked daily for fuel or oil leaks. Vehicles with leaks will not be operated until repaired.
- All fuel tanks will be properly marked to highlight their contents.
- Fuel and oil storage areas shall have secondary containment in the form of cemented or brick masonry bunds with plastered to prevent soil contamination in case of leaks or spills. The volume of the containment area will be equal to at least 110% of the total volume of fuel/oil stored or 110% of the volume of one largest tank. Secondary containment shall also have sump pit for collection of spillage material.
- Fuels tanks will be daily checked for leaks and all such leaks will be plugged immediately.
- The soil contaminated from spills will be collected and handed over to Punjab EPA approved waste contractor for disposal.
- A spill prevention and contingency plan will be prepared to deal with moderate and major spills.
- Shovels, plastic bags, and absorbent material should be present near fuel and oil storage or handling areas to attend spills and leaks.
- Used oil shall be provided to OGRA reclamation license holder Lubricating Plant for reclamation or disposed off through Punjab EPA

approved waste contractor. Handover vehicle-related waste (excluding hazardous waste) to local contractors for recycling.

- During fuel and oil transfer operations such as refueling bulldozers through a dedicated fuel vehicle, drips and spills will be avoided and drip pans will be used.
- Vehicles will only be serviced in designated cemented paved washing areas within campsites.
- Bentonite mud used for the purpose of up-hole and deep-hole drilling (in case dynamite technology is utilized for acquisition of seismic data) will be prepared in earthen pits. The used mud will be disposed of in the same pit and left to dry. After the mud has dried the pit will be backfilled.

6.3.2 Impacts on the Ambient Air Quality

Impacts would depend upon the amount, duration, location, and characteristics of the emissions and the meteorological conditions (e.g., wind speed and direction, precipitation and relative humidity).

Impacts on air quality during seismic activities would include emissions and dust from earth-moving equipment, vehicles, generators, etc. Pollutants include particulates, oxides of nitrogen, carbon monoxide & sulphur dioxide. Emissions during seismic survey would not have a quantifiable impact on climate change.

Mitigation Measures

- Generators, compressors and vehicles used during the operations will be maintained in a good condition to ensure that emissions are kept to a minimum level (compliant with PEQS standards).
- During seismic operations vehicle speeds will be regulated and monitored to minimize dust emissions.
- During operation dust emissions due to road travel will be minimized by regulating vehicle speeds and watering of the access track (where required).
- Minimize the amount of disturbance and areas cleared of vegetation.
- Burning of waste and combustible material at the project site will be strictly prohibited.
- Cover construction materials and stockpiled soils if they are a source of fugitive dust.
- Keep soil moist, if it is a source of fugitive dust, while loading into dump trucks and cover it with tarpaulin during transportation.
- Keep soil loads below the freeboard of the truck.
- Minimize drop heights when loaders dump soil into trucks.

- Campsites will be located at safe distance away from major residential communities.
- Dust emissions due to road travel will be minimized by regulating vehicle speeds and watering of the access track.
- During operation phase, emissions from all point sources should also be monitored to check compliance with PEQS.
- Dust emissions during construction activities should be minimized by good management practices such as locating stock piles out of the wind direction, keeping the height of the stock piles to a minimum, keeping earthwork areas damp, etc.
- During construction, levelling or widening (for the access road) will be done in sections, immediately followed by sprinkling of water and also preferably compaction (where required).

6.3.3 Impacts due to noise pollution

The primary impacts due to noise pollution generated from construction of the site and seismic activity which will localize disturbance to wildlife and inhabitants.

Seismic Survey

Primary sources of noise related with exploration comprises earth-moving equipment, vehicle traffic, generators etc. Detonation of dynamite in shot holes will only be heard at the surface like a muffled thud. According to the Inverse Square Law of noise dissipation, a doubling of the distance from a noise source will reduce the sound level by 6 decibels. As the temporary campsite will be located at distances preferably 500 m from communities, the impact of noise emission from activity areas or the campsite on the settlements will not be considerable.

Mitigation Measures

- During all operations generators, vehicles and other equipment and machinery will be maintained in good condition to ensure that noise from them is kept to a minimum level.
- Seismic camps will be located preferably 500 m away from nearest communities.
- The use of horns by project vehicles will be minimized. The use of pressure horns will not be allowed.
- Generators will be kept within enclosures to minimize dispersion of noise.
- Movement of all project vehicles and personnel will be restricted to within work areas.

- Camp site will be located at safe distance away from the major residential community.
- Position all stationary sound-generating equipment (i.e. pumps and generators) as far as possible from nearby residences and other sensitive receptors.
- Whenever feasible, schedule diverse noisy activities (e.g. excavation, earthmoving) to occur at the same time, since less-frequent noisy activities would be less irritating than frequent less noisy activities.
- All equipment should have sound-control devices.
- Route heavy truck traffic away from residences and other sensitive receptors.
- It shall be assured that generators, vehicles and other potentially noisy equipment used will be in good condition.
- Noise levels at communities nearest to the campsites and access tracks shall be monitored by contractor. In case these are found to exceed safe acceptable limits appropriate mitigation shall be taken.
- The use of pressure horns shall not be allowed.
- Movement of all project and personnel vehicles shall be restricted within work areas.
- Generators will be kept within enclosures to minimize dispersion of noise.
- In areas with higher noise levels or longer shifts, use of ear plugs and earmuffs will be ensured among the workers.

6.3.4 Impacts on water availability

The extraction of water for project activities can affect groundwater availability in the short term, which implies that the groundwater immediately available to the communities may fall. This should not, however, affect the long-term availability of the area's water resources. There is no major village or human settlement in the immediate surroundings of the proposed 2D seismic areas.

Short-term water extraction can affect the quantity and, indirectly, the quality of water available to local communities. In this discussion, 'short-term' refers to a time period ranging from a few hours to a few days.

Mitigation Measures

- Water from a local well will only be used after ensuring that the available capacity at the tube well (safe yield minus local demand) is at least 50% greater than the project demand. Discharge from the tube wells will be regularly monitored to supervise any changes in the yield of the wells. If a single well fails to meet this requirement, water will be obtained from

multiple wells such that each well meets the above-mentioned requirement.

- For all water obtained from local wells, the owner will be paid for water abstracted at the market rate.
- The use of new water wells installed or to be installed by PPL for community benefits will be allowed.
- The quantity of water used during seismic and camp construction operation will be kept to the minimum required by taking prudent water conservation measures on site.
- Contamination of surface and groundwater resources will be avoided.
- A complete record of water consumption during seismic and construction of camps will be maintained.

6.3.5 Impacts on water resources (surface water and ground water)

Seismic Survey

Impacts on water resources are related to land disturbance, erosion, changes in runoff patterns, campsite wastewater and resource use (e.g., water extraction) during seismic surveys and associated activities. There are however, no perennial water bodies along proposed seismic lines in Punjab. Due to the desolate nature of project area, the risk of negative impacts on water resources is low.

Mitigation Measures

- Identify and avoid unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and geologic structures, etc.).
- Use special construction techniques in areas of steep slopes, erodible soils and stream crossings.
- Do not alter or restrict existing surface drainage patterns, especially in sensitive areas such as erodible soils or steep slopes. Cross water bodies at right angles to the channel and/or at points of minimum impact.
- Apply erosion controls relative to possible soil erosion from vehicular traffic and during construction activities. The purpose is to retain the soil on disturbed land, such as a construction site, until the activities disturbing the land are sufficiently completed to allow revegetation and permanent soil stabilization to begin.
- Regularly monitor rights-of-way (ROWs), access roads, and other project areas for indications of erosion.

- Use drip pans during refueling to contain accidental releases and under fuel pump and valve mechanisms of any bulk fuelling vehicles parked at the project site.
- Reestablish the original grade and drainage pattern to the extent practicable.

6.3.6 Blockage of Natural Drainage

The terrain of the project microenvironment is hilly and undulating. This suggests that there would be non-perennial streams/water channels in the seismic area and route leading to it. Therefore, the likelihood of possible blockage of natural drainage from either the construction of access track, land clearing/preparation, establishment of campsite, is not expected. So, there is no mitigation measure required for the project activities. However, in order to carry out the seismic operations in a responsible manner, following measures should be implemented.

Mitigation Measures

- Natural drainage should not be blocked by the construction of campsite.
- Bridge Crossings for access route shall be provided at all stream crossings to avoid blocking of natural drainage. Pipe culverts shall be provided at small drainage channels if any.

6.3.7 Site Restoration

Site restoration after seismic survey operation

After completion of the seismic survey activities, the campsite, up-holes, etc. will be restored to as similar to original condition as possible. For reference purpose a photographic record of the campsite prior to the set-up will be taken.

Mitigation measures

- Demobilization of all equipment and machinery
- Disposal of any waste material remaining at the time of completion of the operation.
- Restoration of seismic lines will include removal of all cables, geophones, station units, flags, stakes and wastes from the lines and back filling of all mud pits.
- All the fencing or barriers surrounding the seismic base camp area will be removed, and the area will be levelled. The concrete structures if desired by the land owner will be left intact. If not, the concrete will be broken up and disposed, reused for backfilling of pits/septic tank (below main rooting zone, 1 - 1.5 m) or provided to locals for re-use.

- Remove wastewater from septic tank and restore it after dismantling in place (top roof and at least 1 meter wall or more if easily possible) and backfilling with at least 1 meter of native soil cover.
- Restore soak pit after removing / handling of wastewater & cover and backfilling it with at least 1 meter of native soil cover.
- Contaminated bricks of black/grey water pits and others shall not be given to locals for any purpose.

6.3.8 Impacts on Ecological Resources

Seismic survey activity involves mobilization of workers, vehicles and also removal of vegetation. These activities can disturb the wildlife in the project area. Small animals, birds and reptiles can be forced to move to other places due to increased human intervention, destruction of burrows and nests and indirectly by noise and vibrations due to operation of equipment and heavy vehicles.

Seismic Survey

In general, the impact on wildlife is insignificant except for reptiles, mammals and local birds. Seismic deep holes and up-holes will be located so as to avoid disturbing live bird nests and small mammals and reptile holes.

Impacts to ecological resources (vegetation, wildlife, aquatic biota, special status species, and their habitats) would be minimal and localized during seismic survey because of the limited nature of the activities such as clearing of land along seismic lines and new tracks prepared during seismic operation.

Mitigation Measures

- Seismic camps will be located in existing cleared and levelled land, if possible.
- The camp site areas will be kept to a minimum required.
- Crew personnel while working along seismic lines will be confined to a corridor of 5 m.
- Use of local wood as fuel will be prohibited.
- The number of access routes used will be kept to a minimum and road travel will be minimized.
- Preparation of new access tracks will be minimized. Where improvement of existing tracks or development of short lengths of new tracks is unavoidable the width of the access track will not exceed 5 m.
- Off-road travel will be strictly prohibited and observance of this will be monitored during the operation.
- The cutting of trees will be avoided. Where it is necessary to cut down trees in government land, relevant departments will be taken on board

before cutting of trees. In case of private land, compensation will be paid to the land owner.

- If clearing of vegetation is unavoidable, the rootstock will be left in place to encourage better regeneration of vegetation.
- Hunting, feeding, trapping or harassment of wildlife will be strictly prohibited.
- Vegetation clearing and land uptake during all operations will be minimised.
- Camp sites for seismic and construction crew will be located preferably 300 m from surface water bodies.
- Drivers will be instructed to keep a watch for domestic animals or wildlife in order to minimise the risk of road accidents.
- Seismic deep holes and up-holes will avoid disturbing live bird nests and small mammal and reptile holes.
- Food wastes will not be left in the open.
- All mitigation measures recommended for waste management, noise and air emissions will be implemented.
- Compressors and vehicles will be maintained in good condition and provided with muffles to reduce noise.
- For preparation of access tracks, routes involving minimum clearing of vegetation will be selected.
- Clearing of dense patches of vegetation will be avoided.

6.3.9 Impacts due to Hazardous Materials and Solid Waste Generated

Hazardous materials and solid waste impacts are related to the types and amount of equipment and machinery used for the project, chemicals used in various processes, training and the methods being employed.

Seismic Survey

Seismic crews generate wastes such as plastic, paper, containers, fuel leaks/spills, food waste, human waste, used oils, filters and metal scrap. Bentonite (non-hazardous in nature) mud will be used during seismic operations for drilling of upholes and deep holes to avoid the holes from collapsing. The use of the mud and its preparation and disposal in earthen pits will therefore have no impacts on groundwater or soil quality.

Mitigation Measures

- Prepare a comprehensive list of all hazardous materials to be used, stored, transported and disposed of during all phases of activity.
- Include a recycling strategy to be practised by workers during all project phases.

- Develop a spill prevention and response plan for addressing spill prevention measures, training requirements, waste-specific spill response actions, spill response kits.
- Construct camp site (if developed) such that nearby water bodies are not contaminated in case of project site run-off..
- Train employees to promptly contain, report and/or clean up any oil or hazardous material spill.
- Provide secondary containment around all the fuel storage tanks and chemical storage area of suitable size (110% of the fuel storage area/largest tank capacity). Fuel storage should be a temporary activity and fuel storage facilities should be removed upon completion of the required activities.

6.3.10 Impacts on Cultural Resources/Sites of Archaeological Significance

No site of archaeological, cultural or historical value is known to exist in the proposed seismic area. However, all contractors hired for seismic activities will be instructed to notify PPL immediately if any artefacts, or sites of archaeological or cultural value, is found while working in the area, so that relevant departments can be informed.

6.3.11 Positive Impacts on Socio-economic Environment

Project activities would add to the local economy by providing employment opportunities to the neighboring communities and money to local contractors. Indirect impacts could occur as a result of the new economic developments (e.g., purchase of raw and other materials from the local market, CSR works, etc.

Table 27: Environmental Impacts & Characterization Matrix							
Activity & Source	Nature of Impact	Duration	Extent	Reversibility	Likelihood	Severity	Significance
Landscape & Soil Erosion							
• Camp siting • Construction of access tracks.	Direct	Short-term	Local	Reversible	Possible	Moderate	Low
Noise pollution							
• Transportation of heavy machinery, materials, equipment & personnel.	Direct	Short term	Local	Reversible	Unlikely	Negligible	Low
Dust Emission							
• Dirt tracks by project related vehicles. • Earthworks and construction for campsite. • Combustion products (NOx, SO_2, PM and CO) from diesel generators used in the camps to generate electricity.	Direct	Short term	Local	Reversible	Possible	Minor	Low medium
Air Emissions							
• Exhaust emissions produced by generators. • Exhaust fumes from vehicles and construction machinery.	Direct	Short term	Local	Reversible	Unlikely as mitigation measures will ensure that air pollution remains within acceptable limits.	Minor	Low medium

Soil and Water Contamination							
• Domestic waste (sanitary and kitchen discharge). • Oil and grease from vehicles and machinery. • Sediments from altered land surfaces (campsite). • Stored fuel, oil and other chemicals.	Direct	Short term (after implementation of mitigation measures)	Local	Reversible	Unlikely	Minor	Low Medium
Impacts on Wildlife							
• Improvement and construction of the access road. • Removal of vegetation only where required.	Direct	Short term	Local	Reversible	Possible	Minor	Low Medium

SECTION 7: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

7.1 General

Environmental management is an integral component of overall planning and implementation of projects that includes policy development, organizational structure, planning activities, responsibilities, procedures and resources for development, implementing, achieving, reviewing and maintaining the environmental program and achieving environmental goals.

The present document has been prepared in accordance to environmental management guidelines. Several aspects have been identified in this EMP to prevent or mitigate that environmental impact of proposed activities in Block.

7.2 Purpose of EMP

PPL has committed to implementing a comprehensive EMP to help ensure the environmental protection. The purpose of EMP is to:

- Ensure implementation of mitigation measures proposed in the EIA report;
- Provide a mechanism for taking timely actions for unanticipated environmental situations;
- Define the various roles, responsibilities and provide a means of effective communication regarding environmental issues among them;
- Provide concise and clear instructions to project personnel and contractors regarding procedures for protecting the environment and minimizing environmental impact;
- To prevent or minimize emissions, effluents, spills and dumping, etc. into air, water and soils for protecting the environment;
- Communicate changes in the program through the revision process;

7.3 Environmental Management Framework

Due to the nature and scale of activities, some environmental risks are associated with the proposed activities. In order to manage these risks as low as reasonably practical, various control measures are adopted. PPL endeavors to perform its activities in a manner to either eliminate or minimize the risks to the lowest possible level.

Environmental management of the project activities will be undertaken within a comprehensive framework comprising:

- PPL's Health, Safety and Environmental Policy Statement;

- Operational controls and specific environmental procedures within the project Environmental Management Plan (EMP); and
- Implementation of Environmental Management and Monitoring Plan.

7.4 Structure of EMP

The environmental management plan is divided into the following core components:

- Organizational Structure and Roles and responsibilities;
- Implementation of EMP
- Mitigation matrix
- Environmental Monitoring Plan
- Waste management plan
- Emergency response plan;
- Site Restoration Plan
- Change Management Plan

7.5 Organizational Structure and Roles and Responsibilities

7.5.1 Organizational Structure

The proposed project includes the following organizations:

- PPL as the project proponent and owner of the EMP
- Contractors and Subcontractors
- Punjab EPA as regulatory body

The general roles and responsibilities of PPL and the Contractors are detailed in the following sections.

7.5.2 Contractors and Subcontractors

Contractor(s) will be responsible for implementation of, or adherence to, all provisions of the EIA and the EMP and with any environmental and other codes of conduct required by PPL. Site Manager of the contractor(s) will be responsible for the effective implementation of the requirements of EIA and EMP. However overall responsibility for implementation of EIA recommendations and the EMP will rest with PPL's Exploration Depts.

The responsibilities of PPL's Site Management and Exploration Dept. at HO would be:

- Carry out project activates in environmentally friendly manner;
- Coordination with the HSE officer to resolve issues arising during project execution;
- Manage construction crew and reduce the environmental impacts;

- Discuss weekly progress report with their management and issues concerned to environmental management.

7.5.3 Environmental Protection Agency

Punjab EPA as regulatory body is to oversee compliance with compliance with local environmental laws. According to Punjab environmental protection act, Punjab EPA has the powers to conduct surprise inspections or visits of the project area to observe the status of environmental compliance of the project.

7.5.4 Roles and Responsibilities of the proponent

For the proposed project, PPL will appoint contractor(s) for the project activities. The contractor(s) will be responsible for implementation of, or adherence to, all provisions of the EIA and the EMP and with any environmental and other codes of conduct required by PPL. However overall responsibility for implementation of EIA recommendation and the EMP will rest with PPL's Exploration Depts.

The responsibilities of PPL's Site Incharge and PPL's Exploration Department would be to;

- Maintain ongoing liaison with the personnel involved in the project;
- Ensure that requirements of EIA and EMP are met during project execution.
- Ensure that prior to commencing work in the project area; all field personnel receive a formal induction;
- Ensure that employees are adequately supervised so that the environmental objectives are achieved;
- Ensure that no pets, firearms, traps and nets are kept by the contractors and their employees whilst in the project license area; during project activities.
- Ensure that regulatory requirements, including any specific conditions contained in the approval, are complied with;

7.5.5 Approvals

Obtaining NOC from PEPA does not relieve the proponent of other obligations and hence PPL and its Contractors will obtain all relevant clearances and necessary approvals required by the government prior to commencing the operations.

7.5.6 Contractual Provisions

The requirements of this EIA in terms of environmental mitigation will be incorporated into the operational plans and procedures with contractors.

7.5.7 Training

The key objective of the training program is to ensure that the requirements of the EMP and EIA recommendations are clearly understood and followed throughout the project. The trainings to the staff will help in communicating environment related restrictions specified in the EIA and EMP.

Contractor's HSE Advisor in coordination with PPL site incharge will determine the training requirements necessary for understanding and effective implementation of the EMP and the EIA. Contractor(s) will be responsible to disseminate the necessary training to relevant personnel.

Project personnel will be trained on various aspects of job safety to ensure sound management of occupational safety issues. They will also be trained on practices of protection of environmental aspects likely to be found susceptible to project activities such as indigenous flora and fauna, wildlife, water bodies and ecological resources etc. It will make sure that employees / workers understand the issues associated with the proposed activities. Trainings will be arranged on regular basis with notification that it must be attended by all employees / workers.

Trainings identified in EMP are given below:

- Site orientation course
- Training for emergency response and preparedness
- Training for familiarization with site environmental controls.
- Specific environmental training for relevant employees

A firefighting system shall be installed which will include firefighting water, foam generators and portable fire extinguishers. The personnel shall be trained on the use and operation of these systems. Equipment such as firefighting equipment, hospital equipment, ambulances and environmental protection and spill control equipment shall also be provided so that they are available in the event of an emergency. The aim is to instruct all personnel on the operation of this equipment and on the procedure to be followed in the event of spills, fire or explosions.

7.5.8 Communication and Documentation

For effective implementation of Environmental Management Plan, HSE matters will be discussed during daily meetings held on-site. Environmental concerns raised during the meetings will be mitigated after discussions between the PPL's Site Incharge, and relevant staff of contractor(s). Any issues that require attention of PPL's higher management will be communicated to them for action. The contractor will also prepare a weekly HSE report.

a) Weekly Reports

The purpose of these reports will be to review the performance of the operation by reviewing the number of non-conformances and the environmental incidents that occurred during the reporting period, progress on daily action items and to list recommendations for additional controls, mitigation measures or monitoring requirements. The main contents of weekly report will include the incident details, resource use, environmental non-compliances, H&S records, socioeconomic issues (if any), photographic records, inspection and audits, change managements (if any) and trainings etc.

b) Social Complaints Register

The PPL site representatives will maintain a register of complaints received from local communities and measures taken to mitigate these concerns. Liaisons with community members including particularly the land owners/occupiers will be maintained throughout the project to identify and address the concerns of locals. Appropriate compensations will be provided to the grieved residents of the project area.

7.6 Mitigation Management Matrix

Mitigation Management Matrixes are provided in Table blow. The Mitigation Management Matrix will be used as a management and monitoring tool for implementation of the mitigation measures.

It is highlighted that although responsibilities for executing and monitoring mitigation measures have been delegated to different persons/organizations, PPL Exploration Depts. will hold the primary and overall responsibility for ensuring full implementation of the EMP.

7.7 Environmental Monitoring

The Monitoring of different activities will be required to assess the impacts of activities on the environment. For this purpose;

- Follow the monitoring frequency of selected parameters as per the monitoring plan given in the Table below.
- Record all non-conformities observed and report them.
- Report any impact anticipated along with recommendations for further action.

Contractor(s) shall take note of the recommendations relating to issues arising during monitoring of proposed activities.

Table 28: Mitigation Management Matrix for Seismic Activities

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
1. Changes in Landscape and Soil Erosion				
1.1	Seismic lines in the hilly region will be planned such a way to minimize disturbance to natural topography.	SC/PPL Exploration	Check line preparation and monitor land clearing activities	Before land clearing
1.2	Clearing of vegetation will be kept to a minimum. Access tracks will move around patches of vegetation and trees to avoid unnecessary clearing of vegetation.	SC / PPL Exploration	Monitor land clearing activities	During land clearing
1.3	The number of access routes used will be kept to a minimum and road travel will be minimized.	SC/PPL Exploration	Approve access tracks	Prior to track preparation
1.4	Preparation of new access tracks will be minimized and use of existing routes will be preferred as much as possible. Where improvement of existing tracks or development of short lengths of new tracks is unavoidable the width of the access track will not exceed 5 m.	SC/PPL Exploration	Supervise preparation of access tracks and randomly check width of access track.	Prior to and during track preparation
1.5	Off-road travel will be strictly prohibited and observance of this will be monitored during the operation.	SC/PPL Exploration	Approved access track and monitor off road travel	During entire operation
1.6	The cutting of trees will be avoided. Where it is necessary to cut down trees in government land,	SC / PPL Exploration	Supervise land clearing activities	During land clearing

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
	relevant departments will be taken on board before cutting of trees. In case of private land, compensation will be paid to the land owner.			
1.7	Seismic camps will be located in existing clearing and levelled land, if possible. If this is unavoidable then the campsites will be located where minimum, land clearing is required.	SC / PPL Exploration	Identify location of the campsite to the SC and CC	At the time of site selection for camp site
1.8	Total land uptake by the camps, and access road will be kept to the minimum required	SC/PPL Exploration	Check areas	Prior to and during construction of camps
1.9	While travelling on banks of streams and watercourses slow speeds (not exceeding 20 km per hour or even lesser) will be maintained to avoid damage to the banks.	SC/PPL Exploration	Check compliance	During entire project
1.10	Photographs will be taken before any activity to record the conditions of campsite, roads and seismic lines at locations that are likely to undergo soil erosion. Similar photographs will be taken at intervals throughout the survey to monitor any changes and soil conditions.	SC/PPL Exploration	Supervise and ensure compliance	During the entire operation

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
2.	**Soil & Water Contamination**			
2.1	Camps will be located such that runoff from the campsite does not contaminate downstream surface water bodies.	SC / PPL Exploration	Check the location of campsite	Before camp setup
2.2	Sewage will be disposed off into the septic tank system comprising of septic tank and soak pit.	SC / PPL Exploration	Check the location of septic tank and soak pit	During the construction of the camp site
2.3	Soak pits will be built in absorbent soil and located preferably 300 m away from a surface water body or water well.	SC/PPL Exploration	Check soil condition and distance between the soak pits and the nearest water body	During the construction of the camp site
2.4	Soak pits will be constructed such that surface runoff cannot enter the pits.	SC/PPL Exploration	Check design of the soak pit and monitor construction	During the construction of the camp site
2.5	Soak pits will be designed to accommodate wastewater generated during the total duration of the operation.	SC/PPL Exploration	Check design of soak pit	Before construction
2.6	In case the soak pits get filled up, grey water can be sprinkled over access tracks if grey water meeting PEQS limits. Sprinkling of grey water will be done in a manner such that accumulation of water is avoided.	SC/PPL Exploration	Supervise sprinkling of grey water	During the entire Operation
2.7	Sprinkling of sewage will not be allowed; in case the soak pits get filled up, the excess wastewater	SC/PPL Exploration	Check compliance	During the entire operation

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
	will be disposed of into the nearest municipal drains after taking written approval from TMA.			
2.8	Food waste will not be disposed off in an open land. Food waste collected in waste segregation units will be buried on the site or disposed off through contractors. Combustible packaging wastes that have no re-use will be stored temporarily within designated waste segregation areas and will be handed over to waste contractor / vendor for appropriate disposal.	SC/PPL Exploration	Check provision of waste bins	During the entire operation
2.9	Recyclable wastes including glass, tin and metal scrap will be recycled.	SC/PPL Exploration	Check compliance	During the entire operation
2.10	Medical wastes will temporarily be stored onsite separately and incinerated at a suitable location through Punjab EPA approved waste contractor.	SC	Check compliance	During entire operation
2.11	Vehicles will be checked daily for fuel or oil leaks. Vehicles with leaks will not be operated until repaired.	SC/ PPL Exploration	Check maintenance logs and ensure daily inspection of vehicles for leaks	During the entire operation
2.12	All fuel tanks will be properly marked to highlight their contents.	SC/PPL	Check signs	During the entire Operation
2.13	Fuel and oil storage areas shall have secondary	SC / PPL	Check containment volume	At the time of

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
	containment in the form of cemented or brick masonry bunds with plastered to prevent soil contamination in case of leaks or spills. The volume of the containment area will be equal to at least 110% of the total volume of fuel / oil stored or 110% of the volume of one largest tank. Secondary containment shall also have sump pit for collection of spillage material.	Exploration	of the banded area	construction
2.14	Fuels tanks will be daily checked for leaks and all such leaks will be plugged immediately.	SC/PPL Exploration	Inspect fuel tanks for leaks	During the entire Operation
2.15	The soil contaminated from spills will be collected and handed over to PEPA approved waste contractor for disposal.	SC/PPL Exploration	Monitor and supervise special treatment, if any	During the entire Operation
2.16	A spill prevention and contingency plan will be prepared to deal with moderate and major spills.	SC/PPL Exploration	Study and examine the plan and identify any flaws if any before its approval	Before the commencement of the project.
2.17	Shovels, plastic bags, and absorbent material should be present near fuel and oil storage or handling areas to attend spills and leaks.	SC/ PPL Exploration	Check provision of materials	During entire operation
2.18	Used oil shall be provided to OGRA reclamation license holder Lubricating Plant for reclamation or disposed off through PEPA approved waste	SC/ PPL Exploration	Check compliance	During the entire Operation

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
	contractor. Handover vehicle-related waste (excluding hazardous waste) to local contractors for recycling.			
2.19	During fuel and oil transfer operations such as refueling bulldozers through a dedicated fuel vehicle, drips and spills will be avoided and drip pans will be used.	SC / PPL Exploration	Ensure provision of drip pans provides training on safe refueling practices, monitor oil or fuel stains	During the entire Operation
2.20	Bentonite mud used for the purpose of uphole and shot hole drilling will be prepared in earthen pits. The used mud will be disposed of in the same pit and left to dry. After the mud has dried, the pit will be backfilled with 1m cover of soil.	SC/ PPL Exploration	Monitoring preparation and disposal	During deep hole and uphole drilling
2.21	Vehicles will only be serviced in designated concrete paved washing areas within campsites	SC	Check compliance	During entire Operation
3. Use of Water				
3.1	Water from a local well will only be used after ensuring that the available capacity at the tube well (safe yield minus local demand) is at least 50% greater than the project demand. Discharge from the tube wells will be regularly monitored to supervise any changes in the yield of the wells. If	SC/ PPL Exploration.	Check local demand and water abstraction	During entire operation

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
	a single well fails to meet this requirement, water will be obtained from multiple wells such that each well meets the above-mentioned requirement			
3.2	For all water obtained from local wells, the owner will be paid for water abstracted at the market rate	SC/ PPL Exploration	Check compliance	During entire operation
3.3	If a new water well is to be installed, the well will be located preferably 500 m from existing local wells.	SC/ PPL Exploration	Check compliance	Before the start of the operation
3.4	The use of new wells installed or to be installed by PPL for community benefits will be allowed.	SC/ PPL Exploration	Check Compliance	During the entire operation
3.5	The quantity of water used during seismic and camp construction operation will be kept to the minimum required by taking prudent water conservation measures on site.	SC/ PPL Exploration	Monitor water consumption and advise water conservation measures	During the entire operation
3.6	Contamination of surface and groundwater resources will be avoided. A complete record of water consumption during seismic and construction of camps will be maintained.	SC/ PPL Exploration	Check compliance	During the entire Operation
4. Climate & Ambient Air Quality				
4.1	Generators, compressors and vehicles used	SC/ PPL	Check maintenance logs	During the entire

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
	during seismic operations will be maintained in a good condition to ensure that emissions are kept to a minimum level (compliant with PEQS standards).	Exploration		operation
4.2	During seismic operations vehicle speeds will be regulated and monitored to minimize dust emissions.	SC/ PPL Exploration	Set and monitor speed limits	During the entire operation
4.3	Campsites will be located preferably 500 m away from communities.	SC/ PPL Exploration	Check distances of camp site from communities	Prior to construction of camp sites
4.4	During operation dust emissions due to road travel will be minimized by regulating vehicle speeds and watering of the access track (where required).	SC/ PPL Exploration	Set and monitor speed limits. Monitor sprinkling of access track	During the entire operation
5. Noise Pollution				
5.1	During all operations generators, vehicles and other equipment and machinery will be maintained in good condition to ensure that noise from them is kept to a minimum level.	SC/ PPL Exploration	Monitor noise levels	During the entire operation
5.2	Seismic camps will be located preferably 500 m away from nearest communities.	SC/ PPL Exploration	Check distances from the community	Prior to construction of the camp sites
5.3	The use of horns by project vehicles will be minimised. The use of pressure horns will not be allowed.	SC/ PPL Exploration	Train drivers, check vehicles and record non-compliance	During the entire operation

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
5.4	Generators will be kept within enclosures to minimise dispersion of noise.	SC/ PPL Exploration	Check compliance	During the entire operation
5.5	Movement of all project vehicles and personnel will be restricted to within work areas	SC/ PPL Exploration	Advise all drivers, and monitor non-compliance	During the entire operation
6. Flora				
6.1	Seismic camps will be located in existing cleared and levelled land, if possible.	SC/ PPL Exploration	Suggest campsite to the SC	At the time of site selection for camp site
6.2	The camp site areas will be kept to a minimum required.	SC/ PPL Exploration	Check areas	Prior to camp setup or construction
6.3	Crew personnel while working along seismic lines will be confined to a corridor of 5 m.	SC/ PPL Exploration	Supervise line clearing operation	Before and During land clearing operation
6.4	Use of local wood as fuel will be prohibited	SC/ PPL Exploration	Check compliance	During entire operation
6.5	The number of access routes used will be kept to a minimum and road travel will be minimized.	SC/ PPL Exploration	Approve access tracks and check road travel	During the entire operation
6.6	Preparation of new access tracks will be minimized. Where improvement of existing tracks or development of short lengths of new tracks is unavoidable the width of the access track will not exceed 5 m.	SC/ PPL Exploration	Supervise preparation of access tracks and randomly check width of access track	Prior to and during track preparation
6.7	Off-road travel will be strictly prohibited and observance of this will be monitored during the	SC/ PPL Exploration	Approve access track and monitor off road travel	During entire operation

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
	operation.			
6.8	The cutting of trees will be avoided. Where it is necessary to cut down trees in government land, relevant departments will be taken on board before cutting of trees. In case of private land, compensation will be paid to the land owner.	SC/ PPL Exploration	Supervise land clearing activities	During land clearing
6.9	Earthen pits for preparation and disposal of bentonite mud will be located in an area where minimum vegetation clearing is involved.	SC/ PPL Exploration	Check compliance	During the entire operation
7. Fauna				
7.1	Hunting, feeding, trapping or harassment of wildlife will be strictly prohibited.	SC/PPL Exploration	Check compliance	During the entire operation
7.2	Vegetation clearing and land uptake during all operations will be minimized.	SC/PPL Exploration	Check compliance	During the entire operation
7.3	Camp sites for seismic and construction crew will be located preferably 300 m from surface water bodies.	SC/PPL Exploration	Check distances from surface water bodies	Before the construction
7.4	Clearing of vegetation will be minimized and the cutting of trees will be avoided.	SC/PPL Exploration	Check compliance	During land clearing
7.5	Off-road travel will be strictly prohibited and observance of this will be monitored during the operation.	SC/PPL Exploration	Approve access track and monitor off road travel	During entire operation

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
7.6	Drivers will be instructed to keep a watch for domestic animals or wildlife in order to minimize the risk of road accidents	SC/PPL Exploration	Train the drivers and check compliance	During the entire operation
7.7	Seismic deep holes and up-holes will avoid disturbing live bird nests and small mammal and reptile holes.	SC/PPL Exploration	Check compliance	During seismic
7.8	Food wastes will not be left in the open.	SC/PPL Exploration	Check compliance	During the entire operation
7.9	All mitigation measures recommended for waste management, noise and air emissions will be implemented.	SC/PPL Exploration	Check compliance	During the entire operation
7.10	Compressors and vehicles will be maintained in good condition and provided with muffles to reduce noise	SC/PPL Exploration	Check maintenance logs and ensure the provision of muffles	During the entire operation
7.11	For preparation of access tracks, routes involving minimum clearing of vegetation will be selected.	SC/PPL Exploration	Check development and clearance of access track	During the entire operation
7.12	Clearing of dense patches of vegetation will be avoided	SC/PPL Exploration	Check development and clearance of access track	During the entire operation

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
8. Socio-economic Environment				
8.1	All community grievances will be recorded and maintained in a Community Complaint's Register. In addition to this, close liaison will be maintained between the community and the site representatives of SC throughout the project activity.	SC / PPL Exploration	Check the provision of complaint register and its access for communities	During the entire operation
8.2	Compensation amounts for land leased will be disbursed in an equitable and transparent manner.	SC / PPL Exploration	Check compensation records	During the entire operation
8.3	Loss of standing crops, traditional land rights and community ownership will be given due consideration while determining compensation amounts.	SC / PPL Exploration	Check compensation records	During the entire operation
8.4	Compensation amounts will be settled as per prevailing market rates & will be settled after an agreement is reached between the local residents & the seismic contractor.	SC / PPL Exploration	Check compensation records	During the entire operation
8.5	All mitigation related to management of wastes, noise & dust emissions suggested in the EIA will be adhered to.	SC / PPL Exploration	Check compliance	During the entire operation
8.6	In order to keep nearby local communities informed of the progress of the operation,	SC / PPL Exploration	Check compliance	During the entire operation

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
	communication channels will be maintained between local spiritual leaders and community elders and PPL			
8.7	PPL and its contractors will employ local residents during the project activities if possible.	SC / PPL Exploration	Check employment records	During all operations
8.8	Strict compliance will be observed with PPL's HSE guidelines. Drivers will be trained in responsible and safe driving practices; safe speed limits for vehicles will be followed.	SC / PPL Exploration	Check compliance	During all operations
8.9	To avoid effects of dust emissions minimum distances should be maintained from local communities as suggested in the EIA	SC / PPL Exploration	Check compliance	During all operations
8.10	Flow of water in canals or water crossings shall not be impeded. Any damage to canals, watercourses, local roads or other infrastructure will be repaired or compensated.	SC / PPL Exploration	Check compliance	During the entire Operation
8.11	Project personnel will respect local cultural norms.	SC / PPL Exploration	Train project staff on social norms and sensitivities	During the entire Operation

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
8.12	Water sources currently being used for irrigation by the resident communities will be exploited only after acquiring approval from concerned Govt. Dept(s).	SC / PPL Exploration	Check compliance	During the entire operation
8.13	All project facilities, seismic lines & access roads will maintain the following minimum distances from cultural, religious & archaeological sites; unless community demands greater distance from graveyards or place of worship, etc[42]. —Seismic lines – 100 m —Access roads – 100 m —Camp sites – 500 m	SC	Check distances	During the entire operation
9. Site Restoration				
9.1	Demobilization of all equipment and machinery.	SC / PPL Exploration	Check compliance	During site restoration
9.2	Disposal of any waste material remaining at the time of completion of the operation.	SC / PPL Exploration	Check compliance	During site restoration
9.3	Restoration of seismic lines will include removal of all cables, geophones, station units, flags, stakes and wastes from the lines and back filling of all mud pits.	SC / PPL Exploration	Check compliance	During site restoration

[42] Source: PPEPCA Sectoral for Upstream Petroleum Sector – Onshore Guidelines – Volume 2 of 2

No.	Impact and Mitigation Measures	Responsibility	Action/Monitoring Parameter/Monitoring Method	Timing
9.4	All the fencing or barriers surrounding the seismic base camp area will be removed, and the area will be levelled. The concrete structures if desired by the land owner will be left intact. If not, the concrete will be broken up and disposed, reused for backfilling of pits / septic tank (below main rooting zone, 1 - 1.5 m) or provided to locals for re-use.	SC / PPL Exploration	Check compliance	During site restoration
9.5	Remove wastewater from septic tank and restore it after dismantling in place (top roof and at least 1 metre wall or more if easily possible) and backfilling with at least 1 metre of native soil cover. Dispose sludge from septic tank in an environment-friendly manner.	SC / PPL Exploration	Check compliance	During restoration
9.6	Restore soak pit after removing / handling of wastewater & cover and backfilling it with at least 1 metre of native soil cover. Dispose wastewater of soak pit in an environment-friendly manner.	SC / PPL Exploration	Check compliance	During restoration
9.7	Contaminated bricks of black / grey water pits and others shall not be given to locals for any purpose.	SC / PPL Exploration	Check compliance	During restoration
Note: SC: Seismic Contractor				

Table 29: Environmental Monitoring Plan for Seismic Activities

S. No.	Monitoring Aspects	Monitoring locations	Parameters	Frequency	Responsibility	Documentation
1	Exhaust and Emissions Monitoring	Vehicles, Generators, Fuel operated Machinery	Smoke, CO, Noise for vehicle CO, NOx, SO2 and PM for engines / generator	Once during the project	Contractor	Punjab EPA Laboratory test Reports
2	Waste water	Campsite	Effluent Flow, Temperature, pH, COD, BOD_5,TSS, TDS, Oil & Grease, Chloride and Phenolic Compounds	Quarterly (if discharged wastewater into any nullah/ water bodies)	Contractor	Punjab EPA Laboratory test Reports
3	Noise	Along Seismic Survey lines & nearby communities and boundaries of the camp site	Noise Level (dBA)	During routine monitoring	Contractor	Record of observations; Internally / externally
4	Solid Waste	Project site	Solid waste collection, storage, transportation and disposal	During routine monitoring	Contractor	Complete waste generation record, waste disposal record & disposal certificate)
5	Occupational Safety	Survey sites, campsite, project roads	HSE Records, Incidents and injuries	During routine monitoring	Contractor	Record of observations.

7.8 Waste Management

Sources of Wastes

Waste is classified as Hazardous and Non-hazardous by identifying the physical, chemical and toxicological properties. Designated drums, containers, bins etc. with specific labels for various types of wastes are placed at the designated locations Waste is disposed off in an environmentally friendly manner.

Waste Management Methods

There are different capabilities and limitations of different Waste Management Options for the various types of wastes generated in order to make cost-effective Waste Management Decisions that are protective of human health and the environment. As a general matter, a Waste Management Hierarchy (as recommended by EPA) should be adopted, with a preference for reduction, reuse and recycling options.

These methods would apply to atmospheric emissions, chemical wastes, contaminated soil from oil / fuel spills, drilling pit waste, drums/containers, garbage (inert solid wastes); sanitary; clinical; produced water; and, rainwater drainage etc.

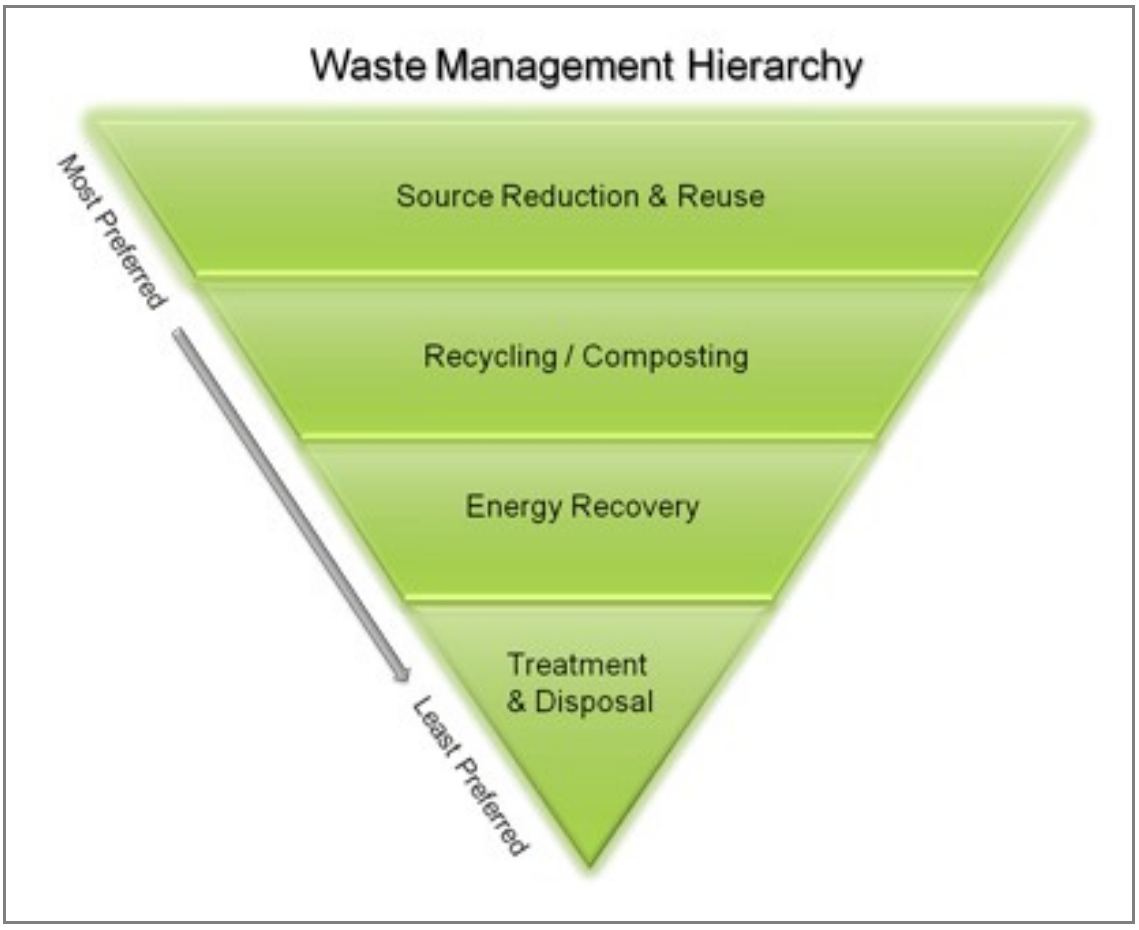


Table 30: List of Different Types of Waste and Disposal Options		
Type of Waste	Description	Disposal Options
Food Waste (decay-able waste)	Animal, fruit or vegetable residues	▪ Food waste to be buried safely or handed over to waste contractor
Packaging Waste	Paper, plastic, glass, textiles, cardboard, rubber, wood, tin cans, aluminum cans	▪ Combustible material that has no reuse will be handed over to waste contractor / vendors for appropriate disposal ▪ Recyclable and reusable wastes will include glass, metals, aluminum cans, etc. These wastes will be sent to a waste contractor, in order to ensure the wastes are recycled or reused properly, without having any effect on the environment.
Medical Waste	Syringes, glass bottles, soiled bandages, expired drugs, dressings	▪ Syringe needles to be cut with cutter and sent for incineration through Punjab EPA approved waste contractor. ▪ Soiled bandages and dressings and needles to be sent for incineration through EPA approved waste contractor. ▪ Expired drugs to be taken by the contractor for disposal/incineration through EPA approved waste contractor.
Workshop Waste	Used oil, ferrous/non-ferrous materials, batteries,	▪ Handover vehicle-related waste (excluding hazardous waste) to local contractors for recycling43 ▪ Used lubricating oil shall either be provided to OGRA reclamation license holder lubricant reclamation plant for reclamation or disposed off through EPA approved waste contractor. ▪ Batteries to be hauled away by contractor for recycling
Demolition Waste	Dirt, concrete, plaster, plumbing, heating & electrical parts	▪ Dirt, concrete and plaster to be buried at the site; and ▪ Plumbing, heating and electrical parts to be hauled away by contractor for recycling
Liquid Waste	Wastewater from	▪ All liquid wastes from the kitchen,

[43] PPEPCA Sectoral for Upstream Petroleum Sector – Onshore Volume 2 of 2

	kitchen and washing areas, sewerage	washing areas and sewage are collected and disposed of into septic tank system.
Oil spills /soil contaminated by oil leakages or spills	Contaminated soil	▪ Oil spills will be contained and controlled using shovels, sands, and native soil. The equipment and materials will be made available at camp sites and during the operation. ▪ The contaminated soil will be excavated and temporarily stored in a metal drum or a bonded area lined with an impermeable base. ▪ Finally, the contaminated soil will be disposed of through Punjab EPA certified waste contractor.

7.9 Change Management Plan

Change in Operations

Any change in the project design or project operation if required will be made in relevance to the EMP and all the impacts associated with changed process will be either similar to the existing impacts and if different will be assessed and included in the mitigation management plan.

Change in Record Register

A record register will be maintained at the project site at the start of project activities. All the changes to be made will be recorded in this register. This will assist in the step-by-step environmental monitoring and decision-making. Record register will be the responsibility of concerned PPL executing Dept. and will be used internally.

Change in EMP

Changes in project design necessitate changes in the EMP. In this case, following actions will be taken:

- A meeting will be held between Site PPL Incharge and staff of the contractor, to discuss and agree upon the proposed change to the EMP.
- Based on the discussion during the meeting, a report will be produced, which will include the additional EMP clauses.
- Additional EMP clauses will be added to the original EMP as a second volume which will be distributed to the relevant staff of PPL and contractor.

7.10 Emergency Response Plan

Contingency planning requires those emergency plans and procedures that can be put into action quickly as soon as unexpected events occur. Poor contingency planning can result in delayed or ineffective response to unexpected events. In turn, this delay could result in short-term and long-term environmental impacts and threats to public safety and convenience. Possible emergency situations during proposed activities include:

- Possible risks arising from operational conditions or human error that could result in accidents, such as
    - Uncontrolled material leak into the atmosphere.
    - Fire/explosions.
    - Occupational accidents (serious or fatal), due failure to comply with operating rules and procedures, negligence of the personnel, falls, onsite accidents caused by equipment, burns, inappropriate use of equipment and personal protection items.
    - Environmental Contamination (due to material leaks/spill into the environment). Spillage of fuel, oil, gas, chemicals and hazardous materials;
- Natural Risks that may affect the facilities and their resulting damage to property and the person (Earthquake, Typhoon/Cyclone, Lightening, etc.)
- External Risks arising from delinquent actions, terrorism, or vandalism.

Emergency situations are possible even with proper planning, design and implementation of correct procedures and personnel training. Project contractors will develop a site-specific emergency response plan and submit it to PPL for review.

7.11 Implementation Environmental Management Plan & Environmental Budget

Budget will be kept for the implementation of Environmental Management Plan. Estimated cost for the implementation of EMP is provided below.

Table 31: Estimated Cost of Key Activities

S.No	Activity	Unit	Estimated Cost (Rs)
1	Sprinkling of water for dust suppression	per gallon	15
2	construction of septic tank	each	32,500
3	Construction of Soak Pit	each	26,500
4	Construction of washing area	each	145,000
5	Color coded bins	each	5,000
6	Disposal of solid waste	per trip	80,000
7	Construction of concrete pad and secondary containment for Fuel station	each	171,500
8	Labelling of fuel tanks	each	1,000
9	Construction of enclosure for generators	each	178,000
10	Drinking water from local well	per gallon	20
11	Drilling of water well	each	200,000
12	Construction of car wash area	each	30,000
13	Disposal of medical waste	per trip	80,000
14	Disposal of used oil	per trip	80,000
15	Disposal of vehicle related waste (non-hazardous)	per trip	80,000
16	Emission testing cost for generators	each	8,000
17	Emission testing cost for vehicles	each	8,000
18	Testing of drinking water	lumpsum	110,000
19	Cost for 3rd party DDC training	each driver	8,000
20	Cost for medical screening (Skilled Labour)	each staff	6,000
21	Cost for medical screening (Local Labour)	each staff	1,000
22	Cost for restoration of Septic tank	each	5,000
23	Cost for restoration of Soak Pit	each	5,000

SECTION 8: CONCLUSION

Environmental Impact Assessment (EIA) was conducted on behalf of PPL for the proposed 2D Seismic activities in Sui North Block, District Rajanpur, Punjab. The findings from the study performed have been categorically recorded and presented in the current report. To ensure compliance of the study and formulation of the reporting, all relevant national legislations were followed and adhered to.

Pakistan is facing an acute shortage of energy which is impeding the economic growth. To further worsen the problem a large portion of country's energy demands are met through expensive imports. Therefore, there is a dire need to explore and increase the production of crude oil and gas and thus reduce the import bills. The proposed project would help achieve this goal and also have a positive impact on socio-economic conditions as it would provide more job opportunities to the local people and generate opportunities for more business.

Potential impacts of seismic activities on the physical, biological, socio-economic and cultural environment of area are assessed through this study and proposed mitigation measures shall be adopted to alleviate the impacts on the environment.

Major impacts from project activities include changes in land use, soil and water contamination from spills, noise pollution, air emissions, impacts on water resources and site restoration after the completion of project activities. To eliminate or minimize the impacts, key mitigation measures include optimal land uptake for project activities and establishment of campsites, minimize vegetation clearance, disposal of sewage water through septic tank and soak pit, reuse of greywater for water sprinkling, provision of secondary containment around fuel and oil storage areas.

The EIA concludes that the proposed activities will not lead to significant adverse environmental impacts and careful implementation of the EMP will ensure that potential impacts are managed and minimized and the project proponents meet all statutory requirements.

Appendix – A

Source of data and list of reference material used

- Geological survey of Pakistan
- Pakistan Meteorological Department
- Field surveys conducted in project area
- Environmental monitoring conducted in project area
- Pakistan Social and Living Standards Measurement Survey
- Pakistan Bureau of Statistics
- Punjab Bureau of Statistics
- Punjab Agriculture Department
- Revenue Department, Government of the Punjab

Appendix – B:

Term of References

Title:

EIA of Seismic Activities in Sui North Block, District Rajanpur, Punjab.

"Environmental consultant firm" to carry out the Environmental Assessment of the 2D Seismic Survey activities proposed in Sui North Block, in accordance with the guidelines of Punjab Environmental Protection Agency (PEPA).

The Environmental Assessment Study will be done for the site proposed by PPL.

Consultant will be responsible to collect all the information relevant / required for the project & are required to compile and subsequently obtained approval of same from PEPA.

The consultant scope includes but not limited to following activities:

i. Description of the Proposed Project Activities
ii. Review of Alternatives
iii. Field Survey
iv. Collection and Review of primary and secondary data as per requirement.
v. Review of existing environmental legislation, guidelines and standards applicable to the operation and assessing their applicability.
vi. Public Consultation (if required)
vii. Identification and Evaluation of Environmental Impacts
viii. Recommendations for Mitigation Measures
ix. Development of Environmental Management Plan
x. Any other item deemed necessary to complete the report in-line with guidelines / requirements of PEPA and or Environmental Protection Agency (EPA)
xi. Preparation of a Final Report to meet or exceed the requirements of PEPA/EPA.
xii. Conclusions

The Environmental consultant shall prepare Environmental Assessment Report and subsequently submit to relevant authority after obtaining review / approval from PPL. Furthermore, consultant shall also be responsible for obtaining approval from PEPA. Consultant shall be solely responsible for obtaining the final approval after fulfillment of all pre-requisites as per PEPA requirements. Overall correspondence and or other financial requirement(s) in this regard are to be taken care by the consultant.

Location:
Sui North Block, District Rajanpur, Punjab

Appendix – C:

List of Individuals consulted with their written feedback

Feedback of consultations conducted:

District EPA Officer – District

Date: Wednesday, 05, October, 2022.

Venue: EPA Rajanpur

Name of the designated person: Mr. Arif Hussain (MI)

Summary of Discussion:

EPA Officer in District Rajanpur, Mr. Arif. Hussain (MI) was contacted for his valuable suggestions and recommendations for the proposed seismic activities in Sui North Block (Rajanpur). He was briefed about the scope of the project and activities involved.

Suggestions and recommendations by EPA Officer are as follows:

- No waste should be discharge in Kacchi canal by PPL Operators or Contractors during the Seismic Survey.
- During Seismic survey, the damages to native flora by land clearing should be minimized.
- The waste produced should be disposed off environmentally friendly manner.
- Plantation should be done by PPL after seismic activities.



TMA Officer

Date: Wednesday, 05, October, 2022.

Venue: TMA Rajanpur

Name of the designated person: Mr. Riaz Mizari (MFO TMA)

Summary of Discussion:

TMA Officer in District Rajanpur, Mr. Riaz MAzari (MFO TMA) was contacted for his valuable suggestions and recommendations for the proposed seismic activities in Sui North Block (Rajanpur). He was briefed about the scope of the project and activities involved.

Suggestions and recommendations are as follows:

- Waste generated should be treated as per law and PPL.
- PPL should contact TMA prior to waste disposal.
- The proposed study area is political unstable. It is recommended that PPL should engage both tribes Bughtis and Mazaris to avoid conflicts.



Quaid I Azam university

Date: Wednesday, 05, October, 2022.

Venue: Quaid I Azam University

Name of the designated person: Dr. Hamid (Research Associate)

Summary of Discussion:

Dr. Hamid from Environmental Sciences department (Quaid-I-Azam University), was contacted for his valuable suggestions and recommendations for the proposed

seismic activities in Sui North Block (Rajanpur). He was briefed about the scope of the project and activities involved.

Suggestions and recommendations are as follows:

- Usually, the seismic study does not have a significant impact if its extent is low but if it is carried out on a large area, then such activities have the potential to disturb vegetation, soil, terrain and of wildlife habitat on a localized scale. Therefore, it is recommended that in case of any damage to the vegetation, a plantation should be carried out in the study area.
- The PPL should ensure that implementation of the EMP proposed to mitigate the impacts.
- If the contractors encountered any wildlife den, nests or offspring during the survey, they should inform the local wildlife department for the safe removal and relocation.

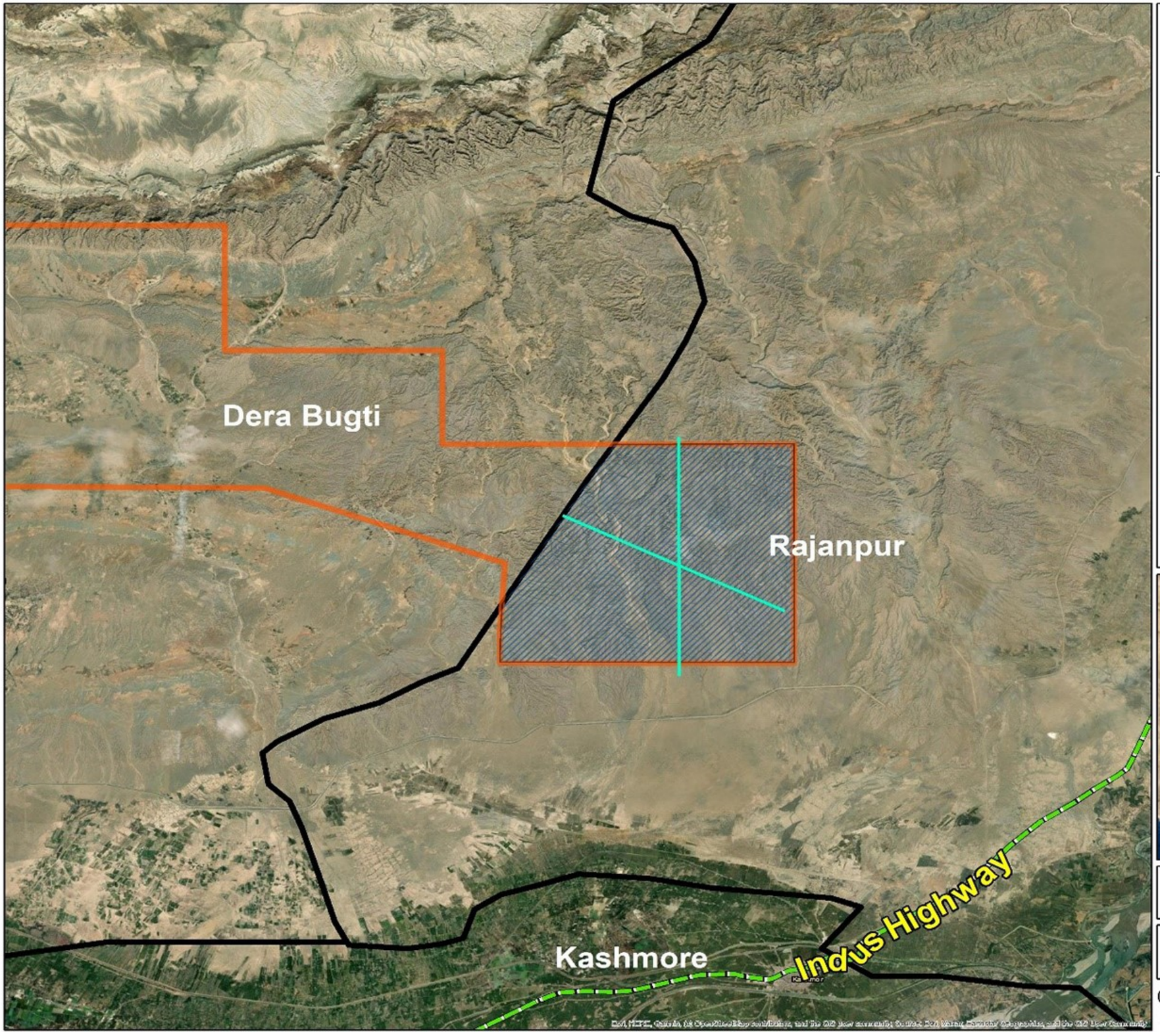
Appendix – D

Names & designation of team members carrying out EIA study

Sr. #	Name of Experts	Position in EIA Study Team
9.	Mr. Syed Nadeem Arif	Project Manager
10.	Mr. Ahmed Zohair Siddiqui	Environmental Engineer & Team Leader
11.	Mr. Sadam Hussain	Environmental Specialist
12.	Mr. Imran Khan	Environmentalist
13.	Mr. Nisar Khan	Environmentalist
14.	Mr. Khurram Shams	Sociologist
15.	Mr. M. Rizwan	HSE Advisor
16.	Mr. Zain Rafi	CAD/Graphics Designer

ANNEXURE I
Project Location Map

Location Map of IEE Study for 2D Seismic Survey in Sui North Block, Rajanpur, Punjab

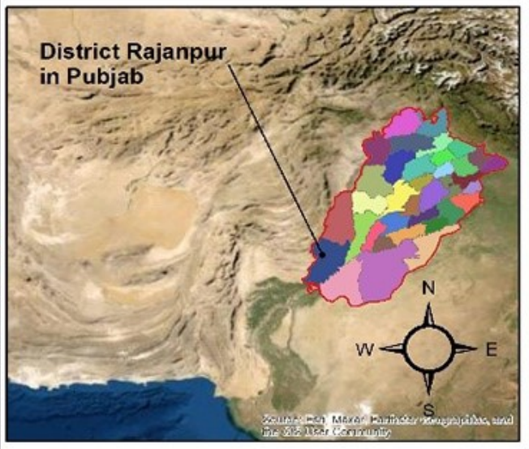


EMC PAKISTAN PRIVATE LIMITED
E M C

PPL

Legend

- Seismic-SuiN-08
- Seismic-SuiN-03
- Indus Highway
- SNB - Rajanpur Section
- Sui North Block
- Provincial Boundaries



Prepared By;
Sadam Hussain

Approved By;
Ahmed Zohair Siddiqui

0 1 2 4 6 8
Miles

ANNEXURE II
Environmental Monitoring Reports

ENVIRONMENTAL PROTECTION AGENCY
GOVERNMENT OF THE PUNJAB
National Hockey Stadium, Gate No. 08
Gaddafi Stadium Complex, Lahore

Validation for Stack & Ambient Monitoring / Sampling

Emission Monitoring under CTM-34 or OTM-39				
Facility Name & Address Phone	EMC. Pakistan Shahiwali, Rajanpur Punjab	No of Stacks /Sampling Point	II AA-	
Industry Category	Baseline Study			
Analyzer Model & Make				
Average stack emission Values of CO, NOx (in mg/nM3)				
Excess Air / Excess Oxygen (%age):-				
Analyzer exposed for Ramp-Up phase to the sample gas for 5 minutes		Yes	NO	NA
Analyzer flow rate and EC temperature monitored during calibration and testing		Yes	No	NA
Test Data Phase of sample gas recorded with 15 second interval		Yes	No	NA
All key requirements to ensure QA/QC complied for said EPA approved Method		Yes	No	NA
Particulate Matter (PM) Monitoring / Sampling under USEPA Method 5 / 17				
Model & Make of Iso-kinetic PM Assembly				
The PM sampling train is complete as per Method 5 & 17		Yes	No	NA
Leak Test performed prior to sampling		Yes	No	NA
Field data Sheet for PM Sampling filled during PM sampling		Yes	No	NA
Data for determining of "K" factor & DGM "Y" Factor filled during sampling		Yes	No	NA
All method key requirements during sampling were compiled to ensure QA/QC		Yes	No	NA
Filter of Particulate matter is suitable for metal Testing		Yes	No	NA
SOx sampling as per Method 8 (Thorin Indicator Method)				
The right absorbent solution are available for SOx Sampling		Yes	No	NA
The equipment is capable to maintain flow rate @ 2.0LPM or as per method 8 requirement		Yes	No	NA
Sampling for SOx is performed as per method		Yes	No	NA
Ambient Air Quality Monitoring by Automatic Monitors for CO, O3, SO2, NOx, PM2.5 & PM10				
In case of continuous monitoring at a site, One Point QC Check Single analyzer & Zero/span check is performed every 14 days.		Yes	No	NA
The CE of NOx analyzer is ensured to be maintained within 96% - 104.1%		Yes	No	NA
Zero/span check is performed prior to starting ambient monitoring		Yes	No	NA
All key requirements for Critical & Operational Criteria for ambient air monitoring by automatic monitors were compiled during monitoring		Yes	No	NA
The measuring techniques of monitors comply PEQS		Yes	No	NA
Ambient Air Sampling of SPM, PM10, Pb by High Volume Sampler				
In case of Sampling for SPM through samplers, the flow rate of sampler comply PEQS (1.1m3/min).		Yes	No	NA
Calibration of Sampler performed prior to sampling		Yes	No	NA
Vehicular Emissions & Noise Measurement				
Sampling of Vehicle emissions and noise measurement have been performed as per method and SOPs		Yes	No	NA

Remarks (if Any):-

Research Officer
Environmental Protection Agency
Punjab Lahore

8-10-2022
Dated

Mohsin Raza

Signature
Name of EPA Officer with office Address
RAs / ROs /DD(Labs)

Signature
Name of Assistant /Deputy Analyst, Analyst with Name of Private Lab along with Address

ENVIRONMENTAL PROTECTION AGENCY
GOVERNMENT OF THE PUNJAB
National Hockey Stadium, Gate No. 08
Gaddafi Stadium Complex, Lahore

Validation for Wastewater & Drinking Water

Facility /Project Name & Address Phone	EMC Pakistan Baseline Study Shahwali, Rajanpur, Punjab	**Sampling Point**	II Ground water

Waste Water (**WW**) Treatment facility Primary Secondary Tertiary NA		Drinking Water (**W**) Treatment Facility ----------	
Total WW collected Sample		Total Collected Drinking water samples.....5.....	
Sample Tag for testing parameter is assigned on sample container	Yes✓	NO	NA
Sample is preserved properly for each testing parameter	Yes✓	NO	NA
Sample size is adequate for testing the target parameters	Yes✓	NO	NA
Wastewater Flow Measurement performed to ensure sample representativeness	Yes	NO	NA

No. of Waste Water outlets	Waste Water Flow m^3/hr from each outlet (**Optional**)	Water intake m^3/hr (**Optional**)	Water Mass balance complied during sampling (**Optional**)	Sample Type
			Yes No	Grab✓ Composite

Parameter	Matrix W	Matrix WW	Container	Sample Size	Preservation	Yes	NO	NA
Coliform, Total or Fecal			Sterile Container	100 mL	Refrigerate 6 C			
Coliform, Total or Fecal, Chlorinated Water			Sterile Container	100 mL	0.008% Thiosulphate & cooled 6 C			
Color, Turbidity			P,G	500 mL	Cool 6 C			
Hardness, Total			P,G	500ml	HNO3 to pH<2			
Nitrogen, Nitrate + Nitrite , Phenolic Compounds, Oil & Grease, COD, NH3			P,G	2000 mL	H2SO4 to pH < 2, Cool 6C			
Metals, General			P,G Rinsed 1.1 HNO3	500 mL	HNO3 to pH < 2			
Cyanide, Total			P,G	500 mL	NaOH to pH > 12, Cool 6C			
Pesticides, General			Glass	1 Liter	Cool 6 C			

Field Parameters*

Field parameter		pH meter, Model Make	Measurement Method	Calibrated in Field	Measured value
pH				Yes NO	
Temp	24.26°				
Cl					

*** Field testing parameters only be validated by RAs, ROs, DD (Labs)**

Remarks for Sample Quality (if Any):-

08-10-2022
Dated

Research Officer
Environment Protection Agency
Punjab, Lahore

Signature
Name of EPA Officer with office Address
Inspectors /RAs / ROs or ADs /DDs

Mohsin Raza

Signature
Name of Assistant /Deputy Analyst, Analyst with Name of Private Lab along with Address

Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003661

Monitoring & Test Report

- Ground Water
- Surface Water
- Ambient Air

EMC PAKISTAN

17th Oct. 2022

Job Reference No.: GCEC-PK-PU-269/2022

Green Crescent Environmental Consultant Pvt. Ltd.
has prepared this report in accordance with the instructions of
Client for their specific purpose. Any other individuals using the content presented in
the document shall do so at their own liability and shouldn't rely upon material provided in this report
as basis for making any legal decision.
© GCEC Pvt. Limited

Pakistan Office: House No. 368-B , Block Canal View
Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Client Detail:	
Name of Contact Person:	Engr. Sadam Hussain
Designation:	Environmental Specialist
Contact Number:	+92-304-5835929
Telephone:	+92-21-34311466
Fax:	-
Email:	sadam.hussain@emc.com.pk
Address:	502-503, Anum Estate Main Shahra-e-Faisal, Karachi

GCEC Details:	
Director:	Mr. Mian Khurram Usman
Telephone:	+92 42 35962885
Fax:	+92 42 35962884
Email:	manager.operations@gcee.ae
Address	House No. 368-B Block B, Canal View, Lahore

Signatories:

Green Crescent Environmental Consultants (Pvt) Ltd. ★ PAKISTAN ★

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003663

CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Sample Details			
Job Ref. No:	GCEC-PK-PU-269/2022	Client Name:	EMC
Telephone No. :	+92-304-5835929	Sample Matrix:	Ground Water Sample
Sample Date:	07-10-2022	Sampled By:	GCEC
Sample Receipt Date:	08-10-2022	Date of Completion of Analysis:	14-10-2022
Grab/Composite:	Grab Sampling	Address:	502-503, Anum Estate Main Shahra-e-Faisal, Karachi
Sample Identification			
01	Near Shahwali Railway Station	Sampling Coordinates	28°30'13.4"N 69°41'20.1"E

Parameters	Analysis Method	Unit	LOR	Result 01	PEQS
PHYSICAL & CHEMICAL ANALYSIS					
pH**	APHA-4500H+ B	-	0.01	7.37	6.5-8.5
Odor	In-house	-	-	Odorless	Non-Objectionable
Taste	In-house	-	-	Sweet	Non-Objectionable
Color	APHA-2120 B/C	Pt/Co	1.0	<1.0	≤15 TCU
Turbidity**	APHA-2130 B	NTU	-	16.73	<5 NTU
Total Hardness**	APHA-2340 B&C	mg/l	0.1	132.0	< 500 mg/l
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1.0	233.0	< 1000
Chloride**	APHA-4500 B	mg/l	0.24	30.13	< 250
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	≤ 0.05
Fluoride (F)**	APHA-4500F- D	mg/l	0.01	<0.01	≤ 1.5
Nitrite	APHA-4500NO2 B	mg/l	0.01	0.064	≤ 3 (P)
Nitrate**	APHA-4500NO3 C	mg/l	0.1	<0.1	≤ 50
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.01	-
Residual Chlorine	APHA-4500Cl G	mg/l	0.1	<0.1	0.2-0.5
Aluminum (Al)	APHA-3111Al B	mg/l	0.028	<0.028	≤ 0.2
Cadmium**	APHA-3111 B	mg/l	0.0028	<0.0028	0.01
Copper**	APHA-3111 B	mg/l	0.0045	<0.0045	2
Chromium**	APHA-3111 B	mg/l	0.0054	<0.0054	≤ 0.05 (P)
Mercury	APHA-3112Hg B	mg/l	0.0008	<0.0008	≤ 0.001
Antimony (Sb)**	APHA-3111 B	mg/l	-	ND	≤ 0.005 (P)
Nickel**	APHA-3111 C	mg/l	0.008	<0.008	≤ 0.02
Zinc**	APHA-3111 B	mg/l	0.0033	<0.0033	5.0
Arsenic	APHA-3111As B	mg/l	0.01	<0.01	≤ 0.05 (P)
Barium	APHA-3111Ba B	mg/l	0.031	<0.031	0.7
Manganese**	APHA-3111 B	mg/l	0.0016	<0.0016	≤ 0.5
Iron**	APHA-3111 B	mg/l	0.1	<0.1	-
Boron	APHA-4500-B (C)	mg/l	0.1	<0.1	0.3
Lead**	APHA-3111 B	mg/l	0.013	<0.013	≤ 0.05
Selenium	APHA-3111Se B	mg/l	-	ND	0.01 (P)
Pesticides	APHA-6630 B	mg/l	-	ND	0.15
MICROBIOLOGICAL ANALYSIS					
Total Coliforms	APHA:9222 B	CFU/100ml		Absent	0/100ml
Faecal Coliforms (Ecoli)	APHA:9222 D	CFU/100ml		Absent	0/100ml

Abbreviations:
ND: Not Detected **LOR:** Limit of Reporting **PEQS:** Pumjab Environmental Quality Standards

Note:
** Uncertainty of all the parameters and laboratory conditions at the time of analysis will be provided as per client's requirement. The lab environmental conditions are maintained at 25±5C° and humidity at 50±20%.*

*Disclaimer: The results are solely of the sample provided. ** All starred parameters are PNAC accredited.*

Sample Analyzed By:

Analyst
Mr.Idrees Zaman

Name of Chief Analyst With Seal:

Mr. Usman Raza Jaswal

Green Crescent Environmental Consultants Pvt. Ltd. * PAKISTAN *

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003664

CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Sample Details			
Job Ref. No:	GCEC-PK-PU-269/2022	Client Name:	EMC
Telephone No. :	+92-304-5835929	Sample Matrix:	Ground Water Sample
Sample Date:	07-10-2022	Sampled By:	GCEC
Sample Receipt Date:	08-10-2022	Date of Completion of Analysis:	14-10-2022
Grab/Composite:	Grab Sampling	Address:	502-503, Anum Estate Main Shahra-e-Faisal, Karachi
Sample Identification			
02	Near Quetta Hotel Siria Rd	Sampling Coordinates	28°28'54.7"N 69°40'06.4"E

Parameters	Analysis Method	Unit	LOR	Result 02	PEQS
PHYSICAL & CHEMICAL ANALYSIS					
pH**	APHA-4500H+ B	-	0.01	7.50	6.5-8.5
Odor	In-house	-	-	Odorless	Non-Objectionable
Taste	In-house	-	-	Sweet	Non-Objectionable
Color	APHA-2120 B/C	Pt/Co	1.0	<1.0	≤15 TCU
Turbidity**	APHA-2130 B	NTU	-	ND	<5 NTU
Total Hardness**	APHA-2340 B&C	mg/l	0.1	148.0	< 500 mg/l
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1.0	275.0	< 1000
Chloride**	APHA-4500 B	mg/l	0.24	33.67	< 250
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	≤ 0.05
Fluoride (F)**	APHA-4500F- D	mg/l	0.01	<0.01	≤ 1.5
Nitrite	APHA-4500NO2 B	mg/l	0.01	<0.01	≤ 3 (P)
Nitrate**	APHA-4500NO3 C	mg/l	0.1	<0.1	≤ 50
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.01	-
Residual Chlorine	APHA-4500Cl G	mg/l	0.1	<0.1	0.2-0.5
Aluminum (Al)	APHA-3111Al B	mg/l	0.028	<0.028	≤ 0.2
Cadmium**	APHA-3111 B	mg/l	0.0028	<0.0028	0.01
Copper**	APHA-3111 B	mg/l	0.0045	<0.0045	2
Chromium**	APHA-3111 B	mg/l	0.0054	<0.0054	≤ 0.05 (P)
Mercury	APHA-3112Hg B	mg/l	0.0008	<0.0008	≤ 0.001
Antimony (Sb)**	APHA-3111 B	mg/l	-	ND	≤ 0.005 (P)
Nickel**	APHA-3111 C	mg/l	0.008	<0.008	≤ 0.02
Zinc**	APHA-3111 B	mg/l	0.0033	<0.0033	5.0
Arsenic	APHA-3111As B	mg/l	0.01	<0.01	≤ 0.05 (P)
Barium	APHA-3111Ba B	mg/l	0.031	<0.031	0.7
Manganese**	APHA-3111 B	mg/l	0.0016	<0.0016	≤ 0.5
Iron**	APHA-3111 B	mg/l	0.1	<0.1	-
Boron	APHA-4500-B (C)	mg/l	0.1	<0.1	0.3
Lead**	APHA-3111 B	mg/l	0.013	<0.013	≤ 0.05
Selenium	APHA-3111Se B	mg/l	-	ND	0.01 (P)
Pesticides				ND	
MICROBIOLOGICAL ANALYSIS					
Total Coliforms	APHA:9222 B	CFU/100ml		Absent	0/100ml
Faecal Coliforms (Ecoli)	APHA:9222 D	CFU/100ml		Absent	0/100ml

Abbreviations:
ND: Not Detected **LOR:** Limit of Reporting **PEQS:** Punjab Environmental Quality Standards

Note:
** Uncertainty of all the parameters and laboratory conditions at the time of analysis will be provided as per client's requirement. The lab environmental conditions are maintained at 25±5C° and humidity at 50±20%.*

*Disclaimer: The results are solely of the sample provided. ** All starred parameters are PNAC accredited.*

Sample Analyzed By:

Analyst
Mr.Idrees Zaman

Name of Chief Analyst With Seal:

Mr. Usman Raza Jaswal

Green Crescent Environmental Consultants Pvt. Ltd. ★ PAKISTAN ★

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003665

CHEMICAL ANALYSIS TEST REPORT (SURFACE WATER)

Sample Details			
Job Ref. No:	GCEC-PK-PU-269/2022	Client Name:	EMC
Telephone No.:	+92-304-5835929	Sample Matrix:	Surface Water Sample
Sample Date:	07-10-2022	Sampling By:	GCEC
Sample Receipt Date:	08-10-2022	Date of Completion of Analysis:	17-10-2022
Grab/Composite:	Grab Sampling	Address:	502-503, Anum Estate Main Shahra-e-Faisal, Karachi

Sample Identification			
01	Kachi Canal Siria Road	Sampling Coordinates:	38°35'14.3"N 69°35'05.2"E

Parameters	Analysis Method	Unit	LOR	Result
				01
pH**	APHA-4500-H+ B	-	0.01	7.73
Temperature	-	^{0}C	-	24.3
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1.0	2417
Total Suspended Solid**	APHA-2540-C	mg/l	1.0	1361
Biological Oxygen Demand	APHA-5210	mg/l	1.0	5.6
Chemical Oxygen Demand**	APHA-5220-D	mg/l	1.0	14.0
Oil and Grease**	USEPA-1664	mg/l	0.2	<0.2
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0..01
Chloride (Cl)**	APHA-4500 B	mg/l	0.24	212.7
Fluoride (F)**	APHA-4500F- D	mg/l	0.01	<0.01
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01
Detergent	APHA-5540 B	mg/l	-	ND
Pesticides	APHA-6630 B	mg/l	-	ND
Sulphate**	APHA-4500-SO4^{2-}C	mg/l	0.41	34.0
Sulphide	APHA-4500-S2-E	mg/l	0.4	<0.4
Ammonia	APHA-4500-NH3-B	mg/l	0.002	<0.002
Zinc**	APHA-3111 B	mg/l	0.0033	1.5936
Manganese**	APHA-3111 B	mg/l	0.0016	<0.0016
Silver	APHA-3111Ag-B	mg/l	0.0032	0.0043
Chlorine	APHA-4500Cl-B	mg/l	0.1	<0.1
Iron**	APHA-3111 B	mg/l	0.1	9.0580
Cadmium**	APHA-3111 B	mg/l	0.0028	0.0029
Chromium**	APHA-3111 B	mg/l	0.0054	<0.0054
Copper**	APHA-3111 B	mg/l	0.0045	0.0048
Lead**	APHA-3111 B	mg/l	0.013	<0.013
Mercury	APHA-3112 Hg B	mg/l	0.0008	<0.0008
Nickel**	APHA-3111 C	mg/l	0.008	0.0071
Arsenic	APHA-3111 As B	mg/l	0.01	<0.01
Barium	APHA-3111 Ba B	mg/l	0.031	<0.031
Boron	APHA-4500B-C	mg/l	0.1	<0.1
Selenium	APHA-3111 Sc-B	mg/l	-	ND
Total Toxic Metals	By Calculation	mg/l	-	0.0231

Abbreviations:

ND: Not Detected
LOR: Limit of Reporting

Note:

**Uncertainty of all the parameters and laboratory conditions at the time of analysis will be provided as per client's requirement. The lab environmental conditions are maintained at 25±5C° and humidity at 50±20%.*
*** NEQS Limits are not available for surface water inspection. ** All starred parameters are PNAC accredited.*

Sample Analyzed By:

Analyst
Mr. Idrees Zaman

Name of Chief Analyst With Seal:

Mr. Usman Raza Jaswal

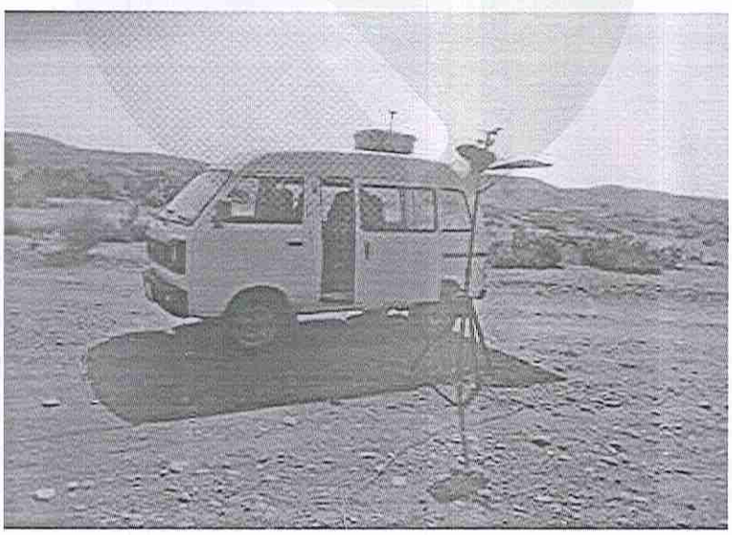
Green Crescent Environmental Consultants Pvt. Ltd. ★ PAKISTAN ★

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003677

Ambient Air & Noise Monitoring
Location #01
Near Kachi Canal
Tribal Area



Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-PU-269/2022
Monitoring Point	Near Kachi Canal, Tribal Area
Date of Intervention	07-10-2022 to 08-10-2022
Monitoring Coordinates	28°38'26.5"N 69°32'59.6"E

Sr. #	Time	CO (mg/m^3)	NO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)
1.	13:00	0.78	10.21	13.23	23.44	14.15
2.	14:00	0.76	9.07	12.12	21.19	13.01
3.	15:00	0.73	8.92	13.77	22.69	14.59
4.	16:00	0.71	11.23	15.23	26.46	14.02
5.	17:00	0.71	10.18	13.98	24.16	13.12
6.	18:00	0.65	12.34	14.02	26.36	12.38
7.	19:00	0.63	9.98	14.02	24	12.53
8.	20:00	0.61	10.23	13.92	24.15	13.07
9.	21:00	0.62	10.12	13.23	23.35	11.12
10.	22:00	0.59	9.98	14.21	24.19	13.17
11.	23:00	0.57	11.98	14.92	26.9	10.38
12.	0:00	0.58	10.29	13.29	23.58	11.44
13.	1:00	0.52	11.01	14.09	25.1	12.41
14.	2:00	0.65	9.98	13.98	23.96	13.81
15.	3:00	0.69	10.21	13.98	24.19	13.41
16.	4:00	0.75	10.02	15.12	25.14	15.01
17.	5:00	0.74	11.01	14.98	25.99	14.89
18.	6:00	0.81	10.89	15.02	25.91	13.54
19.	7:00	0.83	10.81	14.32	25.13	14.51
20.	8:00	0.79	9.98	15.02	25	14.72
21.	9:00	0.88	9.68	14.98	24.66	15.04
22.	10:00	0.84	10.21	14.98	25.19	14.52
23.	11:00	0.86	9.18	18.78	27.96	13.14
24.	12:00	0.81	9.11	14.02	23.13	14.21
Average Concentration		0.71	10.28	14.38	24.66	13.42

Monitoring Performed By:
Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:
Mr. Usman Raza Jaswal

Green Crescent Environmental Consultants Pvt. Ltd. ★ PAKISTAN ★

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-PU-269/2022
Monitoring Point	Near Kachi Canal, Tribal Area
Date of Intervention	07-10-2022 to 08-10-2022
Monitoring Coordinates	28°38'26.5"N 69°32'59.6"E

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	PEQS
Nitrogen Dioxide (NO_2)	µg/m³	24 Hours	1.00	14.38	80.0
Nitrogen Oxide (NO)	µg/m³	24 Hours	1.00	10.28	40.0
NO_X	µg/m³	24 Hours	1.00	24.66	120.0
Sulphur Dioxide (SO_2)	µg/m³	24 Hours	1.00	13.42	120.0
Carbon Monoxide (CO)	mg/m³	08 Hours	0.01	0.71	05.0*
Ozone (O_3)	µg/m³	01 Hour	-	13.19	130.0**
Particulate Matter ($PM_{2.5}$)	µg/m³	24 Hours	1.00	19.04	35.0
Particulate Matter (PM_{10})	µg/m³	24 Hours	1.00	116.79	150.0
Total Suspended Particulate (TSP)	µg/m³	24 Hours	1.00	167.83	500.0
Lead Airborne Particles	µg/m³	24 Hours	-	0.12	1.5

Abbreviations:
µg/m³= Micrograms per Cubic Meter
mg/m³= Milligrams per Cubic Meter
LDL= Lowest Detection Limit
PEQS= Punjab Environmental Quality Standards
*08 hour standard for CO
**01 hour standard for O_3

Monitoring Performed By:
Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:
Mr. Usman Raza Jaswal

Green Crescent Environmental Consultants Pvt. Ltd. * PAKISTAN *

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Meteorological Data

Job Reference Number	GCEC-PK-PU-269/2022
Monitoring Point	Near Kachi Canal, Tribal Area
Date of Intervention	07-10-2022 to 08-10-2022
Monitoring Coordinates	28°38'26.5"N 69°32'59.6"E

Time	Ambient Temperature °C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
13:00	35	SE	3.2	12	754.3
14:00	36	SE	3.1	11	754.5
15:00	37	SE	3.4	9	751.5
16:00	35	SE	3.2	9	756.5
17:00	34	SE	3.2	10	755.3
18:00	34	S	3.7	10	752.5
19:00	33	S	3.2	11	754.8
20:00	32	S	4.1	12	756.8
21:00	31	S	4.5	12	755.3
22:00	30	S	3.6	13	756.8
23:00	29	S	3.2	14	753.4
0:00	29	S	3.4	16	754.5
1:00	28	SW	3.2	21	756.8
2:00	27	SW	2.3	23	757.5
3:00	26	SW	2.5	24	756.3
4:00	25	SW	2.1	25	756.8
5:00	24	SW	2.5	34	755.4
6:00	24	SW	2.2	35	756.8
7:00	23	SW	2.5	33	756.2
8:00	24	SE	2.1	29	756.9
9:00	25	SE	3.3	26	755.3
10:00	27	SE	3.2	21	755.3
11:00	32	S	3.1	15	756.8
12:00	33	S	2.5	14	756.5

Monitoring Performed By:
Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:
Mr. Usman Raza Jaswal

Green Crescent Environmental Consultants Pvt Ltd. ★ PAKISTAN ★

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Noise Level Monitoring Report

Job Reference Number	GCEC-PK-PU-269/2022
Monitoring Point	Near Kachi Canal, Tribal Area
Date of Intervention	07-10-2022 to 08-10-2022
Monitoring Coordinates	28°38'26.5"N 69°32'59.6"E

Sr. #	Time	Method/Technique	Unit	Results LAavg	PEQS (Residential)
Night Time					
1.	23:00	Noise Meter	dB	40.1	
2.	00:00	Noise Meter	dB	42.5	
3.	01:00	Noise Meter	dB	41.5	
4.	02:00	Noise Meter	dB	42.6	
5.	03:00	Noise Meter	dB	41.9	45.0
6.	04:00	Noise Meter	dB	40.8	
7.	05:00	Noise Meter	dB	42.5	
8.	06:00	Noise Meter	dB	41.4	
Night Time Average			**dB**	**41.7**	**45.0**
Day Time					
9.	07:00	Noise Meter	dB	43.4	
10.	08:00	Noise Meter	dB	42.7	
11.	09:00	Noise Meter	dB	49.4	
12.	10:00	Noise Meter	dB	48.1	
13.	11:00	Noise Meter	dB	47.2	
14.	12:00	Noise Meter	dB	48.2	
15.	13:00	Noise Meter	dB	44.2	
16.	14:00	Noise Meter	dB	45.3	
17.	15:00	Noise Meter	dB	47.1	55.0
18.	16:00	Noise Meter	dB	45.3	
19.	17:00	Noise Meter	dB	44.8	
20.	18:00	Noise Meter	dB	43.5	
21.	19:00	Noise Meter	dB	43.9	
22.	20:00	Noise Meter	dB	44.1	
23.	21:00	Noise Meter	dB	44.9	
24.	22:00	Noise Meter	dB	39.2	
Day Time Average			**dB**	**45.1**	**55.0**

Monitoring Performed By:

Deputy Analyst

Mohsin Raza

Name of Chief Analyst with Seal:

Mr. Usman Raza Jaswal

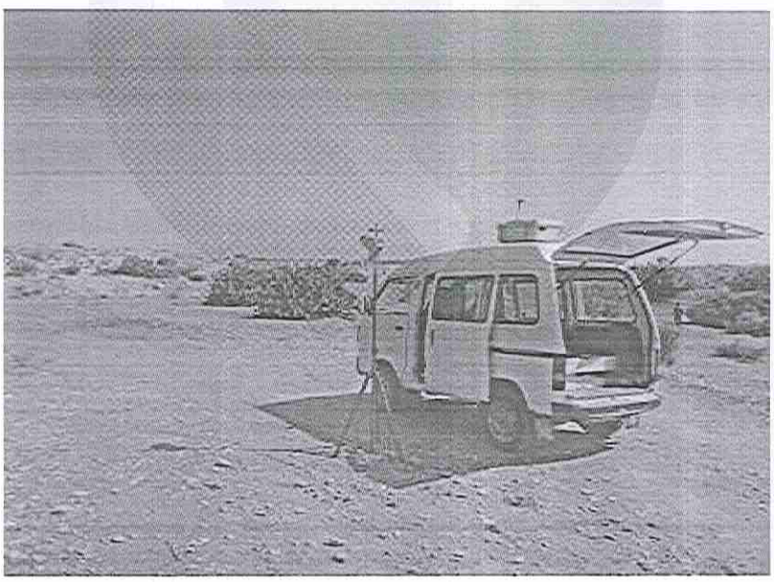
Green Crescent Environmental Consultants Pvt. Ltd. ★ PAKISTAN ★

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003671

Ambient Air & Noise Monitoring
Location # 02
Near Kachi Canal
Tribal Area



Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003672

Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-PU-269/2022
Monitoring Point	Near Kachi Canal, Tribal Area
Date of Intervention	08-10-2022 to 09-10-2022
Monitoring Coordinates	28°36'48.8"N 69°31'33.6"E

Sr. #	Time	CO (mg/m^3)	NO ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)
1.	13:00	0.98	10.98	14.23	25.21	12.3
2.	14:00	0.89	11.23	13.82	25.05	12.43
3.	15:00	0.87	10.92	13.98	24.9	11.42
4.	16:00	0.92	11.23	14.02	25.25	13.02
5.	17:00	0.91	10.18	14.04	24.22	11.98
6.	18:00	0.86	11.98	13.98	25.96	11.86
7.	19:00	0.95	9.98	14.12	24.1	13.82
8.	20:00	0.78	10.23	13.23	23.46	12.34
9.	21:00	0.86	12.3	15.19	27.49	11.02
10.	22:00	0.79	9.98	14.23	24.21	12.98
11.	23:00	0.8	10.98	15.23	26.21	11.87
12.	0:00	0.91	10.29	13.99	24.28	11.44
13.	1:00	0.86	12.31	14.22	26.53	12.98
14.	2:00	0.9	12.03	15.81	27.84	13.81
15.	3:00	0.87	11.9	16.01	27.91	12.91
16.	4:00	0.67	10.02	14.02	24.04	13.23
17.	5:00	0.77	11.01	14.87	25.88	10.92
18.	6:00	0.81	9.98	13.98	23.96	13.54
19	7:00	0.83	10.81	14.01	24.82	14.51
20.	8:00	0.79	11.23	14.23	25.46	13.24
21.	9:00	0.87	9.68	14.91	24.59	11.24
22.	10:00	0.84	10.21	14.21	24.42	14.52
23.	11:00	0.78	10.98	13.98	24.96	13.14
24.	12:00	0.76	10.23	14.11	24.34	12.44
Average Concentration		0.84	10.86	14.35	25.21	12.62

Monitoring Performed By:

Deputy Analyst

Mohsin Raza

Name of Chief Analyst with Seal:

Mr. Usman Raza Jaswal

Green Crescent Environmental Consultants Pvt. Ltd. ★ PAKISTAN ★

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-PU-269/2022
Monitoring Point	Near Kachi Canal, Tribal Area
Date of Intervention	08-10-2022 to 09-10-2022
Monitoring Coordinates	28°36'48.8"N 69°31'33.6"E

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	PEQS
Nitrogen Dioxide (NO_2)	µg/m³	24 Hours	1.00	14.35	80.0
Nitrogen Oxide (NO)	µg/m³	24 Hours	1.00	10.86	40.0
NO_X	µg/m³	24 Hours	1.00	25.21	120.0
Sulphur Dioxide (SO_2)	µg/m³	24 Hours	1.00	12.62	120.0
Carbon Monoxide (CO)	mg/m³	08 Hours	0.01	0.84	05.0*
Ozone (O_3)	µg/m³	01 Hour	-	12.74	130.0**
Particulate Matter ($PM_{2.5}$)	µg/m³	24 Hours	1.00	21.46	35.0
Particulate Matter (PM_{10})	µg/m³	24 Hours	1.00	122.88	150.0
Total Suspended Particulate (TSP)	µg/m³	24 Hours	1.00	176.34	500.0
Lead Airborne Particles	µg/m³	24 Hours	-	0.138	1.5

Abbreviations:
µg/m³= Micrograms per Cubic Meter
mg/m³= Milligrams per Cubic Meter
LDL= Lowest Detection Limit
PEQS= Punjab Environmental Quality Standards
*08 hour standard for CO
**01 hour standard for O_3

Monitoring Performed By:
Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:
Mr. Usman Raza Jaswal

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Meteorological Data

Job Reference Number	GCEC-PK-PU-269/2022
Monitoring Point	Near Kachi Canal, Tribal Area
Date of Intervention	08-10-2022 to 09-10-2022
Monitoring Coordinates	28°36'48.8"N 69°31'33.6"E

Time	Ambient Temperature ^{0}C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
13:00	36	SW	4.2	11	753.4
14:00	36	SW	4.3	10	754.5
15:00	35	SW	3.4	9	753.4
16:00	34	SE	4.1	9	756.5
17:00	34	SW	3.9	8	755.3
18:00	33	SW	3.2	11	754.3
19:00	33	SW	3.4	12	753.2
20:00	32	SW	4.1	12	756.8
21:00	32	SW	3.4	13	752.4
22:00	31	S	3.2	13	756.8
23:00	30	S	3.2	14	754.3
0:00	29	S	3.5	15	754.5
1:00	28	S	4.1	18	753.4
2:00	27	SE	4.2	24	757.5
3:00	26	SE	2.5	26	756.3
4:00	25	SE	3.5	31	756.3
5:00	25	SE	3.1	32	755.4
6:00	24	SE	3.2	34	755.9
7:00	23	S	2.9	36	756.2
8:00	26	S	3.2	31	753.2
9:00	29	S	3.1	28	755.3
10:00	31	SE	3.4	22	754.9
11:00	33	SE	3.1	14	756.8
12:00	32	SE	3.2	12	753.2

Monitoring Performed By:

Deputy Analyst

Mohsin Raza

Name of Chief Analyst with Seal:

Mr. Usman Raza Jaswal

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Noise Level Monitoring Report

Job Reference Number	GCEC-PK-PU-269/2022
Monitoring Point	Near Kachi Canal, Tribal Area
Date of Intervention	08-10-2022 to 09-10-2022
Monitoring Coordinates	28°36'48.8"N 69°31'33.6"E

Sr. #	Time	Method/Technique	Unit	Results LAavg	PEQS (Residential)
Night Time					
1.	23:00	Noise Meter	dB	42.4	
2.	00:00	Noise Meter	dB	40.2	
3.	01:00	Noise Meter	dB	42.1	
4.	02:00	Noise Meter	dB	42.6	
5.	03:00	Noise Meter	dB	39.3	45.0
6.	04:00	Noise Meter	dB	40.8	
7.	05:00	Noise Meter	dB	41.5	
8.	06:00	Noise Meter	dB	42.4	
Night Time Average			**dB**	**41.41**	**45.0**
Day Time					
9.	07:00	Noise Meter	dB	42.4	
10.	08:00	Noise Meter	dB	41.4	
11.	09:00	Noise Meter	dB	48.3	
12.	10:00	Noise Meter	dB	48.1	
13.	11:00	Noise Meter	dB	45.6	
14.	12:00	Noise Meter	dB	49.2	
15.	13:00	Noise Meter	dB	45.3	
16.	14:00	Noise Meter	dB	43.5	
17.	15:00	Noise Meter	dB	44.9	55.0
18.	16:00	Noise Meter	dB	45.3	
19.	17:00	Noise Meter	dB	43.5	
20.	18:00	Noise Meter	dB	44.2	
21.	19:00	Noise Meter	dB	43.9	
22.	20:00	Noise Meter	dB	45.3	
23.	21:00	Noise Meter	dB	44.9	
24.	22:00	Noise Meter	dB	43.5	
Day Time Average			**dB**	**44.96**	**55.0**

Monitoring Performed By:
Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:
Mr. Usman Raza Jaswal

Green Crescent Environmental Consultants Pvt. Ltd. ★ PAKISTAN ★

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

Pictorial Evidence for Water Sampling & Ambient Air Monitoring



Figure 1: Surface Water

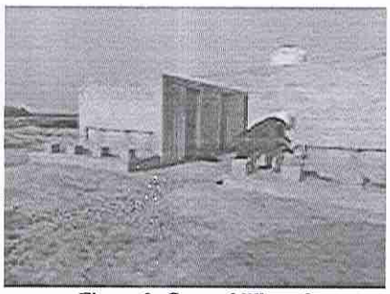


Figure 2: Ground Water 2

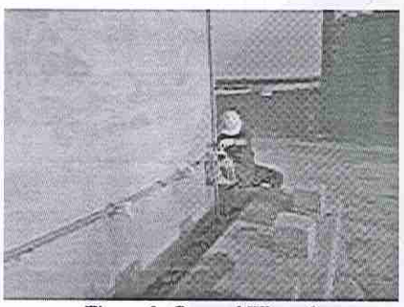


Figure 3: Ground Water 3



Figure 4: Ambient Air Location #01



Figure 5: Ambient Air Location #02

End of Report

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
0320 4143519, 0320 4143318
042 35962884-85 0320 4143318
manager.operations@gcee.ae www.gcee.pk

ANNEXURE III

Pakistan Petroleum Concession Agreement for Sui North Block

PETROLEUM EXPLORATION LICENCE

NO. 518/PAK/2022

BLOCK NO. 2869-15

(Sui North)

(ZONE II)

BETWEEN

THE PRESIDENT OF THE

ISLAMIC REPUBLIC OF PAKISTAN

AND

PAKISTAN PETROLEUM LIMITED

AND

MARI PETROLEUM COMPANY LIMITED

(2022)

N.A

ough with address ..... IRFAN ALI SHAIKH
Advocate
post ..... Leg # 445 KBA
ue Rs .....
mp Vendor Signature .....

PETROLEUM EXPLORATION LICENCE NO. 518/PAK/2022
FOR BLOCK NO. 2869-15 (Sui North)
ZONE-II

The President of Pakistan (hereinafter referred to as "the President") hereby grants under and in accordance with the provisions of the Pakistan Onshore Petroleum (Exploration and Production) Rules, 2013 ("Rules") and on the terms and conditions set forth or referred to herein, and PAKISTAN PETROLEUM LIMITED, a company existing under the laws of Pakistan, having its principal office at P.I.D.C. House, Dr.Ziauddin Ahmed Road, Karachi, Pakistan (hereinafter referred to as "**PPL**" which term and expression shall include its successors in interest and assigns) and MARI PETROLEUM COMPANY LIMITED, a company existing under the laws of Pakistan, having its registered office at 21, Mauve Area 3rd Road, G-10/4, Islamabad, Pakistan (hereinafter referred to as "**MPCL**" which term and expression shall include its successors in interest and assigns) (together hereinafter referred to as "the Licensee(s)") hereby accept an exploration licence, on the terms and conditions set forth herein as follows:

This licence is granted to the following company(ies), with working interest as stated herein:

Name(s) of Licensee(s)	Working Interest
PPL (Operator)	50%
MPCL	50%

2. This licence gives the Licensee(s) the exclusive right to perform activities in connection with the exploration for and exploitation of petroleum in the following areas:

Licence Area No.	Coordinate	Km2
2869-15 (Sui North) EL	As show in attached Annex-A	811.73

3. The Licence is valid for an initial period of 5 years, divided into two phases of three years and two years each effective on 22 November 2022 (hereinafter called the "Effective Date"). The Licensee(s) shall be entitled to two renewals of one year each of the Licence, as provided in the Rules.

4. The Licensee(s) shall undertake the Minimum Work to discharge the obligations, during the initial term provided for in Rule 21(2) as follows:

		Minimum Work

N/A

Initial Term	Phase I	Contract Years 1, 2 and 3: **360** Work Units
	Phase II	Contract Year 4 and 5: At least one exploration well to be agreed by the Government before entering into Phase-II along with corresponding Work Units.

The above Work Units shall be accomplished at any time prior to the end of respective Phase of the Initial Term.

a. The Licensee(s) shall undertake such coring and other tests and registrations as the Authority, may regard as necessary in order to estimate possible petroleum finds. Special care shall be given to coring in all prospective intervals. The sampling shall lead to exhaustive analysis and interpretations.

b. If the Licensee(s) should fail to complete the above mentioned work programme within the time limits specified, Licensee(s) shall pay liquidated damages to the Federal Government, as in accordance with Rule 28 of the Rules.

5. The Licensee(s) shall, not later than thirty days after this Licence has been granted enter into a Concession Agreement including Joint Operating Agreement with the Federal Government. Any subsequent amendment, supplement, or exception from the Concession Agreement requires the Federal Government's prior written approval.

6.

a) Discovery of all minerals necessary for the generation of Nuclear Energy shall be reported by licensees to Pakistan Atomic Energy Commission and Authority. Licensee(s) shall have no right to develop/exploit such minerals without prior approval of the Pakistan Atomic Energy Commission.

b) The Licensee(s) will allow existing and future licence and lease holders for solid minerals being administered by a Provincial Government in any land which is comprised in or adjoins or is reached by the Area, all reasonable facilities for their access hereto. Exploration work will not be carried out over the area already granted under mining leases/prospecting licences for Mineral except with the prior approval of the Provincial Government and the companies concerned.

c) The Licensee(s) will without delay report to the Provincial Government the discovery of any mineral ore, or within any of the Area in question which is administered by the Provincial Government but Licensee(s) shall not have a right to exploit these minerals/ores unless a formal mining concession has been granted by the Provincial Government to the Licensee(s).

d) No operations will be carried out within Municipal limits. The Licensee(s) will inform the Authority about the programme and specific purpose of visit of its personnel and others to the License Area from time to time so that necessary security arrangements could be made. Protection of personnel employed must be co-ordinated with local civil administration prior to the commencement of work. All companies (local and foreign) will give advance information and details about the exploration programme in the Licence Area to local civil administration and Authority so as to alert the parties concerned to take necessary precautions to interalia safeguard vital installations such as microwave towers, irrigation regulators and other public and private buildings.

N.A.

e) The unskilled persons to be engaged as labour should be taken from the inhabitants of the area particularly where the work has to be carried out with preference to displaced landowners. Rest of the manpower will also be taken from the area if available. Locals of the area will be considered for grant of sub-contracts provided their terms are competitive.

f) No employee of the Licensee(s) shall indulge in illegal hunting/trapping of the wild animals, Violation of the rules shall make the NOC of the Provincial Government liable to cancellation in addition to imposition of penalties as provided for under the law.

g) The Licensee(s) shall confine their activities to exploration only and no permanent structure would be constructed on the Area without the prior approval of Authority. The Licensee(s) will also not undertake any agricultural or other related activities nor interfere in the existing grazing or felling rights etc. of the local inhabitants. In case any loss is caused to public private property, the Licensees will be liable to pay adequate compensation.

h) The Local Civil Administration in the Licence Area must be informed in case any matter needs to be cleared from the Home Department.

i) The operation will in no way affect or abridge the rights of owners of private property and necessary procedure according to the relevant law would be imperative.

j) The Licensee(s) will pay proper compensation to owners of land prior to commencement of exploration.

k) The Licensee(s) will approach Survey of Pakistan for issuance of maps in accordance with the prescribed procedure. The individuals handling restricted maps will need security clearance.

l) Flying over the Area shall not be allowed without permission of the concerned security agencies.

m) Visits will be properly conducted and restricted to the open area. Aerial survey/photography in the Licence Area will not be undertaken. In case it is essential, a separate clearance for the same will be obtained through Authority from security agencies. If allowed, the aerial survey/photography will invariably be carried out by Survey of Pakistan. Visits, trespassing or photography (aerial/ground) of sensitive areas, restricted areas key points and vital installations are prohibited. All movement of personnel and vehicles will be co-ordinated with concerned Formation Headquarters.

n) All mapping information including sketches and photography to be prepared by the Licensee(s) concerning the Licence Area shall not be released to anyone except as permissible under the Concession Agreement and the relevant rules.

o) No roads/tracks will be constructed/developed in the Licence Area without prior clearance of security agencies. The tracks that may be allowed to develop should preferably be parallel to the border and constructed in consultation with the local Formation Headquarters. All such tracks should be rendered unserviceable by the licensee(s) when no longer required again in consultation with the local Formation Headquarters.

p) The Licensee(s) will ensure that no border violation takes place.

q) The Licensee(s) shall ensure that none of its employees, contractors or consultants discloses any information about the terrain of the area to any individual/agency without clearance from the General Headquarters (M.I. Directorate) through Authority.

r) The Licensee(s) will ensure that all the foreigners involved in exploration are security cleared prior to their arrival in Pakistan. Foreigners working in the Licence Area will be cleared by the concerned security agencies and should be registered with FRO concerned under Foreigners Act and full particulars including photographs shall be supplied to the concerned Provincial Government. Instructions issued by the Ministry of Interior from time to time regarding work in the area, employment of foreign nationals and movement of local/foreign nationals will be strictly followed. Expatriates of countries as specified from time to time by appropriate Pakistani authorities will not be employed. In addition a liaison Officer of the Ministry of Energy (Petroleum Division) will be detailed to look after the project and watch the activities. Foreigners will remain confined to the working area.

s) The Licensee(s) may ensure that no activity is carried out within 4,000 meters of the International Border (Zero Line).

t) No Global Positioning System shall be used except with the prior permission of the agencies concerned.

u) The forest and mineral property will not be damaged and in case damage occurs during any survey, the licensees shall be responsible for it as per provisions of the Forest Act and other rules applicable to that property.

v) The Licensee(s) will not use forest road without permission. However, where the use of these roads is permitted, the Licensees will be responsible for proper maintenance of such roads.

w) Licensee(s) will pay suitable rent if forest and other government land is utilized. There will be no prohibition in carrying out forest and mining working in the Licence Area by the concerned department or on its behalf.

x) The local irrigation authorities will be informed in advance before any particular area is taken for exploration purposes. No irrigation structures including Canals, Head works. Small Dams, Flood Bunds and Tube wells etc. will be damaged during Joint Operations. Such operations will be undertaken at a reasonable distance from either side of the channels, main canals, from any important structures on canals, and in or around a barrage. It would not in any way interfere with, or cause hindrance to the works of concerned Provincial Departments and to the normal flow of irrigation supplies in the canals. If any operation is necessary at such locations, the same will be undertaken after consultation with and written approval of the concerned Department of the Provincial Government. The "No Objection Certificate" of the concerned Department would not in any way, be interpreted to mean that canal supplies would be available for the purpose of prospecting activities.

y) Canal Patrol Bank will not be used for running machinery along the channels. In case it is used when no alternate is available, the cost for its repairs will have to be deposited in advance. Special approval will have to be obtained where heavy machinery has to cross the channels either through existing bridges or across the channels. The limits of loading capacities on the regulators, bridges and the canals shall have to be observed at the time of transportation of any equipment required for exploration and drilling purposes. Repairs and replenishing cost of the effected sites will have to be deposited in advance by the Licensee(s).

z) The data and test results shall not be exported outside Pakistan without prior clearance from Authority.

aa) Licensees will deposit the advance rent as prescribed in Rule 29 of the Rules in any Federal Government treasury under the head of account No.C-03 – Miscellaneous Receipts, C038 – Other *C-03808* – Receipts under the Mines and Oilfields and Mineral Development (Government Control) Act, 1948. A receipted copy of the treasury challan in respect of advance rent of the Licence will be sent to Authority without fail. The Licensee(s) acknowledge that the rate of rentals will be adjusted in future on the basis of official rate of inflation as notified by the State Bank or by reference to an appropriate index as may be decided by the Federal Government so that the rent retains its value in real terms.

ab) Investment on social welfare schemes and training will be made in accordance with the provisions of the Petroleum Exploration and Production Policy 2012 and the guidelines issued by the Federal Government from time to time. The Licensee(s) will provide the manpower requirements (Category-wise) during different phases of operations to Authority for approval.

ac) Worker's safety, health and welfare laws as contained in Mines Act, 1923 and the rules and regulation made thereunder shall be followed.

ad) The Licensee(s) will strictly follow the environment protection and pollution control laws and guidelines as notified by the Federal Government from time to time.

7. The laws and Rules of the Federation shall govern all activities pursuant to this Licence.

N.A.

In witness whereof the President has set his hand and seal and the Licensees have caused their common seals to be affixed here on this 22Nd day NOVEMBER 2022.

Signed for and on behalf of
The President of Pakistan

By: _____
SECRETARY (PETROLEUM)

Witness:

1) _____

2) _____
54100-0987408-1

Signed for and on behalf of
Pakistan Petroleum Limited

By: _____
IMRAN ABBASY
61101-1747102-7

Witness:

1) _____ (37405-2060100-7)

2) _____
TAHIR JAVED
42201-3043844-7

Signed for and on behalf of
Mari Petroleum Company Limited

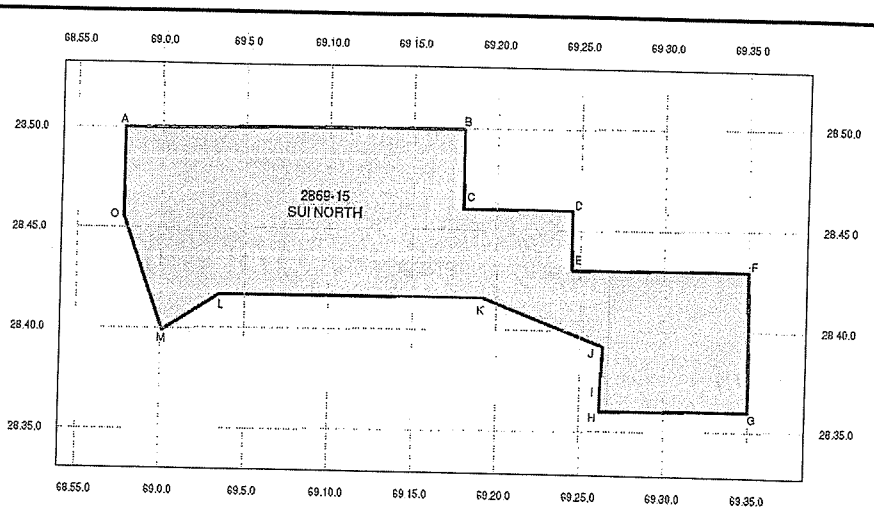
By: _____

Witness:

1) Abdul Rauf Khan
3740506276623

2) _____
Muhammad Hussain
61101-2003118-9

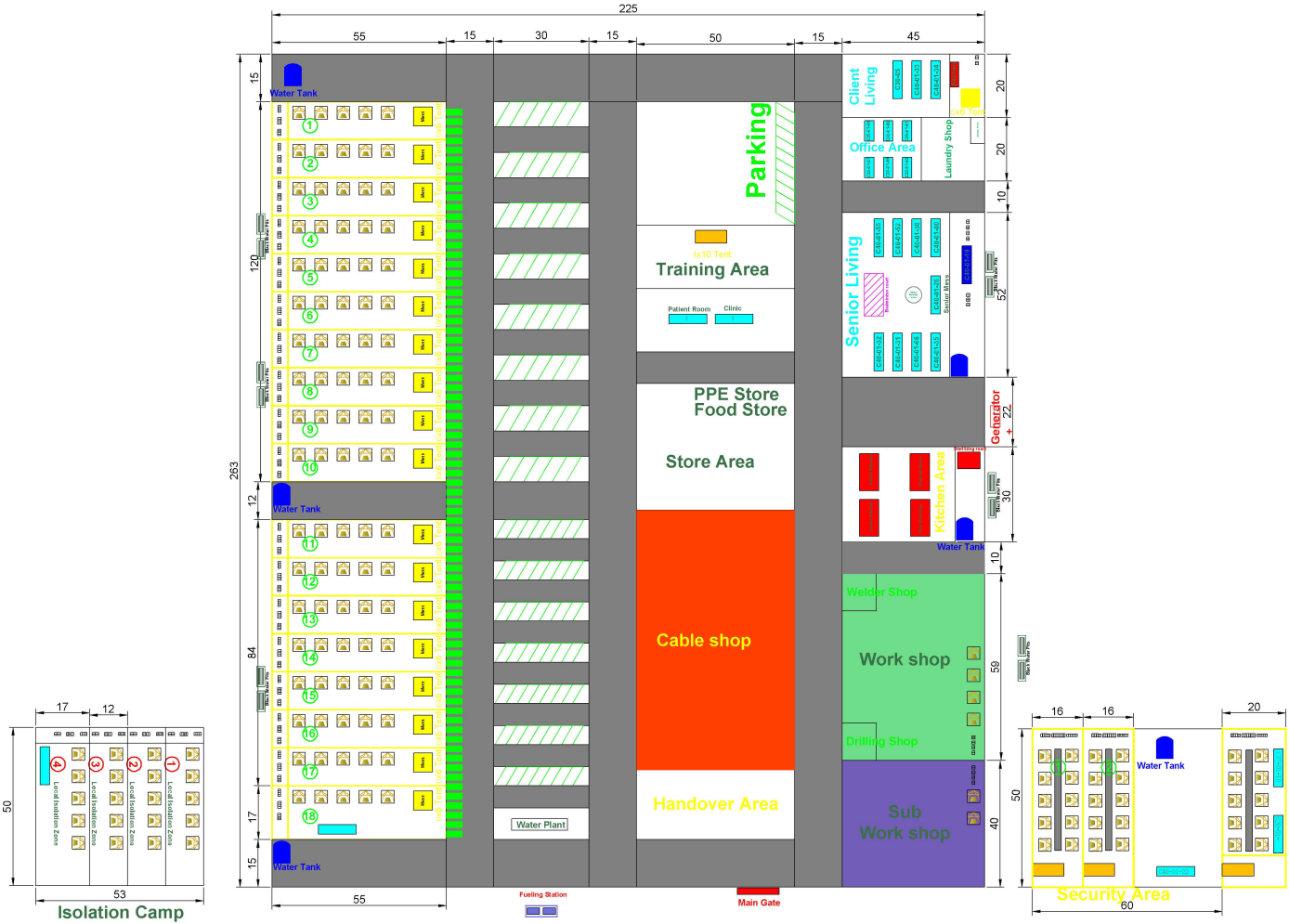
Annex-A



2869-15 (SUI NORTH)						
A	28	50	00.00	68	57	46.30
B	28	50	00.00	69	18	00.00
C	28	46	00.00	69	18	00.00
D	28	46	00.00	69	24	30.00
E	28	43	00.00	69	24	30.00
F	28	43	00.00	69	35	00.00
G	28	36	00.00	69	35	00.00
H	28	36	00.00	69	26	13.00
I	28	37	00.00	69	26	13.00
J	28	39	12.00	69	26	22.00
K	28	41	36.00	69	19	11.00
L	28	41	41.00	69	03	28.00
M	28	39	54.00	69	00	05.00
O	28	45	34.17	68	57	46.26
A	28	50	00.00	68	57	46.30

2869-15 (SUI NORTH) Exploration Licence		
Total Area	=	811.73 Sq.Kms
Grid Area	=	10.81
Zone	=	II

ANNEXURE IV
Campsite Layout


225
55
15
30
15
50
15
45
263
15
120
12
84
17
15
Water Tank
Water Tank
Water Tank
Water Tank
Parking
Training Area
Patient Room
Clinic
PPE Store
Food Store
Store Area
Cable shop
Handover Area
Water Plant
Client Living
Office Area
Laundry Shop
Senior Living
Kitchen Area
Generator
Welder Shop
Work shop
Drilling Shop
Sub
Work shop
Fueling Station
Main Gate
Isolation Camp
Local Isolation Zone
Security Area
Water Tank
60
53
50
40
59
52
30
22
20
10

ANNEXURE V
Emergency Response Plan

BGP (Pakistan) International

Emergency Response Plan
PPL Shah Bandar 3D Seismic

October 2020

Activity	Name	Designation	Date	Signature
Prepared By	Mr. Zahid Sarwar	HSE Manager		
Approved By	Mr. Zhang Zhenqiang	Country Manager		

BGP (Pakistan) International
House # 6, Hill Road, F-6/3, Islamabad, Pakistan
Email: zahidsarwar@bgpsouthasia.com

Contents

1	PURPOSE AND SCOPE OF THE DOCUMENT:	9
2	BGP 3D Seismic Base Camp Shah Bandar:	9
3	BGP MEDICAL FACILITIES:	9
4	MEDICAL EMERGENCY AT BGP FIELD LOCATION:	11
5	BGP FIELD DOCTOR:	12
6	TRANSPORTATION OF THE PATIENT:	13
7	EMERGENCY TEAMS	14
8	Responsibilities	15
9	FIRE CONTINGENCY PLAN	17
10	MAN/VEHICLE LOST FLOW CHART	23
11	WEATHER CONTINGENCY PLAN	31
12	EMERGENCY SPILL PROCEDURE	33
13	COVID-19	34
EMERGENCY CONTACTS NUMBERS		40

1 PURPOSE AND SCOPE OF THE DOCUMENT:

The objective of this Emergency Response Plan is to explain the line of action to be followed in case of any emergency occur on Shah Bandar 3D Seismic operation and to define the responsibilities of different persons. All the concerned BGP employees will act as a team on both the ends i.e. Islamabad office and field location. Once issued, the plan will be used as a guideline to deal with all the medical emergencies and will be practiced through drills on monthly basis.

Any injury or illness, which is a potential threat to life or an organ and needs specialized hospital care.

2 BGP 3D Seismic Base Camp Shah Bandar:

Field Camp is located approximately 180 km and drive time of approximately 2 hrs and 30 minutes from the city of Karachi. And an hour distance from Badin.

Under no condition the plan should be changed without the information of Management in Islamabad, and any change should be followed, in not more than 24 hrs, by the written report of the reason of the change from documented guidelines. The summary of contacts is mentioned in

Annex-2:

3 BGP MEDICAL FACILITIES:

To cover the medical problems on the field, BGP will set a well-managed medical system, with contacts at reliable health facilities to take care of grave medical emergencies. The brief description is as follows:

3.1 BGP FIELD DOCTOR:

BGP has employed the services of qualified medical doctor for its 3D Seismic operation in Shah Bandar. He is responsible for providing the medical coverage for minor health problems on the field. He is also responsible for providing first aid in case of a medical emergency and to give suggestion to management regarding evacuation of a diseased person in case of medical emergency.

3.2 BGP FIELD CLINIC:

BGP will set a fairly well-equipped clinic on the project for the medical coverage of its field employees. It will contain all the first aid material required to stabilize a casualty in case of serious medical emergency and Most of Life Saving Drugs.

3.3 Indus Hospital, Badin

3.4 CMH, Badin

3.5 AKUH, Karachi

NOTE: AKUH Karachi will be the primary hospital in case of neurosurgical problems, multiple severe injuries and heart related emergencies. It will also be used as the primary facility in case of medical problem with any of the expatriate.

4 MEDICAL EMERGENCY AT BGP FIELD LOCATION:

There can be situations in which we can come across medical emergencies during our field operations. These emergencies can be:

4.1 *Medical emergencies for example uncontrolled high-grade fever, severe dehydration, flaring up of gastric ulcer, burns etc.*

All such emergencies will be referred to Indus Hospital, Badin (if needed) and the Company Doctor and our contact in the hospital will be informed in advance;

And in case of burn victims would be evacuated to Karachi Patel Hospital if the Doctor feels that Indus Hospital, Badin is not sufficient.

4.2 *Surgical emergencies for example acute abdomen, trauma, fractures etc.*

All such emergencies will also be referred to Indus Hospital, Badin and the contacts will be informed in advance.

4.3 *Insect bites.*

The field clinic has the capability to treat scorpion bite cases. However, all the snakebite cases will be referred to the hospital for treatment. **Under no condition the snakebite cases will be retained or attempt to be treated on the field.** All the daytime or night time snakebite cases will be referred to Indus Hospital, Badin**.** Field doctor will accompany the victim to the hospital and will return after ensuring that the right person has started the proper treatment. Company has a reasonable stock of anti snake venom on the field. Under all conditions these sera will be carried along, due to possibility of non-availability in the hospital. If the snake has been killed, it will be carried along for identification;

4.4 Medical Emergencies related to Road Traffic Accidents.

All such cases will be referred initially to Indus Hospital, Badin. If after the initial evaluation, the person is found to have Multiple Severe Injuries or Head Injury, then he will be shifted to AKUH Karachi as soon as possible, after initial stabilization.

4.5 Daytime / Night time Medical Emergency

Emergencies related to heart problem will later be shifted to Indus Hospital, Badin for specialized care and later on AKUH Karachi.

5 BGP FIELD DOCTOR:

BGP will designate a qualified medical doctor on 3D Seismic Shah Bandar. He will be responsible for the quick assessment of the sick or injured person, as per his professional knowledge and the administration of first aid and stabilization of the person, who has been reported sick or injured.

5.1 IF FIRST AID IS ENOUGH:

- Inform the Field In-charge/ Party Chief about the incident and the condition of the person.
- Record the incident as a First Aid Case in the record.

5.2 IF FIRST AID IS NOT ENOUGH:

- He will stabilize the victim in the field clinic, or at the site of the incidence (if required).
- Make Primary and Secondary assessment of the person and start the initial treatment. The assessment form is attached with the document as **Annex-1.** A copy of the form will accompany the patient in case of medical evacuation.
- Pass on the status of the patient to the Field Management. He will assess the need for the possible evacuation of the person and discuss it with the Base Camp field management.

The Field Doctor will remain in contact with the field management about the condition of the patient and the Field Management will further inform the HSE Manager in Islamabad Office about the final plan. He will contact the hospital authorities, as per the advice of the Field Management, and will ensure that adequate arrangements have been made for safe evacuation.

5.3 IF DECIDED TO EVACUATE THE PATIENT:

- Field doctor will inform the Field Management about the status of the patient and will discuss the details about this Medivac, so that necessary arrangements for the safe and earliest possible evacuation of the patient can be made.
- Measures to be taken for the safe traveling of the patient be decided and documented.
- As soon as the patient is stabilized, evacuation will be done to the hospital, as decided earlier, using the best available transportation facility. The doctor himself or his nominated medic will travel with the patient, until he is handed over to medical personnel in the recommended health facility.

The contact numbers of recommended health facilities are mentioned in **Annex-3.**

6 TRANSPORTATION OF THE PATIENT:

Well-equipped ambulances will be provided at the 3D Seismic Operation Shah Bandar.

7 EMERGENCY TEAMS

7.1 AT FIELD:

7.1.1 Emergency Response Team (ERT)

This team shall be established on site and shall have personnel who are experts to deal with the emergencies like fire fighting, oil spill control, man lost etc.

This team shall include the trained personnel, radio operator, and camp boss.

7.1.2 Incident Management Team (IMT)

This shall be formed at the crew/field level normally headed by the party chief. In his absence Party Manager will fulfil his responsibilities.

This team shall include Party Chief, Party Manager, HSE Advisor, Chief Geophysicist, Chief Surveyor, Drilling Supervisor, Cable Chief, Doctor, Camp Administrator, security supervisor, vehicle supervisor and other responsible person(s) on crew.

7.1.3 Emergency Management Team (EMT)

This team shall be based in the head-office Islamabad. This team shall be formed for managing the incidents/ accidents. Normally it shall be headed by the Country Manager.

The team shall include Country Manager as team leader, Manager HSE, Manager Operations, Manager HR, Manager Finance, Manager Security, Manager Admin & IT.

Any incident/ accident shall be reported to EMT by the IMT. EMT shall decide the seriousness of the incident/ accident and informed the Country manager about the situation, who will decide if a crisis need to be declared.

8 Responsibilities

8.1 TEAM Leader

Holds the ultimate responsibility of safe and earliest evacuation in case of medical emergency. He will be heading the EMT and will ensure that all the EMT members play their role satisfactorily and in time to proceed with this evacuation without any unnecessary delay.

8.2 OPERATION MANAGER

Operation Manager will ensure that all the necessary support and help is provided for the safe and quick medical evacuation and remain in touch with the field and the city arrangements in this regard.

8.3 PARTY CHIEF AND ADMINISTARTION

Party Chief and Crew Administrator are responsible to ensure that overall field conditions are suitable for the free movement of vehicles and personnel during the evacuation and no security or logistics problem occur on the way. In coordination with EMT, he will provide all the support for the quick and safe evacuation of the casualty.

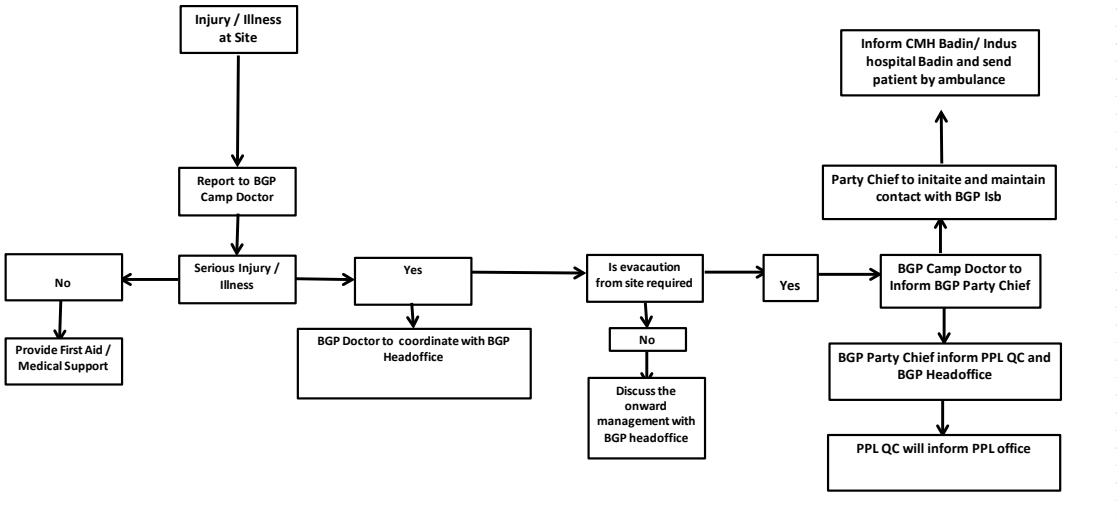
8.4 MANGER ADMINISTARTION ISLAMABAD OFFICE

In coordination with other members of EMT, Manager Administration will support all the facilities required for the evacuation activities towards Islamabad/ Karachi, or during overseas evacuation. His support may include coordinating the activities of other EMT members, arranging ambulance at Islamabad/ Karachi etc.

The contact detail of all the EMT members is mentioned in **Annex-2.**

EMERGENCY MEDICAL EVACUATION FROM BGP OPERATION SHAH BANDAR 3D (FLOW CHART)

MEDIVAC FLOW CHART



9 FIRE CONTINGENCY PLAN

Fire is a major hazard in any situation where large numbers of people work and sleep in a relatively confined area. This Applies equally to a seismic crew and to a town-based operation.

Four essential steps in the control of the fire hazards are:

1) Reduction of the Basic Risk by:

- Restricting cigarette smoking
- Upgrading and maintenance of electrical fittings
- Posting warning notices
- Training - both in the use of fire-fighting equipment and in general awareness of the hazards and what to do in the event of fire.

2) Early Detection by:

- Means of smoke alarms
- Personal vigilance

3) Prompt Reaction by:

- Shouting “Fire, Fire, Fire!”
- Sounding the fire alarm
- Evacuating the tents and trailer
- Fighting the fire, if appropriate

4) Immediate Response by:

- Using the nearest suitable fire extinguishers
- Isolating the electrical supply, if appropriate
- Accounting for all personnel (Head count)

- Organizing available personnel to assist with fire-fighting, if appropriate

There shall be one Fire Chief/ Fire Fighting Team Leader. He will form a Fire Team from available personnel if the fire team member not present.

- When the Fire Alarm is sounded, the trailers or tents must be evacuated immediately and the occupants must proceed directly to the Muster Point.
- A head count and search must be carried out as soon as all occupants are out of the trailers or tents.

9.1 ON DISCOVERING A FIRE

Fire extinguishers, Dry Powder fire extinguishers are located near the door of every trailer, tent and on each vehicle. Foam fire extinguishers shall be located near fuel locations.

On discovering a fire, you should immediately attempt to fight it with the nearest extinguisher **UNLESS**:

There is no extinguisher on hand **OR**

The fire is near the exit to your room **OR**

There is a noticeable quantity of smoke **OR**

You are not confident of using the extinguisher **OR**

The fire is visibly increasing in size. **OR**

A fuel tank has caught fire (**EVACUATE THE AREA**)

In which case, **GET OUT AT ONCE AND SOUND THE ALARM**.

All personnel, upon hearing the alarm, proceed to the Muster Point immediately. Any one near a radio upon hearing the alarm will make a general call announcing “Fire in Camp - Fire in Camp”.

If a fire is extinguished, remember that it can re-ignite spontaneously. Do not leave the scene until it is assured that the fire is out and will not re-ignite. Then immediately report the incident to the Party Chief, HSE Adviser or the most senior person in camp.

9.2 ON HEARING THE FIRE ALARM:

Everyone is to proceed directly to the Muster Point. A head count will be conducted at the Muster point.

(FOLLOWING PROCEDURES ARE DESIGNED TO INSURE THE SAFETY OF PERSONNEL.)

All the fire wardens will check the areas allotted to them. The fire team will approach to the fire scene under the direction of the fire chief.

The Fire Chief / Fire Team is to proceed directly to the fire and carry out the crew procedure for dealing with the situation.

9.3 Crew FIRE FIGHTING PROCEDURES

These are guidelines only to give a general outline towards getting a fire extinguished should the situation arise. Below assumes that we have a major fire in the camp area. Hopefully before it gets to this situation somebody has been able to put the fire out while it is minor.

A fire fighting team will be set up from available personnel. This team will be trained in correct fire fighting procedure. Other crew members will also be trained so they maybe co-opted onto the team as required.

Eventually all crew members should be trained in the use of fire extinguishers and basic fire control.

9.4 THE PRIME CONCERN IN CASE OF FIRE IS THE PROTECTION OF PERSONNEL -EQUIPMENT IS SECONDARY!!

The person discovering the fire should raise the alarm, immediately evacuate everyone from the area and notify the fire chief.

The "**FIRE CHIEF**" will be the most experienced in camp and will take complete charge of fire fighting and directing the **"FIRE TEAM"**.

The senior member of the kitchen staff will account to the coordinator for their personnel, including the camp boss. The Cable Shop foreman will account for his men. The Camp boss will be responsible for accounting for foreigner camp staff and alerting the junior camp.

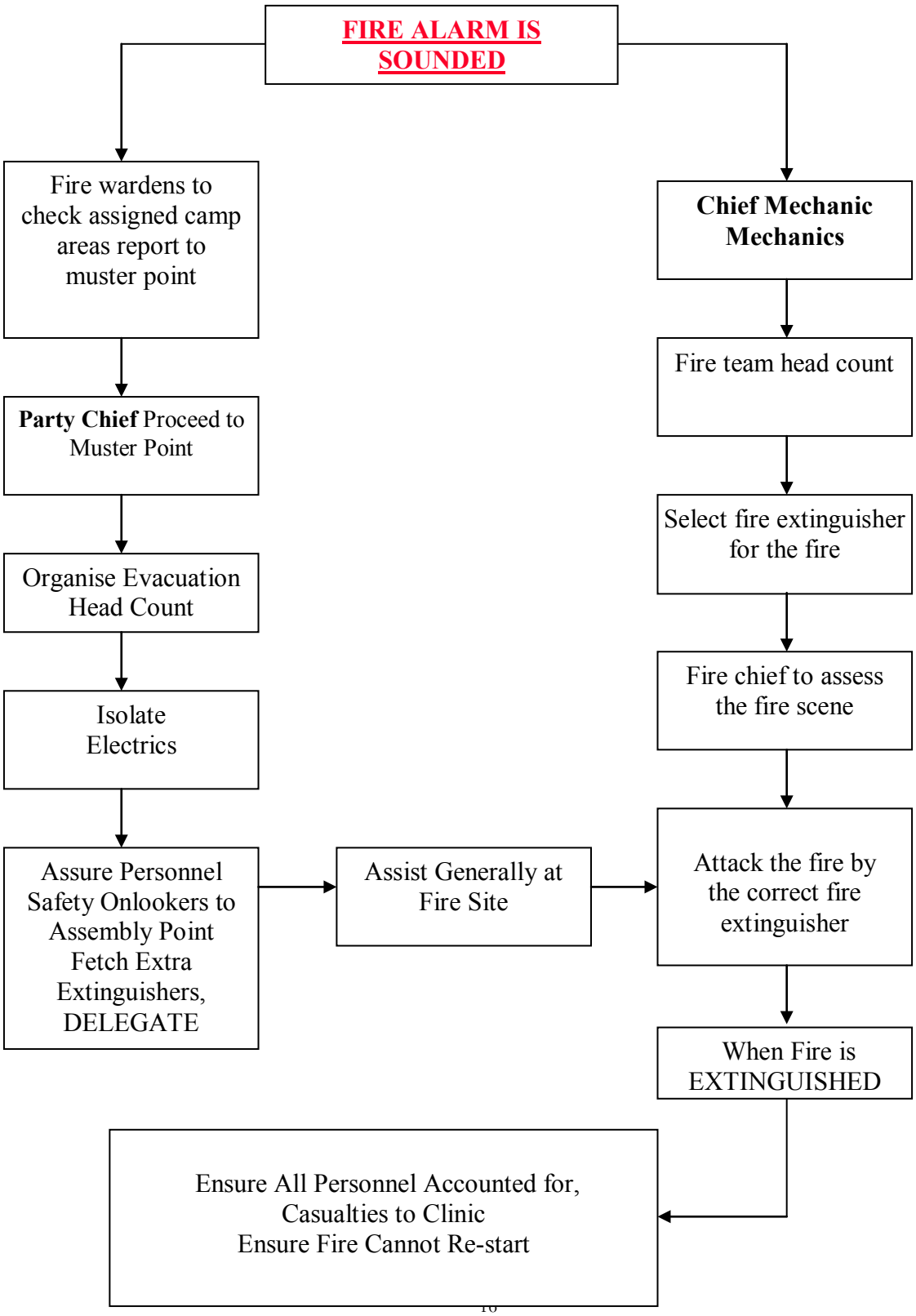
The coordinator gets a head count at the muster point.

At the same time the electrician will cut off the power to the fire location. Power should only be cut to the fire site as power is required for lighting if at night and also to run water pumps, if available.

THE LEAST PEOPLE INVOLVED THE BETTER. ALL OTHER PEOPLE ARE TO STAY AT THE MUSTER POINT. SHOULD THEY BE REQUIRED THEY WILL BE DIRECTED WHERE TO GO AND WHAT TO DO.

REMEMBER THAT THIS IS ONLY A GUIDE. NOTHING EVER HAPPENS AS PLANNED.

FIRE


FIRE ALARM IS SOUNDED
Fire wardens to check assigned camp areas report to muster point
Party Chief Proceed to Muster Point
Organise Evacuation Head Count
Isolate Electrics
Assure Personnel Safety Onlookers to Assembly Point Fetch Extra Extinguishers, DELEGATE
Assist Generally at Fire Site
Chief Mechanic Mechanics
Fire team head count
Select fire extinguisher for the fire
Fire chief to assess the fire scene
Attack the fire by the correct fire extinguisher
When Fire is EXTINGUISHED
Ensure All Personnel Accounted for, Casualties to Clinic
Ensure Fire Cannot Re-start

10 MAN/VEHICLE LOST FLOW CHART

10.1 TO AVOID GETTING LOST:

- Plan your route in advance. Know the route. If in doubt, ask. If marked tracks exist, use these rather than striking out across country.
- Inform someone of your destination and route. It is imperative that you inform the Base Camp Radio Room, who runs Journey management of your destination, route etc and any other locations that you will be visiting.
- Cancel this information promptly on your return, or call from your destination and have someone cancel it.
- Be sure your vehicle is equipped, no matter how short the journey.
- Check: **Oil, Water, Tyre Pressure, Spare Wheel, Jack, Tools, Drinking Water, Tow Strap, Shovel, and Radio,** before departure.
- If you are traveling on poorly defined tracks, be constantly aware of where you are. The instant you do not know where you are, be fully aware for definite landmarks.
- If, after a few minutes **(MAX. 5 MINS)** you are still uncertain, **STOP AT ONCE AND GO BACK ALONG YOUR TRACKS** until you do know where you are and start again. This will only loose you a few minutes, and often only a few hundred metres.
- **Failure to do this, and continuing to drive on in the hope of finding a familiar track, is the most common cause of getting lost.**
- Finally, take your Journey Management seriously. If you are lost or overdue, a search **will** be launched, and you **will** be found.

However, a Man Lost Emergency and Search causes a great deal of anxiety and effort by a large number of people. **You will not be popular** if you become the object of a full scale search because you neglected one of the simple points above!!

10.2 IF LOST OR BROKEN DOWN:

- **DO NOT LEAVE YOUR VEHICLE -** It's easier to locate a vehicle than a man.
- If possible go back along your tracks to the last known point.
- If this is not possible - Go to the nearest high point.
- Protect yourself from the sun and conserve your energy. Tasks are better carried out in the cool of the morning or evening.
- Do not park under a tree or in the shadow of a large rock.
- **STAY CALM -** Anxiety and apprehension is common as the reality of being lost or immobile sets in.

Your absence has been noted from the Journey Management sheet and the Man Lost Procedure has started. You will be found.

- Use your radio every 30 minutes, on the hour and half hour. These are the times that people will be listening for you.
- Transmit your approximate location, route taken, any problems, and the amount of water you have on hand. Transmit "blind" even if you get no reply.
- If the engine will start, you should run it periodically to charge the battery.
- Signal every hour on the hour, using the most suitable means. Signal from the highest point in the area.

10.3 DAYTIME SIGNALS:

- The most effective non- radio signal is the heliograph - reflecting the sun's rays by means of a mirror.
- Use any of the vehicle mirrors and practice aiming the reflected image onto the ground in front of you, up to the horizon, and back again. Repeat this process through 360°, covering the entire horizon.
- Smoke - the denser the better- is the second option. Use a spare tyre, but be sure to completely deflate it first, using a stick or pencil, to open the valve. Diesel will help the tyre burn, if any is available.

Add any kind of oily rags, green vegetation etc. that will ensure the maximum amount of smoke on the hour. This is the time when search vehicles will be stationary and actively looking for you.

10.4 NIGHT TIME SIGNALS:

- The only effective night signal is light, the brighter the better.
- Light a fire and have extra fuel ready to increase the size of the blaze on the hour.
- Use the vehicle headlights. If possible, remove one and use it as a spotlight. Sweep the horizon (as with the heliograph) on the hour.
- **STOP at midnight, and sleep.**

10.5 SEARCHING

PARTY CHIEF / APC IN CAMP TO CO ORDINATE ALL MAN LOST ACTIVITIES

- A Man Lost Situation occurs automatically when any person is notified as being overdue by VJM, back in camp, or at his destination.
- Before commencing a search it is imperative to check thoroughly the base camp to ensure that the missing party has not arrived. If possible, any likely alternative destinations should be checked out.
- BGP Islamabad Office must be informed, day or night, if a Man Lost Situation exists.

10.6 DAYLIGHT SEARCH

- The destination and planned route is to be ascertained from the Journey Management Board. Planning should start at once to identify and search the most likely areas.
- Search vehicles are to be prepared.
- There must be two people in each vehicle and pre departure checks must ensure that:

- Fuel tanks are full
- Water tanks are full
- You have a good spare wheel and tools
- You have Maps and a GPS navigator
- You have a working radio

- A common radio frequency must be established and made known to all personnel involved in the search. Select the channel most likely to be used by the lost party.
- The controller must appoint one person (maybe himself) to maintain a radio and telephone watch.
- A written Log of all activities, messages, decisions, and timings must be kept by the controller from the outset. Annex 5
- A fifteen (15) minute call schedule must be maintained between search vehicles and the controller.
- An initial search should follow the lost person's route as noted on the Journey Management Register. If sufficient light remains, a search of all known roads and tracks in the area should be made.
- At dusk the vehicles will either return to camp or commence night search procedures, at the discretion of the P.C. or controller.

10.7 NIGHT SEARCH:

- A night search will be conducted at the sole discretion of the Party Chief.

DO NOT SEARCH IN DUNE AREAS IN THE DARK – IT IS HIGHLY DANGEROUS

- Factors affecting the decision on whether to conduct a night search include:

  - The urgency of the search. Whether there is reason to believe that the lost party is injured.
  - The general type of terrain. Sand dunes or rough rocky areas initially present unacceptable safety hazards at night.

- If a night search is to be launched, the vehicle preparations are the same as for a daylight search, but additionally:

  - Only the most experienced staff from survey department is to participate, and they should be familiar with the whole area to be searched.
  - Flashlights must be carried, and the vehicle should also carry a couple of blankets if there is the possibility or getting stuck.

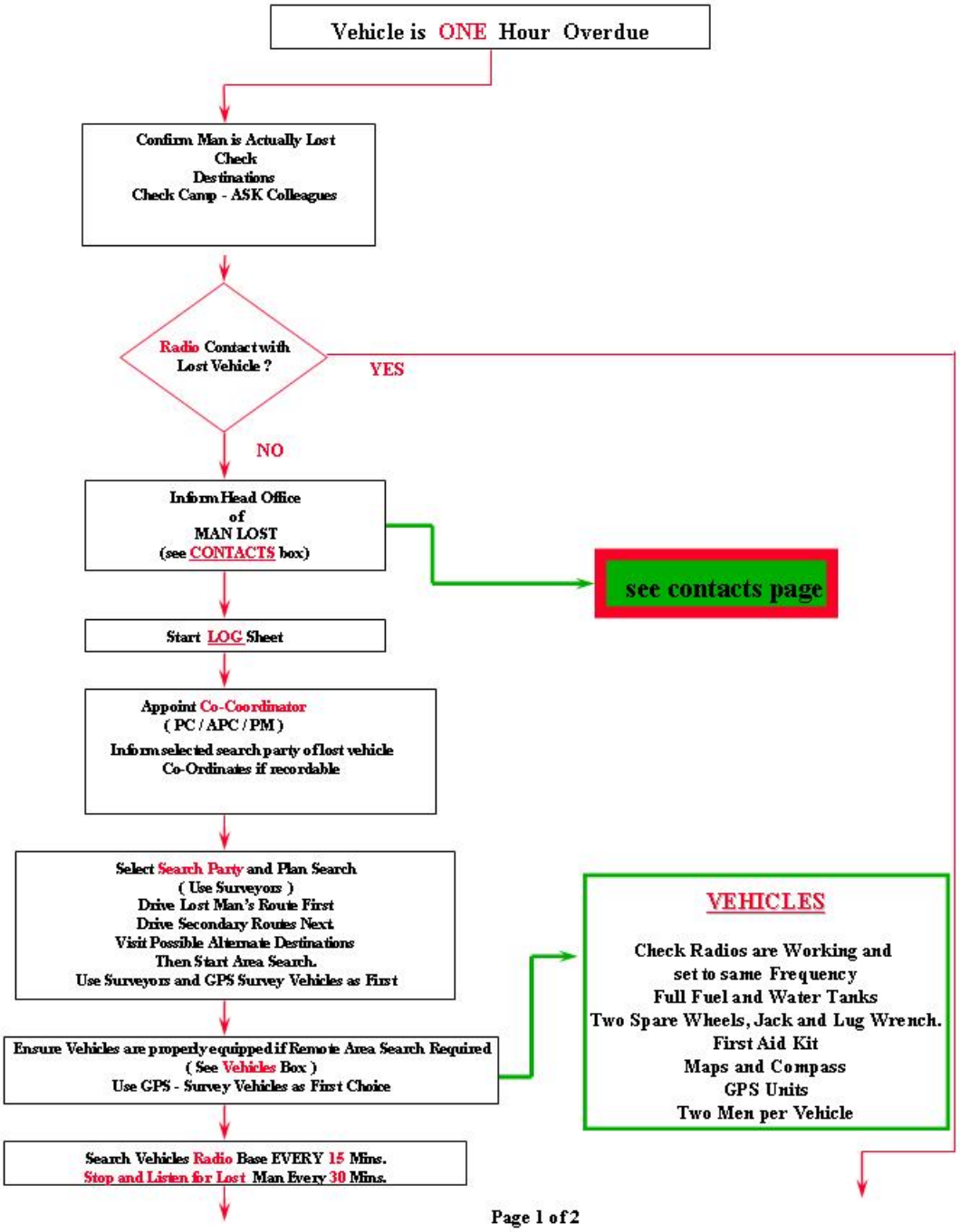
- The controller should consider calling off the night search if the weather or terrain are causing problems for the search parties.
- Each vehicle must be stationary every hour on the hour in order to look for signals from the missing party.
- Close the highest piece of ground a few minutes before the hour. Stop and douse the lights in order to maximise night vision.
- A night search should not continue past 23.00 hours and the aim should be to have all search vehicles back in camp before midnight.

10.8 FIRST FULL DAY SEARCH

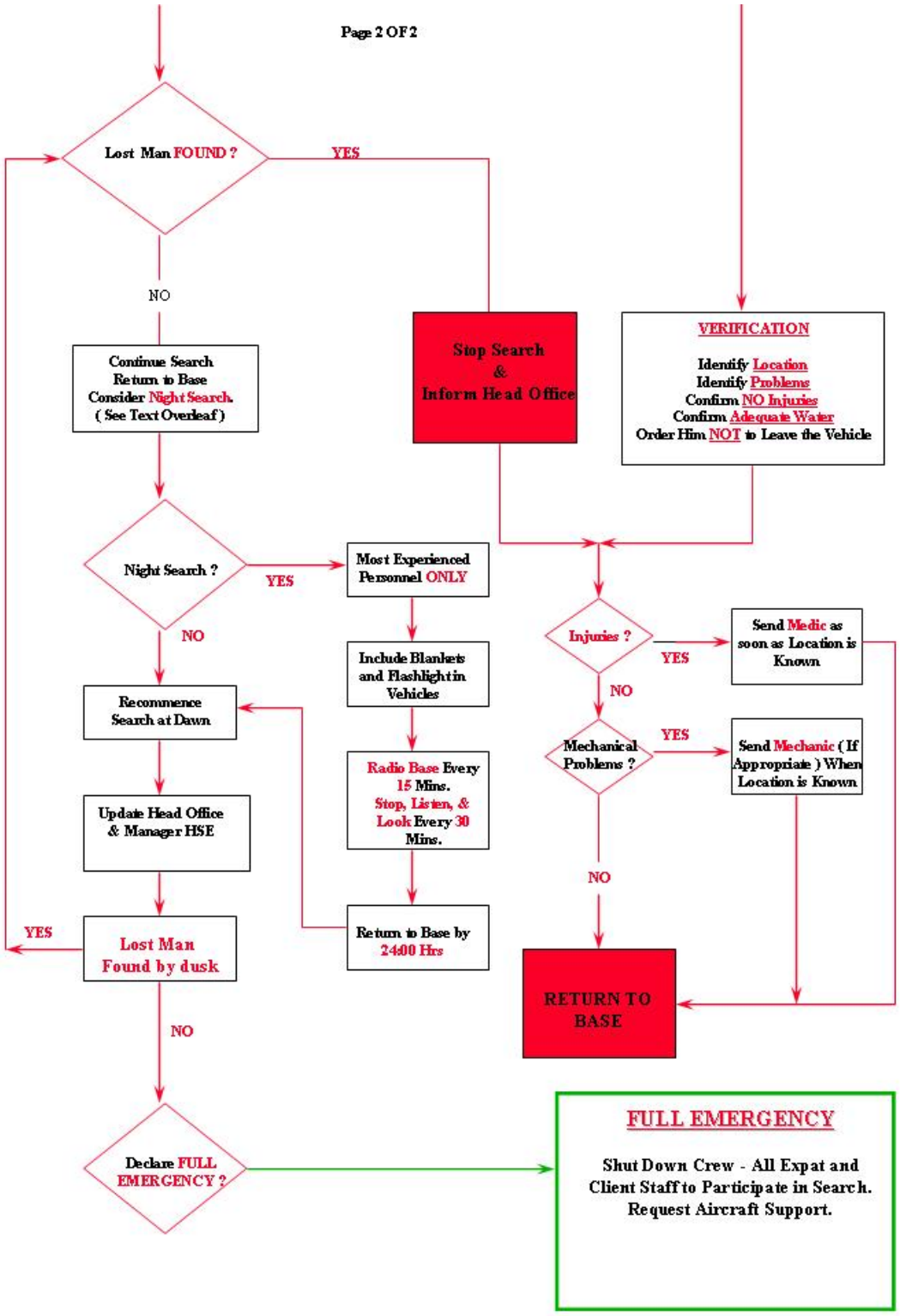
- The lost party may now be overdue by 18 hours. This is an extremely serious emergency, and every available resource must be made available to locate the missing party.
- BGP Islamabad Office must be kept informed of the search and any progress.
- All crew personnel must be involved in the search. Outside agencies must also be considered to help with the search.
- With the assistance of a surveyor, the controller must calculate the theoretical range of the lost vehicle and use this distance as the radius of a circle centered on the point of origin of the lost party. The circle must be divided into sections and thoroughly searched.
- All tracks and water sources must be checked, and inquiries made of local inhabitants.
- If the lost party is not found, the search will continue until instructed to do otherwise by BGP management.

- Refer to the emergency contacts for a listing of all relevant phone numbers and contacts.

MAN LOST !



Page 1 of 2


Page 2 OF 2
Lost Man FOUND ?
YES
NO
Continue Search
Return to Base
Consider Night Search.
(See Text Overleaf)
Stop Search
&
Inform Head Office
VERIFICATION
Identify Location
Identify Problems
Confirm NO Injuries
Confirm Adequate Water
Order Him NOT to Leave the Vehicle
Night Search ?
YES
NO
Most Experienced Personnel ONLY
Include Blankets and Flashlight in Vehicles
Radio Base Every 15 Mins.
Stop, Listen, & Look Every 30 Mins.
Return to Base by 24:00 Hrs
Recommence Search at Dawn
Update Head Office & Manager HSE
YES
Lost Man Found by dusk
NO
Declare FULL EMERGENCY ?
Injuries ?
YES
Send Medic as soon as Location is Known
NO
Mechanical Problems ?
YES
Send Mechanic (If Appropriate) When Location is Known
NO
RETURN TO BASE
FULL EMERGENCY
Shut Down Crew - All Expat and Client Staff to Participate in Search.
Request Aircraft Support.

11 WEATHER CONTINGENCY PLAN

In case of severe weather conditions the following precautions will be taken:

11.1 FOG

No one shall leave the camp until the PC has assessed the situation and is satisfied that the visibility is such that driving will not be hazardous. All vehicles will travel with headlights on until the fog has completely cleared. Vehicles will travel in convoy if necessary.

Should you be driving in the field when fog descends, you should stop and switch your headlights on. Remain stationary with your engine running. Do not attempt to drive to your destination especially in uneven terrain as disorientation is a possibility. Call base camp to inform them of your late arrival and present location

11.2 HEAVY RAIN

Driving in the rain calls for extra care and driving skills. The roads will be slippery, and acceleration and braking must be made gently. Reduce your speed and be aware of other road users. Should the rain be heavy enough to impair your vision, you should pull off the road in a safe location and wait for the weather to pass. Call base camp to inform them of your late arrival and present location.

11.3 SANDSTORM

The sandstorm will be treated as FOG. Visibility will be seriously impaired, and disorientation is a possibility. Take care exiting the vehicle as the strong wind could blow the door out of your grasp. Call base camp to inform them of your late arrival and present location. If contact is not possible, the Man Lost situation may be started under the direction of the PC / APC

11.4 FIELD OPERATIONS

In all severe weather conditions the senior observer will decide upon the best course of action for the line crew and trouble shooters. Should the situation dictate, production will be stopped and personnel ordered to take shelter. Department heads will co-ordinate with their field units to decide upon the safest course of action.

All vehicles standing by on weather should call base camp and inform them of their status and position.

12 EMERGENCY SPILL PROCEDURE

STOP THE FLOW AS SOON AS POSSIBLE

Use any safe, practical means at your disposal. Remember to locate and check the operation of all valves daily. Remember that every gallon you keep from leaking is one less to clean up later.

CONTAIN THE SPILL IN THE SMALLEST POSSIBLE AREA

Sound judgment is the key to good containment. Keep in mind that other regulatory agencies have very definite ideas about what you can or cannot do with the natural resources around the fuel site. If you use the material around the spill to create a dike, be sure that it can be restored to its original condition after clean up is complete.

REPORT THE SPILL THROUGH THE PROPER CHANNELS

AND INITIATE CLEAN-UP PROCEDURES

Prompt, accurate reporting is imperative and should be done as soon as possible after discovery of the spill. If the spill is minor and the clean up is obvious you should go ahead but if a major spill occurs you should stand by for detailed instructions. Remember that disposal of waste created by clean up has to be taken care of properly and not left to create another problem. In some cases, this may require evacuation of the waste to a suitable site designated by the authorities. In conclusion, you must do everything possible to prevent a spill but if one does happen you should STOP THE FLOW, CONTAIN THE MATERIAL and REPORT THE INCIDENT through proper channels, AND CLEAN IT UP.

13 COVID-19

Suspected COVID-19 cases

Immediate Response

Employees who have COVID-19 symptoms (i.e., fever, cough, or shortness of breath) should notify their head/supervisor and stay separate.

Employees who appear to have symptoms upon arrival at work or who become sick during the day should immediately be separated from other employees and sent to the doctor at camp.

Employees should not return to work until the criteria to discontinue isolation are met, in consultation with the crew doctor.

Confirmed COVID-19 cases

If an employee is confirmed to have COVID-19, and he is stable, should be advised to send back home for self-isolation.

A dedicated/ disinfected vehicle will take him to his destination.

Employee having serious condition will be sent the designated hospitals after consultation with him and his family.

Protect Other Employees

If an employee is confirmed to have COVID-19, employers should inform fellow employees of their possible exposure but maintain confidentiality.

The fellow employee should also be separated i.e. they can work but should not mix with the other staff

Fellow employees should self-monitor for symptoms

Identify where the infected employee worked and came into contact with (within 2 meters, having exchange of documents without precautions, long exposure time) during the 14 days prior to testing positive or first displaying symptoms

Disinfection of Workplace

In case of reporting of the lab confirmed Covid-19 positive cases, the other setting e.g vehicle, living, mess, office is to be closed/sealed for disinfection with the recommended disinfection material.

The other staff is to be for isolation and follow the instructions of the crew doctor

Urgent measures should be taken for proper fumigation, sterilization and other necessary precautionary measures within premises of living and

other facilities that are commonly used, after persons suspected or confirmed to have COVID-19 positive

Employers should follow the disinfecting procedures for disinfection

Training should be provided to all cleaning staff on site prior to providing cleaning tasks. Training should include when to use personal protective equipment, what PPE is necessary, how to properly wear, use, and take off PPE, and how to properly dispose of PPE

Camp Boss must ensure workers are trained on the hazards of the cleaning chemicals

Cleaning staff should clean and disinfect all areas such as offices, bathrooms, common areas, shared electronic equipment (like tablets, touch screens, keyboards, remote controls, and copy/print/scanning machines, other tools, machines, equipment) used by the ill persons, focusing especially on frequently touched surfaces

ANNEX-1

PATIENT EXAMINATION FORM

NAME:

AGE:

COMPANY:

ADDRESS/TEL. #:

ANY KNOWN ALLERGY:

BLOOD GROUP:

ANY KNOWN CHRONIC DISEASE:

VITAL SIGNS:

Pulse: _____ /min Temp: _____ ºF B.P: _____ mmHg

Respiratory Rate: _____ /min Appearance (Pale/Normal): _____

PRIMARY SURVEY:

1. Airway (Patent/ Not patent): _____

2. Breathing (Yes/No): _____

3. Circulation (Carotid pulse palpable or not): _____

4. Haemorrhage (Visible or not): _____

5. Level of consciousness (**Glasgow coma scale**):

Eye Opening (E)	**Score**
▶ Spontaneous ▶ To speech ▶ To pain ▶ Nil	▶ 4 ▶ 3 ▶ 2 ▶ 1
Best Motor Response	
▶ Obeys ▶ Localize ▶ Withdraws ▶ Abnormal flexion ▶ Extensor response ▶ Nil	▶ 6 ▶ 5 ▶ 4 ▶ 3 ▶ 2 ▶ 1
Verbal Response	

▸ Oriented ▸ Confused conversation ▸ Inappropriate words ▸ Incomprehensive sounds ▸ Nil	▸ 5 ▸ 4 ▸ 3 ▸ 2 ▸ 1
Coma Score= E+M+V	
▸ Minimum ▸ Maximum	▸ 3 ▸ 15

REMARKS:

_____

_____

_____

_____

_____

_____

_____

SECONDARY EXAMINATION:

AREA EXAMINED	YES	NO	REMARKS
HEAD • Any bleeding • Any bruise or laceration • Any deformity			
NECK • Any bleeding • Any bruise or laceration			
THORAX • Any bleeding • Any bruise or laceration • Any deformity • Any point of tenderness			
ABDOMEN • Any bleeding • Any bruise or laceration • Any point of tenderness • Soft or rigid			
UPPER AND LOWER LIMBS • Any deformity • Any bleeding • Any bruise or laceration			

• Any area of tenderness • Any pain during movement			

ANY TEATMENT GIVEN:

_____

_____

_____

_____

_____

_____

_____

_____

_____

TIME: _____

DATE: _____

Doctor's signature: _____

Contact Number: _____

ANNEX-2

EMT (Emergency Management Team) CONTACT NOs.

S#	Name	Designation	Office Phone #	Mobile Phone #
1	Mr. Zhang Zhenqiang (Team Leader)	Country Manager	051- 2270818	0313-8518666
2	Mr. Yang Yanjun	Deputy Country Manager	051- 2270818	0313-8516900
3	Mr. Zahid Sarwar	HSE Manager	051- 2270818	0313-8518885 0345-8512226
4	Mr. Wang	Crew Party Chief	051- 2270818	0313-8519889
5	Mr. Zhang Shoutian	Manager HR	051- 2270818	0315-8553566
6	Mr. Waqas	Manager Finance	051- 2270818	0307-5527967
7	Col ® Aurangzeb	Manager Security	051- 2270818	0313-7770170
8	Mr. Zhang Yunlong	Manager Admin	051- 2270818	0313-8510688

ANNEX-3

EMERGENCY CONTACTS NUMBERS

Aga Khan University Hospital, Karachi

Hussain Haji

Associate
Patient Business Services
The Aga Khan University Hospital
p: 922134862380 m: 923062520260
f: 922134934294
a: Stadium Road, 74800
Karachi Pakistan
w:www.aku.edu e: hussain.haji@aku.edu

Mr. Faheem,
Marketing Department
Tel: 021-448592695 (Direct),
021-4930051 (Hospital) ext: 2695.
Fax: 021-4934294, 4932095.
Mobile# 03332118995

1	DC Sajawal	Deputy Commissioner	0298-920061
2	Indus Hospital Badin	Badin	0297-330160
3	Agha Khan Hospital	Karachi	021-34930051

ANNEX-4

Emergency Log Sheet

Time	Event	Initials

ANNEXURE VI
Written Stakeholder Feedback

STAKEHOLDER FEEDBACK FORM

PROJECT: ENVIRONMENTAL IMPACT ASSESSMENT OF SEISMIC ACTIVITIES IN SUI NORTH BLOCK, DISTRICT RAJANPUR, PUNJAB

NAME	OCCUPATION	AREA/RESIDENCE	FEEDBACK	SIGNATURE
اعجاز	آفس کا کام	راجن پور	بجلی کا مسئلہ ہے اور بجلی کے لیئے بہت پریشانی ہے	
محمد یعقوب	آفس بوائے	راجن پور	علاقے میں ہسپتال نہیں ہے اور روڈ نہیں ہے	
منیب	آفس کا کام	راجن پور	علاقہ میں پانی اور روڈ کا مسئلہ ہے۔	
کرتان	پیشہ	راجن پور	علاقہ میں پانی کی سخت قلت ہے۔	
عمران خان	ڈرائیور	راجن پور	صحت کے مراکز کی کمی ہیں۔ صاف پانی نہیں۔	
علی	مزدور	راجن پور	روزگار ملنا چاہیے۔	
قاسم	مزدور	راجن پور	علاقے میں بجلی نہیں ہے۔ نظام کو بہتر کریں	
شاہ نواز	مزدور	راجن پور	ہمارے علاقے میں پانی بہت مسئلہ ہے اسے ٹھیک کیا جائے	
غلام عباس	مزدور	راجن پور	صاف پانی کا نہ ہونے کی وجہ سے بیماریاں پیدا ہو رہی ہیں۔	
جان محمد	رہائشی	راجن پور	مقامی رہائشی آبادی سہولیات موجودگی یقینی بنائے جیسے صحت کی اور پڑھائی کی۔	

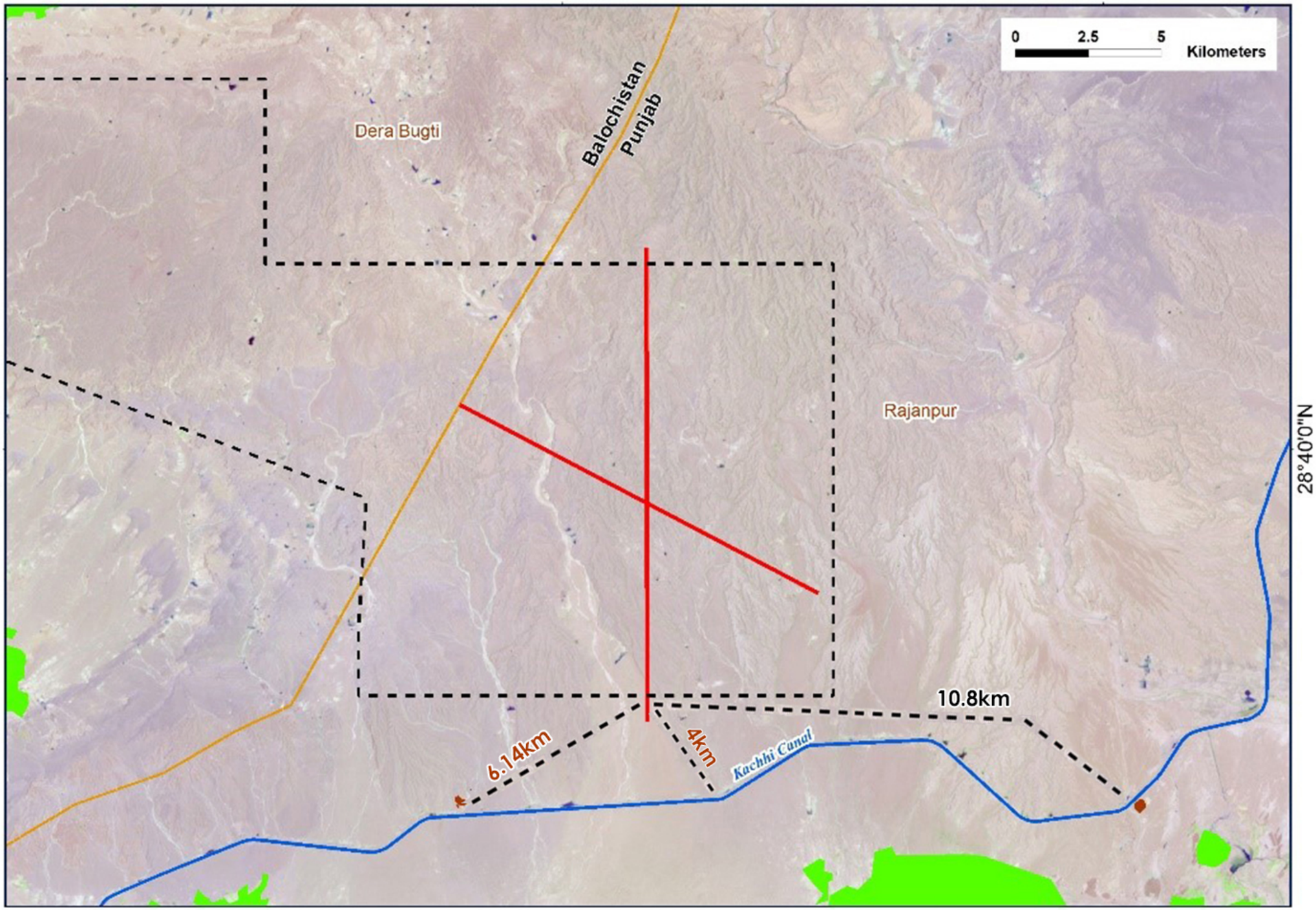
ANNEXURE VII

Map Showing Distances Of Project Area And Features









N
W
E
S

EMC PAKISTAN PRIVATE LIMITED
EMC

PPL

Sui North Block
Seismic Lines
Province Boundary
Settlements
Farmlands
Water Channel

Seismic Survey in Sui North Block (2D Seismic Acquisition), Punjab

Prepared by:
Syeda Urooj Fatima

Checked by:
Imran Khan

Approved by:
Ahmed Zohair Siddiqui