

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) DRILLING ACTIVITIES IN ADHI MINING LEASE

JULY 2023



EMC Pakistan
Private Limited





Environmental Impact Assessment (EIA)

Drilling Activities in Adhi Mining Lease

Final Report

July, 2023

Ref: EIA/01/05/23



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ABBREVIATIONS

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

GLOSSARY

Client /Proponent:	Pakistan Petroleum Limited
Proposed Project:	Drilling Activities in Adhi Mining Lease
Environmental Consultant:	EMC Pakistan Pvt. Ltd.
Project Location:	Tehsil Gujar Khan district Rawalpindi, Punjab Province.
EPA	Punjab Environmental Protection department
Study	Environmental Impact Assessment (EIA)
Study Area	Project site and 1 km radius around the project site

Development Well: A development well is drilled in a proven producing area for the production of oil or gas. It stands in contrast to an exploratory well, which is one that is initially drilled to find oil or gas in an unproven area. As a result, dry or unsuccessful development wells are rarer than dry exploratory wells.

Drilling mud / fluid: Drilling mud, also called drilling fluid, in petroleum engineering, a heavy, viscous fluid mixture that is used in oil and gas drilling operations to carry rock cuttings to the surface and also to lubricate and cool the drill bit. The drilling mud, by hydrostatic pressure, also helps prevent the collapse of unstable strata into the borehole and the intrusion of water from water-bearing strata that may be encountered.

Wellhead: The component at the surface of an oil or gas well that provides the structural and pressure-containing interface for the drilling and production equipment.

Feeder Line: A surface pipeline carrying oil, gas or water that connects the wellhead to a manifold or to production facilities.

Produced Water: Produced water is a term used in the oil industry to describe water that is produced as a byproduct during the extraction of oil and natural gas. Produced water is kind of brackish and saline water from underground formation that are brought to the surface.

Hydrotesting water: Hydrostatic Testing or Hydro Testing is a process where components such as piping systems, gas cylinders, boilers, and pressure vessels are tested for strength and leaks. Hydro tests are often required in new equipment (pipeline system, pressure vessels etc.) before commissioning, after shutdowns and repairs in order to validate that equipment will operate under desired conditions once returned to service. A hydrostatic test is performed by filling (pressurizing) the vessel or piping being examined and subsequently monitoring the level of pressurization for changes. If there is a lowering of pressure, there is a leak somewhere in the system.

Government Approvals: The Petroleum Concession Agreement for Adhi Mining Lease between the President Islamic Republic of Pakistan & Pakistan Petroleum Limited.

EXECUTIVE SUMMARY

Project Title	<i>Drilling Activities in Adhi Mining Lease</i>
Location	<i>District Rawalpindi</i>
Proponent	<i>Pakistan Petroleum Limited.</i>
EIA Consultant	<i>EMC Pakistan Pvt. Limited</i>

This document presents the findings of an Environmental Impact Assessment (EIA) study carried out by EMC Pakistan (Pvt.) Limited for the project “Drilling Activities in Adhi Mining Lease” proposed by Pakistan Petroleum Limited (PPL). Scope of the project includes drilling of 03 development wells along with laying of associated feeder lines. The feeder lines will be laid from the proposed successful wells. The feeder line will serve the purpose of transferring raw feed from the proposed wells to the gathering point / Adhi LPG/NGL plant.

The 03 proposed development wells viz. A-36, A-37 and A-38 and their associated feeder lines (approximately 6.5 km long total length) are situated in Tehsil Gujar Khan, district Rawalpindi, Punjab. The location coordinates are given below. The development wells will enhance the oil/gas production from the reservoir.

Table ES.1: Location coordinates of proposed well sites

Well ID	Latitude	Longitude
A-36	33°08'40.20"N	73°09'00.34"E
A-37	33°08'16.51"N	73°08'35.30"E
A-38	33°07'40.20"N	73°07'28.96"E
The locations of the wells are tentative and may change upto 1 km based on the results of G & G technical studies.		

Table ES.2: Coordinates of Feeder Line start and termination point

Start point	A-36	
Termination point	33° 8'31.74"N	73° 9'31.68"E
Length	~ 1 Km	
Start point	A-37	
Termination point	33° 6'43.88"N	73° 7'20.93"E
Length	~ 5 Km	
Start point	A-38	
Termination point	33° 7'38.02"N	73° 7'37.04"E
Length	~0.5 Km	
The location and the length of feeder lines are tentative and subject to change		

Table ES.3: Specification of the Feeder line	
Diameter of pipe	06-inch NPS
Depth	1.37 to 1.6 meters buried from surface
Width of ROW	~40 feet
Total Length of feeder lines	~ 6.5 km
Products to be transported	Raw Hydrocarbon
Corrosion Protection of Pipeline	Cathodic Protection
Codes & Standards	ASME B 31.8
Estimated Volume of water for hydrostatic testing	31,850 US gallons

Adhi Mining Lease is situated in the East-southeast of district Rawalpindi and North-northeast of District Chakwal of Punjab Province. The Proposed development wells and their associated feeder lines are situated in Tehsil Gujar Khan of district Rawalpindi.

The Environmental Impact Assessment (EIA) of the project has been carried out in compliance with the mandatory requirement of Section 12 Punjab Environmental Protection Act, 1997 (Amended 2012 & 2017) which states 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.”* Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations, 2022, accordingly categorizes the proposed project in Schedule II, Category “A. Energy”, sub-category (5) requiring an Environmental Impact Assessment.

The existing natural and socioeconomic environments of the project area have been studied and the report covers the assessment of 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 number of households, education, health, gender issues, water supply, agriculture, transport and communications, and occupations and income of the inhabitants.

The baseline environmental and socioeconomic information was collected from a variety of sources, including reports of previous studies, published literature, and field survey (primary information). The information collected was used to develop baseline conditions of project area with respect to the natural, socioeconomic, and cultural environments likely to be affected by the project.

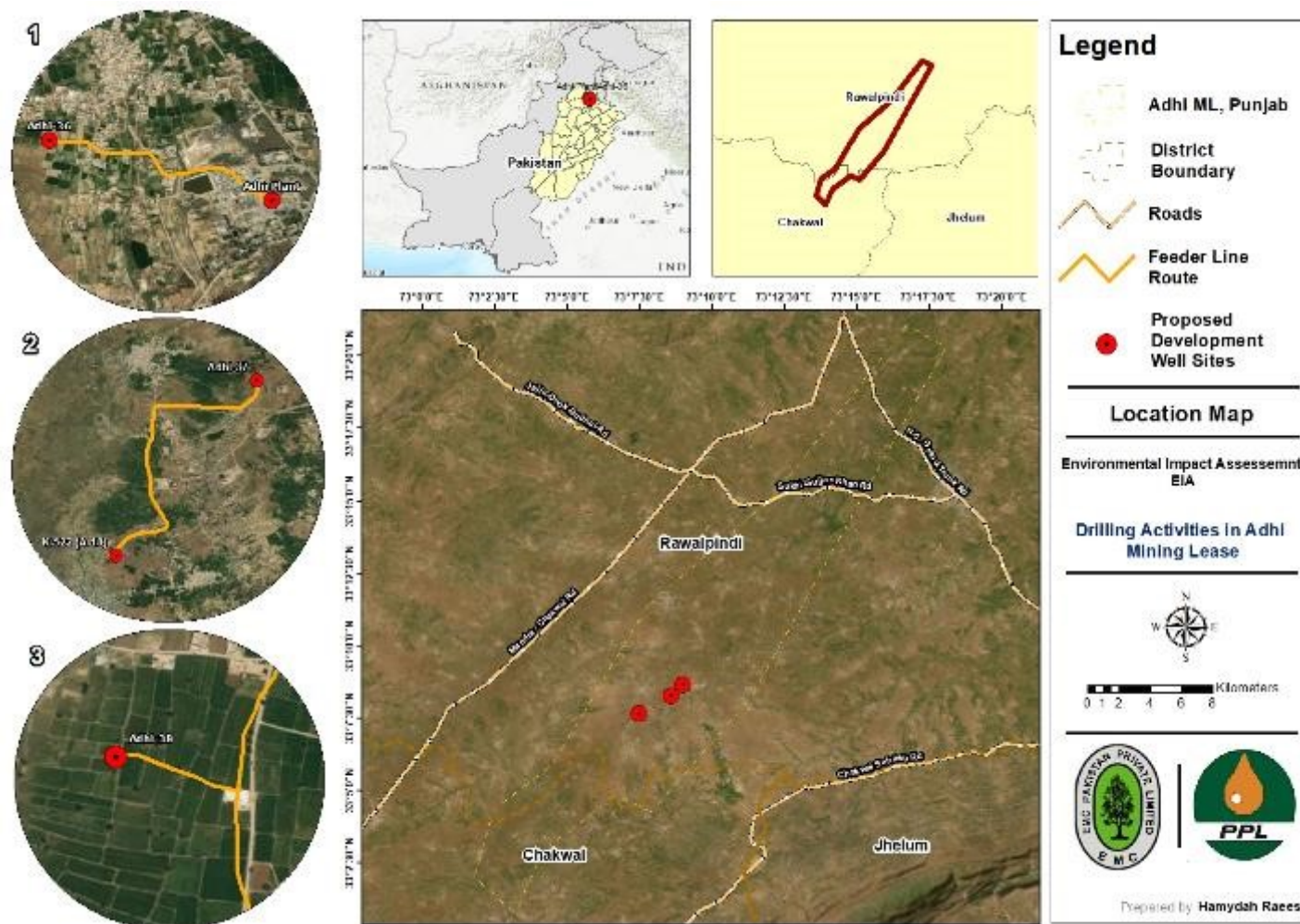


Figure ES-1: Proposed Project Location Map

The project area is semi-arid, semi-humid land with gentle undulation. Project area has considerable agricultural activity and the land is also covered with natural vegetation belonging to grass, shrubs and herbs and trees such as Sheesham, Sufaida, Phulai, Kikar and other common to the region. There is no river or irrigation canal network in the Adhi Mining Lease area, therefore, the agriculture and the natural vegetation are dependent on rainwater. The settlements in the project area are in form of village / small town with infrastructure of semi-urban / semi-rural. These settlements are situated far apart. Some of the prominent village / small town in the Adhi Mining Lease are Mastala, Ahdi, Lohasar, Dhok Khakkar, Khesiah and Domali. Houses in these settlements are made of cement/RCC, mud and wood and huts. There is no drainage/sewage network, no solid waste management system. The roads connecting these settlements are mostly dirt track and gravel top. Only few kilometers are black topped. Streets inside these settlements are both dirt track and cemented.

Major Impacts and Mitigation Measures

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 Adhi ML.

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

- Temporary and localized impacts to land use would result from wellsite construction, drilling and feeder line laying 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 sewage water, drilling cuttings and mud and produced water. 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.
- Inadequate storage of hazardous substances at project sites can be a fire hazard and can also cause spills and uncontrolled releases into surrounding environment.
- 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 nearby communities and can propagate from project activities such as excavation, land clearance, power generation, drilling, etc.
- Water resources of the area can be impacted due to abstraction of water for project activities from groundwater.
- Hydrotesting testing would release substantial quantities of water which would require retention or discharged into the environment.

Recommendations on Mitigation Measures

- Disturbance to the agricultural land and vegetation will be minimized as much as possible. Compensation will be paid for the land acquired and for any crop damaged.
- The proposed activities may have adverse impacts which can be mitigated by adopting best industrial practices and restoration of the area after activity.

- Proper implementation of plan for hazardous waste management will reduce the soil and water contamination. Drill cuttings and mud will be collected into geomembrane lined evaporation pond. Produced water will either be reinjected into the well or will be either be collected into evaporation pond. Chemicals shall be stored at designated area(s) at project sites. Project sites will be restored after completion of activities.
- A spill prevention and response plan will be developed for addressing spill prevention measures, training requirements, waste-specific spill response actions, spill response kits. Secondary containment will be provided around all the fuel storage tanks and chemical storage area of suitable size (110% of the fuel storage area/ largest tank capacity).
- By minimizing the disturbance and areas cleared of vegetation, using dust control techniques, following restoration and 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 recycling and rainwater harvesting.
- Water from hydrostatic testing will be collected in retention pond and will only be released into the environment after it meets PEQS.

Proposed Monitoring Plan

Monitoring plan for well construction & drilling and feeder laying activities has been provided in chapter 7. Based on project activities, regular monitoring has been proposed for following key parameters;

- Ambient air quality
- 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 in each phase.

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.

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APPENDIX

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Appendix – II	: Source of data and list of reference material used
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ANNEXURES

Annexure – I	: Project Location Map
Annexure – II	: Adhi Mining Lease Agreement
Annexure – III	: Environmental Monitoring Reports

1.0 INTRODUCTION

1.1 General

Project Title: Drilling Activities in Adhi Mining Lease
Proponent: Pakistan Petroleum Limited

This document presents the findings of an Environmental Impact Assessment (EIA) carried out by EMC Pakistan (Pvt.) Limited for the project “Drilling Activities in Adhi Mining Lease” proposed by Pakistan Petroleum Limited (PPL). The EIA study has been carried out in the compliance with Section 12 of Punjab Environmental Protection Act, 1997 (amended 2012 and 2017) and rules and regulations framed thereunder.

1.2 Brief Description of the project

PPL is planning to conduct activities related to drilling of development wells in Adhi Mining Lease. The project comprises of drilling of 03 development wells, laying of associated feeder line to transfer the raw hydrocarbon from these wells to nearest gathering point, if the well is successful. The proposed project sites are situated in Rawalpindi district. Location coordinates of the proposed wells are provided in table 1.1 and figure 1.1 below shows the location map of the project.

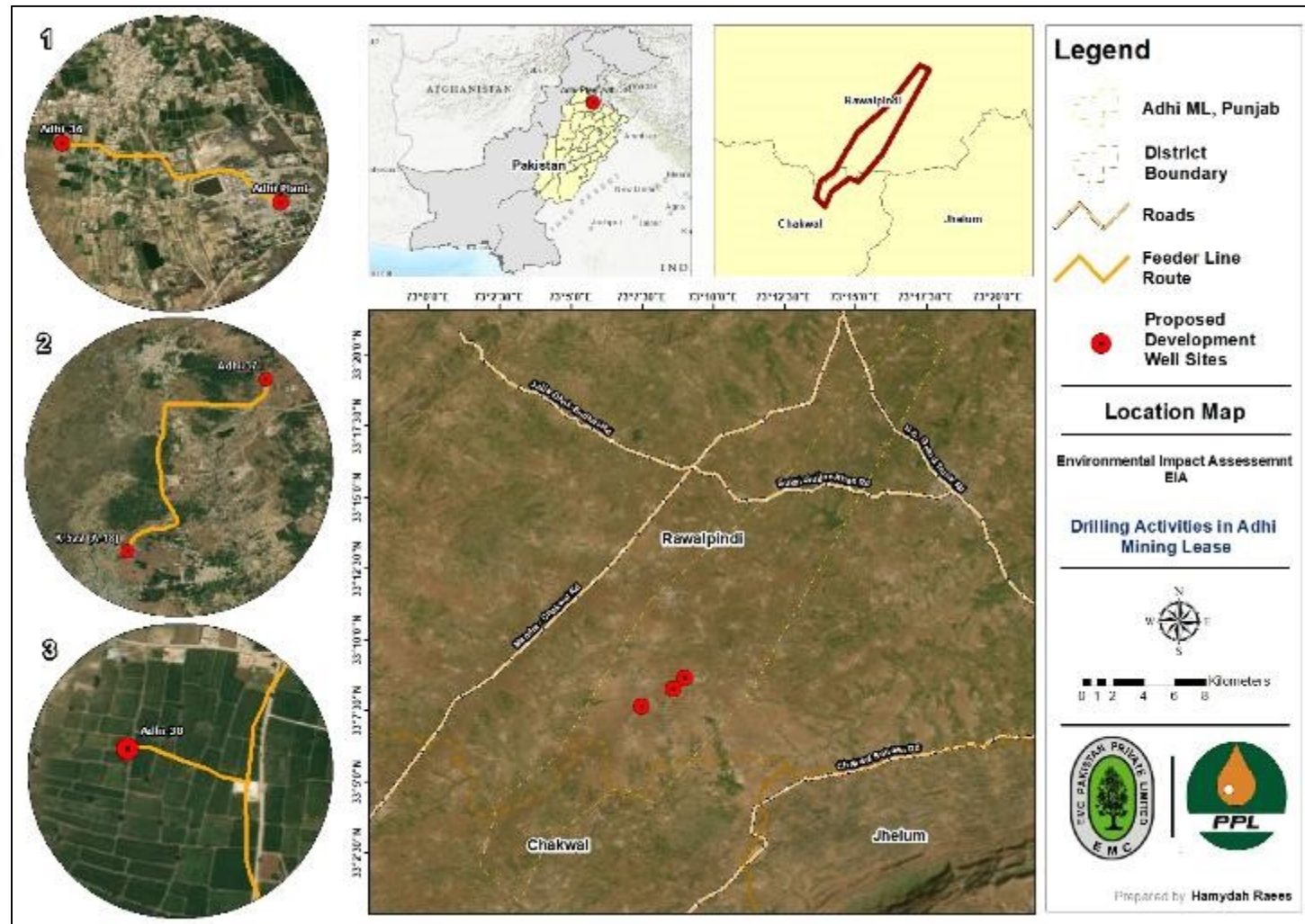


Figure 1.1: Location Map of the project

Table 1.1: Location coordinates of proposed well sites

Well ID	Latitude	Longitude
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Termination point	33° 7'38.02"N	73° 7'37.04"E
Length	~0.5 Km	

The location and the length of feeder lines are tentative and subject to change

Table 1.2: Specification of the Feeder line from Oil/Gas well

Diameter of pipe	06-inch NPS
Depth	1.37 to 1.6m
Width of ROW	~40 feet
Products to be moved	Raw Hydrocarbon

1.3 Project Proponent – Contact details

Pakistan Petroleum Limited

Address: PIDC House, Dr. Zia Uddin Ahmed Road,
PO Box 3942, Karachi 75530,
Phone :(+) 9221-111 568 568
Fax: (+) 92- 21-35680005
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1.4 EIA Consultant – Contact details

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

1.5 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 Environmental Impact Assessment (EIA) 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.

1.6 Pakistan Petroleum Limited – The Proponent¹

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

¹ <https://www.ppl.com.pk/content/corporate-profile-overview>

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.

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.

Vision²

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

Mission³

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 Responsibility⁴

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 centerpiece 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.

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 2018⁵.

PPL has one producing field in Punjab province namely Adhi Field which lies on border of District Rawalpindi and District Chakwal with majority of area at tehsil Gujar Khan which is operational since early 1980s while exploration is made in the province in the blocks / areas allocated / awarded to the Company from time to time. Therefore, it will be nearly

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/Community>

⁵ <https://www.ppl.com.pk/content/awards>

impossible to highlight all the CSR / social welfare activities carried out by PPL in province of Punjab. However, few notable ones are as under:

Corporate Social Responsibility in Punjab

Community Development Initiatives at Adhi Field, Tehsil Gujar Khan

Education:

1. Installation of solar system at Govt. Girls Elementary School, Chechi Noor
2. Repair, renovation, boundary wall at Govt. Model Primary School, Dhok Mannah.
3. Quality interventions at Govt. Boys elementary School, Mastala and Govt. Girls Elementary School, Chak Naban
4. Construction of 02 classrooms at Govt. Girls Elementary School, Chak Naban (Work in progress)
5. Construction of 1 Classrooms at Govt. Model Primary School, Dhok Budhal (work in progress)
6. Construction of 02 classrooms and toilet block at Govt. Girls High School, Domali.
7. Furniture to 05 Government Schools in the area.
8. School bags to 1000 local students.
9. 05 Higher Professional Education Scholarships to students of tehsil Gujar Khan.

Health

10. Construction of dispensary building at Nirali
11. Operating medical dispensary at village Mastala.
12. Holding surgical eye camps at Dhong, Naban Janjua and Daultala.
13. Holding ENT camps at Dhong, Adhi, Nirali and Naban Janjua.
14. Support in-kind to BHU Dhong.
15. Vaccinations of locals.

Water & Environment

16. Installation of water filtration plant at Nirali.
17. Maintenance of Park at Dhong.
18. Tree Plantation at Schools

Infra-structure Development

19. Repair of black top road to Naban Janjua & Naban Sayedah
20. Construction of PCC streets at Mastala and Dhok Budhal.

Social Welfare at Adhi Field, Tehsil Gujar Khan

Health:

- Holding surgical eye camps annually nearby Adhi Field at BHU Dhoong, RHC Daultala & RHC Pir Phullai (District Chakwal)
- Constructed, furnished and operating medical dispensary at village Mastala.
- Rehabilitation of BHU Dhoong and BHU Sukku
- Rehabilitation of Tehsil Head-Quarter Hospital, Gujar 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 - Dhoong, Govt. Kazmia High School - Chechi Noor, Govt. Boys High School - Naban Janjua and Govt. Boys High School - Narali.
- 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 Gorian.
- 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 Gujar 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, Dhoong 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 Elementary 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, Dhoong.
- 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, Dhoong.
- 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.
- Constructed PCC Road from Adhi to village Mastala.
- Constructed causeway and 3 culverts at village Dhoong.
- 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 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, Jhamat
- Provided School furniture to 08 Govt. Schools for 300 students at UC Dakhnir.
- Provided School bags to 08 Govt. Schools to some 800 students at UC Dakhnir.

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 classroom at Govt. Boys Primary School, Dhok Walana.
- Constructed classroom 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 with Chakri bypass 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 street 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 Environment⁶

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

⁶ <https://www.ppl.com.pk/content/health-safety-environment-overview>

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.

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.

1.7 Purpose of EIA Study

Activities associated with the proposed project i.e., well site construction, Drilling of Oil and gas development wells, well site construction and laying of feeder lines can have adverse impacts on the environment if proper mitigation measures are not in place. The potential impacts occur mainly on the area in which such activities are being undertaken and includes soil contamination, disturbance to local communities and wildlife, destruction of wildlife habitat, land erosion and surface and subsurface water contamination etc. However, through the identification of potential impacts and the development and implementation of mitigation measures, such potential adverse environmental and social impacts can be avoided or reduced, making the project environmentally and socially friendly.

This EIA study aims to provide environmental report of the project "Drilling Activities in Adhi Mining Lease", to assess the impacts of project activities on existing physical, ecological and socioeconomic environment. The main rationale of EIA study is to make sure that:

- Any major undesirable impacts on environment (physical, ecological and socioeconomic) during different phases are identified;
- 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) is provided for sustainable development and operation of the project;
- To submit an assessment report to Punjab Environmental Protection Agency (Punjab EPA);
- To acquire Environmental approval from Punjab EPA.

This EIA report appropriately recognizes the environmental aspects and screen the potential impacts to make sure that effects of various activities on proposed site have been carefully

assessed and mitigation measures are properly planned & implemented to keep environmental impacts under acceptable limits.

1.8 Categorization of the project

On the basis of categorization given in Schedules I and II of the Punjab Environmental Protection (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

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

1.9 Methodology for Environmental Impact Assessment (EIA) study

Various steps were undertaken in order to 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 the Proposed Project

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

1.9.2 Review of Legislation and Guidelines

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

1.9.3 Secondary Data Collection

Available published and unpublished information pertaining to physical, biological and socio-economic micro & macro environment was obtained and reviewed. It included previous environmental studies and baseline conducted for various similar and other projects in Punjab Province.

1.9.4 Field Data Collection

Primary data for this study has been acquired through visits of the project area conducted by EIA study team during the month of March, 2023. Team members surveyed the proposed well locations and their vicinity to perform reconnaissance survey and to gather primary baseline data related to environmental (physical & biological) and social aspects. Land use of the locations visited during site survey includes agricultural lands along/near major settlements namely Mastala, Adhi and Dhoong. Discussions were also held 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.



1.9.5 Baseline Studies

The environmental profile of the project area was established through primary data (field survey, consultations) and secondary data. 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 etc.).

1.9.6 Impact Identification and Assessment

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 Stakeholder Consultation

Public involvement is one of the key features of environmental assessment, which leads to better and more acceptable decision-making. The objective of consultation was to interact with local communities and identify their concerns regarding the project. The local residents were informed of the project activities and their feedback was recorded. The outcome of consultation is given in section 5 of this report.

1.9.8 Recommendations to Mitigate Impacts

Keeping in view 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, industry best practices, legislative requirements and professional judgments.

1.9.9 Environmental Management Plan (EMP)

Environmental management plan (EMP) is developed for effective implementation of the recommended mitigation measures. EMP includes controls to minimize the identified impacts and monitoring program to control residual impacts (if any). The EMP has laid down procedures to be followed during the drilling and its associated activities and feeder line laying operations and has identified roles and responsibilities for all concerned personnel.

1.9.10 Documentation, Review and Conclusion

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

1.10 Structure of the EIA Report

The EIA report has been structured on the standard format. The Report has been presented in the following sections:

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

Section 2: Describes the proposed project and its associated activities in detail;

Section 3: Gives an overview of national & international policies and legislation along with guidelines relevant to the project;

Section 4: Provides description of the microenvironment and macro-environment of the Project area; explaining its physical & biological environment, as well as socio-economic conditions;

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 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.

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

1.11 EIA Study Team

This EIA report has been prepared by a team of EMC Pakistan (Pvt.) Limited which comprises of following members mentioned in Table 1.3.

Table 1.3: List of EIA Study Team		
S. No	Names	Positions
1.	Mr. Syed Nadeem Arif	Project Manager
2.	Mr. Ahmed Zohair Siddiqui	Environmental Engineer/ Team Leader
3.	Mr. Sohaib Tariq	Environmental Engineer
4.	Mr. Syed M. Omer Arif	Environmental Engineer
5.	Mr. Mohiuddin	Environmental Expert
6.	Mr. Adil Khan	Environmentalism
7.	Mr. Nisar Ali Khan	Environmentalism

2.0 DESCRIPTION OF PROJECT

2.1 The Project

PPL plans to drill three (03) development Wells namely A-36, A-37 and A-38 & lay associated feeder lines (06' diameter and approximately 1 km, 5 km and 0.5 km long, respectively) from these wells to the nearest gathering point in the Adhi Mining Lease, Punjab. The purpose of drilling development wells is to increase production of oil/gas from identified reserve. Whereas, the feeder lines will serve to transfer the product obtained from the proposed development wells to the gathering point given the proposed wells are successful. The details of the feeder line are as follows.

Table 2.1: Specification of the Feeder line	
Diameter of pipe	06-inch NPS
Depth	1.37 to 1.6 meters buried from surface
Width of ROW	~40 feet
Total Length of feeder lines	~ 6.5 km
Products to be transported	Raw Hydrocarbon
Corrosion Protection of Pipeline	Cathodic Protection
Codes & Standards	ASME B 31.8

2.2 Project Location

Adhi Mining Lease is situated in the East-southeast of district Rawalpindi and North-northeast of District Chakwal of Punjab Province. The Proposed development wells and their associated feeder lines are situated in the South of Adhi Mining Lease in Tehsil Chakwal of district Chakwal. The Injection well is situated in Tehsil Gujar Khan of district Rawalpindi.

Location coordinates of the proposed development wells are provided in table 2.2 and location map of the project is given in figure 2.1.

Table 2.2: Location coordinates of proposed well sites		
Well ID	Latitude	Longitude
A-36	33°08'40.20"N	73°09'00.34"E
A-37	33°08'16.51"N	73°08'35.30"E
A-38	33°07'40.20"N	73°07'28.96"E
The locations of the wells are tentative and may change upto 1 km based on the results of G & G technical studies		

Table 2.2 (b): Coordinates of Feeder Line start and termination point		
Start point	A-36	
Termination point	33° 8'31.74"N	73° 9'31.68"E
Length	~ 1 Km	
Start point	A-37	
Termination point	33° 6'43.88"N	73° 7'20.93"E

Length	~ 5 Km	
Start point	A-38	
Termination point	33° 7'38.02"N	73° 7'37.04"E
Length	~0.5 Km	
The location and the length of feeder lines are tentative and subject to change		

2.3 Objectives of the project

The objective of drilling development wells is to increase production of oil and gas from the identified oil and/or gas reserves in the Adhi Mining Lease. The product obtained from these wells shall be transferred to the gathering point / Adhi LPG/NGL Plant through the proposed feeder lines for treatment and onward supply.

2.4 Scope of Work

The project involves activities associated with drilling of development wells and laying of underground feeder lines as described below;

- Land acquisition
- Construction of access road;
- Development of well site and campsites;
- Mobilization;
- Drilling;
- Laying of Feeder line from proposed well sites to gathering point/Adhi LPG/NGL Plant;
- Well evaluation and Completion;
- Restoration and rehabilitation;

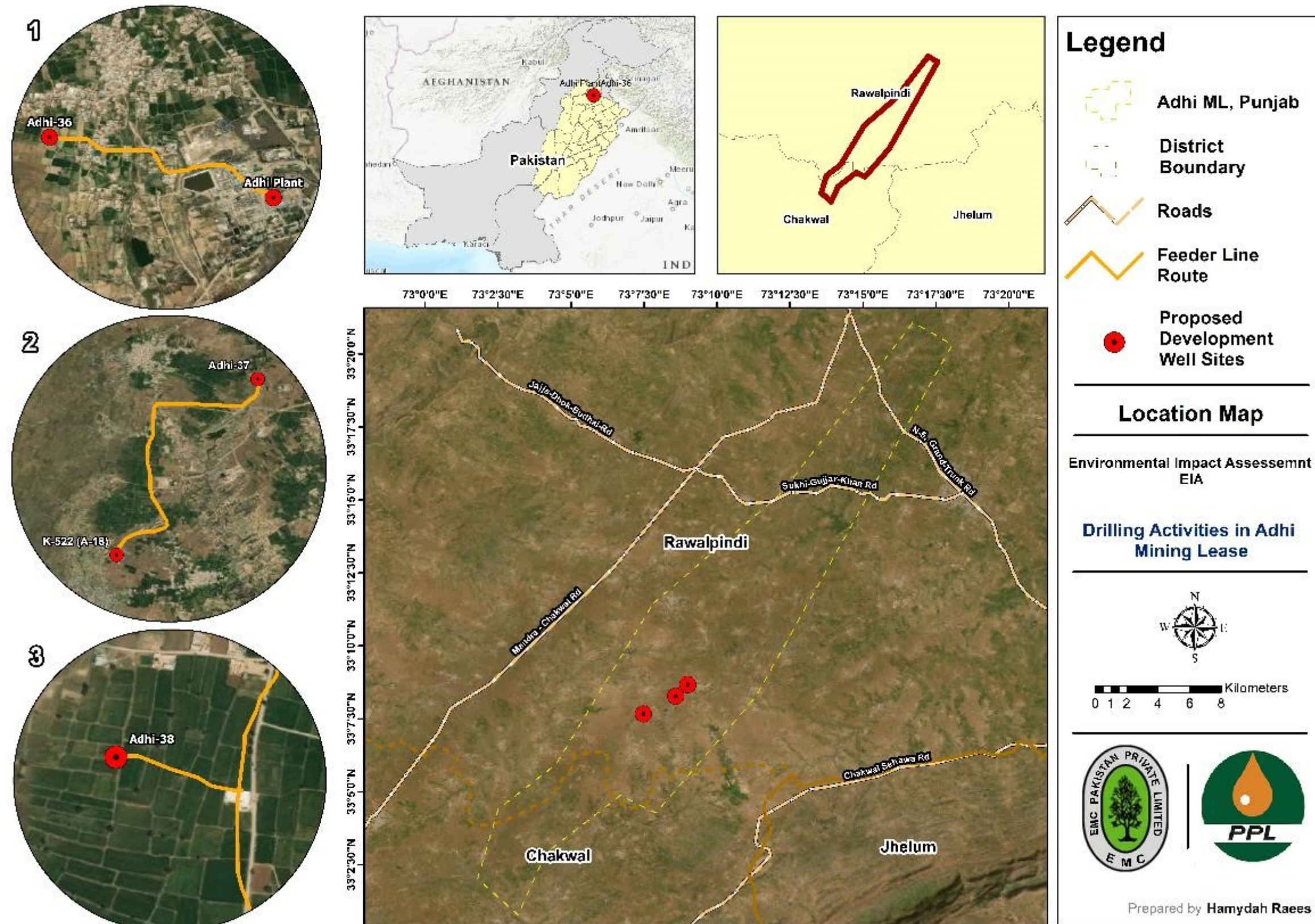


Figure 2.1: Location Map of the Proposed Project

2.5 Drilling Operation

Activities for each development well drilling will include construction of a well site, camp site, and an access track; drilling of the well; possible well testing, tie-in with the gathering point / Adhi Plant will be done for which feeder line will be laid; abandonment, completion or suspension of the well depending on the success or failure of the well and site restoration.

2.5.1 Schedule of implementation

The drilling operation of well, from civil works to restoration/plugging and abandonment is expected to take about 9 – 10 months. The tentative duration of key activities is provided below;

Table 2.4: Tentative Duration of activities for oil/gas Development well	
Activity	Duration
Civil works	Civil Works: 90 - 120 days
Rig mobilization	Mobilization: 10 – 15 days
Drilling	Drilling: 180 – 200 days
Feeder line laying	Well # 36: ~4 days for laying 1Km Feeder Line Well # 37: ~20 days for laying 5Km Feeder Line Well # 38: ~2 days for laying 0.5Km Feeder Line

2.5.2 Construction Activities

In this phase of the operation, rig & base camps and access track will be developed for the drilling of the well. The construction contractor will develop its own camp for construction purposes. The camp will accommodate approximately 10-20 workers per well site. The contractor will also hire local people for unskilled jobs if possible. The power for the construction site will be acquired through a diesel generator of 50-80 KVA.

i. Well Site

Each camp site will cover an area of approximately 400 x 400 sq ft. Construction works to develop a well location will involve the following:

- Clearing, leveling and compaction;
- Construction of the drilling rig pad and cellar;
- Construction of covered septic tanks and soak pit
- Construction of platform for fuel storage tank with secondary containment & sump pit;
- Installation of chain link fence around the well site etc.

ii. Rig Camp

Each rig camp site will consist of portable cabins, kitchens, mess rooms, bathrooms, laundry area, etc. for which limited construction works including leveling, grading, filling and compaction will be required. Development of campsite includes, but not limited to the following;

- Leveling and compaction of area for the campsite;
- Provision of drainage works in and around the campsite;

- Laying and compaction of the gravel topping in the campsite;
- Construction of fuel storage tank with secondary containment & sump pit
- Provision of fence, access and emergency gates;
- Construction of covered septic tank and soak pit
- Installation of security guard wooden cabins; and
- Installation of sewerage pipeline with manholes for the septic system;

iii. Development of Access track/road

All equipment, supplies and personnel will need to be moved to and from the selected site by road. The existing tracks will be used as much as possible to access the selected drilling location. Access tracks exists in the area, unpaved road from main road to site location will be constructed that would be few km. The access road will be built to a standard that is suitable for movement of 40 ft. flatbed trucks. The road will be 9 – 10 m wide for the safe movement of vehicles during normal operation and rig movement and compacted with gravel.

Construction works to develop the access roads includes, but not limited to the following;

- Cutting and filling;
- Leveling, grading and compaction of sub grade;
- Laying and gravel compaction;
- Construction of pipe culverts and Fjord crossing;
- Provision of earthen catch drains;
- Provision of pass points at every 1,000m; and
- Provision of milestones, road and safety signs.

After completion of construction activities, all except for a few machineries, equipment and personnel required for maintenance of the access road will be demobilized from the area.

Water source will be through contractor and supplied with bowsers to the drilling location.

2.5.3 Rig Mobilization

Following the construction of the well site, camp site and access road, mobilization of the rig and related machinery and equipment will commence. Mobilization will involve the transportation of the following to designated drilling location;

- The drilling rig;
- Ancillary equipment such as power generators, mud pumps, mud tanks, shale shakers, cementing unit, drill pipe and collars;
- Porta-cabin style camp, complete with all catering, power generation, laundry and other facilities;
- Drilling and other necessary support personnel; and
- Drilling material such as casing and associated accessories, well heads, drill bits, drilling fluid chemicals, liner hanger equipment

The drilling rig will be transported to the site using 40 ft. long trailers. Depending on the type of rig, approximately 80 to 150 truckloads of equipment will be transported during mobilization. The rig will be assembled and erected over the well location.

2.5.4 Drilling

Drilling will be carried out using conventional equipment, techniques and practices for hydrocarbon exploration and production. A rotary drilling rig will be used in this operation; the derrick will be mounted on a steel platform known as the rig floor. The rig floor will provide working area for the drilling operations and personnel. A hoisting drum called draw works will be mounted on the rig floor at the base of the derrick. A wire rope called the drilling line will pass from the draw works to the top of the derrick through a system of pulleys called the crown block and will be attached to a further system of pulleys known as the hook and block. The whole system of wire rope and pulleys will operate like a crane. A drill string made up of uniform lengths of hollow steel pipes will be suspended from the hooks. Suspended from the drill string will be the drill bit. The drill bit will drill through the formations by the combined effect of the weight of the drill collar and the rotary action provided to the bit by a rotary table mounted on the rig floor. Rotation of the drilling bit and string is achieved by means of powerful electric motors on the surface.



Figure 2.2: Drilling equipment

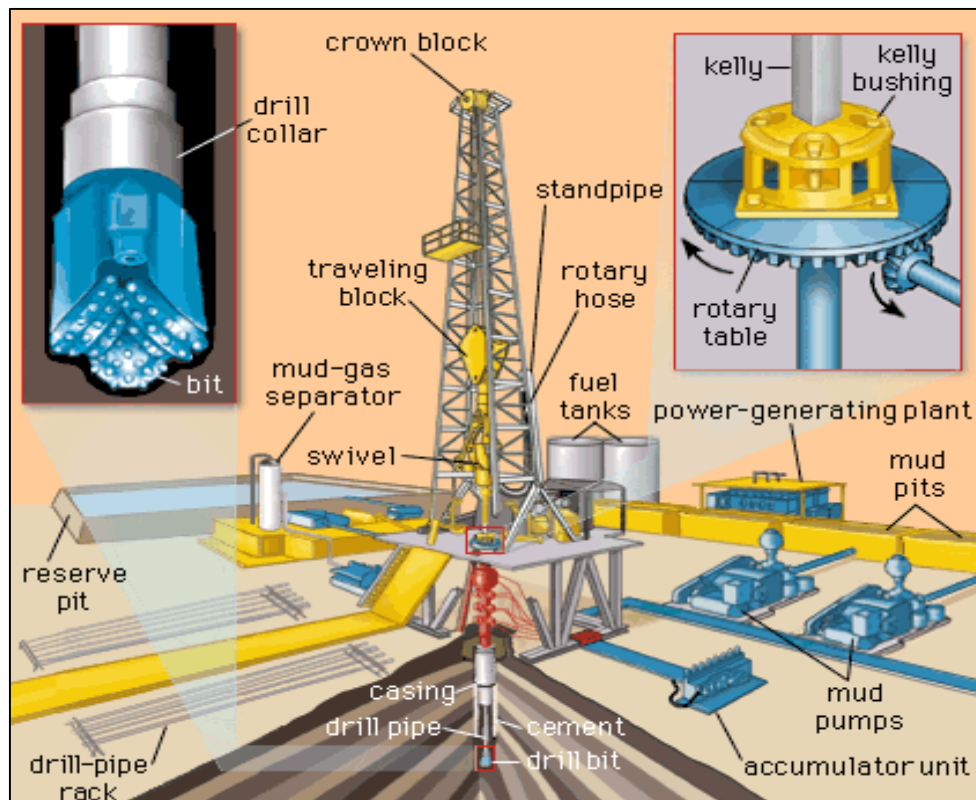


Figure 2.3: Anatomy of a rotary drilling rig

As drilling progresses in a given section of the well the length of the drill string will be increased by the addition of new lengths of pipes. Steel pipes known as casing will be lowered into the hole to line the sides of the well and prevent the hole from collapsing. At the end of drilling each section, these steel casings will be cemented into place by pumping cement into the space between the casing and the surrounding strata. The sections of the well will be drilled in this manner until the desired target depth is achieved.

2.5.5 Drilling Mud

Water based drilling mud will be used during the operation to serve the following functions:

- Flushing out drilled solids from the bottom of the hole and transfer to the surface;
- Lubrication and cooling of the drill bit and string;
- Deposition of an impermeable layer on the wall of the well-bore so as to seal the drilled formations; and
- Countering the natural formation pressures and preventing uncontrolled flow of fluid from the formations.

Water based drilling mud will consist of slurry of formation cuttings suspended in liquid phase. Certain additives such as bentonite, barite and salts will be used for initial mud formulation and subsequent changes as required during the operation. The exact constituents and concentrations will be finalized before the drilling operation. The quantity of drilling mud used and the cuttings generated will depend upon the well geology, depth of the well, and other operating factors. Water based drilling mud is handled in HDPE lined pit and disposed of in an environmentally friendly manner. Mud will be held in 220 x 220 Sq ft (2 pits) which will be located near rig machinery set up. After completion of drilling

and at the time of complete restoration, the cuttings remaining in the waste pit will be allowed to dry out or wastewater will be treated and disposed of through waste contractor in an environmentally friendly manner. The cutting will be then encapsulated within the HDPE liner and the waste pit will be backfilled with atleast 1 meter of native topsoil cover and levelling the pit with natural ground level.

During partial restoration, either liquid / wastewater and drill cuttings will be removed from the site and disposed off in an environmentally friendly manner or WBM pit will be closed as per details mentioned in above para.

In case the drilling mud pit is an agricultural land, the drilling mud should be disposed of as per the applicable and relevant guidelines of LSO 29 B.

2.5.6 Coring and Well Logging

In the potential reservoir section, cores of rock will be taken from the borehole and a number of well logs are performed. Cores and well logs will be used to confirm geology of the structures being bored through and assess the accuracy of the seismic survey data interpretation done before drilling. Coring and well logging will also help identify possible hydrocarbon.

2.5.7 Well Evaluation (for development well)

After having drilled to the specified depth, a number of logs for hydrocarbon bearing strata will be taken to accurately measure the pressure, temperature and fluid content of the zone. The main objectives of the logs will be to determine the fluid composition (gas, oil, or water), whether or not it will flow, and its pressure regime.

If test results show that oil/gas has been encountered, it becomes necessary to conduct further tests to determine whether it is feasible to develop the well. Tests are conducted to determine the fluid composition and the reservoir's permeability.

It is ensured that the mud column is more than adequate to counteract any formation pressures that could be released, temporary test string is run. A subsurface safety valve is kept in place throughout the test to encounter any uncontrolled pressure release from bottom hole. Once these steps have been taken, oil / gas is allowed to flow to the surface and is passed through a 3-phase separator that segregates the fluid into water, gas and oil (if present) or condensate. Metering devices and valves are used to estimate the oil, gas and water production rate, after which the gas and associated condensate are flared, and wastewater discharged into the lined pit.

2.5.8 Well Completion (for development well)

If data collected from coring, logging and well testing shows that the well can be used as a producing well then a completion string consists of subsurface equipment i.e. production packer, flow measuring devices, circulation devices and subsurface safety valve runs downhole to enable production from the well to surface facilities through feeder line etc. The mud in the well will be displaced by completion fluid, which is normally solid free brine containing small volumes of chemicals designed to protect the formation and casings. These chemicals will generally include corrosion inhibitor, an oxygen scavenger, biocide, and a chemical for pH control. The final design of the completion equipment will depend on the sub-surface geology, fluid composition and pressure / temperature regimes.

2.5.9 Well Control & Blow out Preventer (for development well)

In addition to careful monitoring and control of the mud system and the installation of casing in each section of the well, a surface wellhead consisting of a series of Blow out Preventers (BOPs) will be installed at the top of the casing. The function of the BOP is to prevent uncontrolled flow from the well by positively closing in the well bore as and when required. The BOP is made up of a series of hydraulically operated rams, and is designed to withstand pressures well in excess of those expected to be encountered.



Figure 2.4: Blow out Preventer

2.6 Typical details of Pipeline Laying activities

The proposed project includes;

- i. Laying of feeder lines having cumulative length of approximately 6.5 km and will serve to transfer the oil or gas obtained from the proposed wells to the nearby gathering point.

The laying of pipeline involves various steps. Below are the steps that are typically followed for laying an oil / gas pipelines.

Construction Staging Areas & Storage Yards

In order to lay a pipeline, staging areas and storage yards are cleared, strategically located along the planned right-of-way. For the proposed project, storage yard inside the well site could be used. These areas are used to stockpile pipe and to store fuel tanks, sand bags, silt fencing, stakes, and equipment parts. They provide parking for construction equipment, trucks and vehicles, and locations for office trailers.

Clear Cutting the ROW

After the equipment is accessible in the staging area, work will begin to clear the feeder line right-of-way. Topsoil is removed carefully before the trench digging begins. The goal is to preserve the original topsoil from the site to return it to its natural condition without losing the rich top layer of soil.

Excavating the Trench

The trench for the feeder line is dug after the ROW is cleared. Particular care must be taken to prevent any damage to the existing infrastructure. The soil removed during trenching goes into storage throughout the construction process. That soil goes back into the ground to fill in around the pipe. These practices help maintain the original state of the area while conserving resources.

Pipe Transport, Stringing, & Assembly

When the trench is completed, pre-coated segments of pipe are transported from stockpiles in the staging area to the right-of-way. Pipes are laid above ground beside the trench, or within the trench on top of supportive sandbags in steep terrain. Certain pipe sections are bent using a pipe bending tool to allow the pipeline to follow the planned route and the terrain. The pipe sections will then be welded together, sand blasted, and the weld joints coated with epoxy to prevent corrosion. Finally, the weld joints are inspected with x-ray to ensure their quality. Connected lengths of pipe can then be lowered into the trench.

Obstacles: Roads or tracks

In case the pipelines cross existing roads, highways, rivers, canals and wetlands; typically, pipelines are constructed underneath these obstacles by either boring for shallow depth or using horizontal directional drilling (HDD) for deeper placement. Other obstacles include abandoned mines, karst topography, and densely populated areas. Each obstacles requires a unique method and order of operations. No such obstacles are in the proposed pipeline route that require HDD.

Tentative coordinates of road/track crossing points are as follows;

Coordinates of crossing points	
S. No	Coordinates
1.	33°08'03.41''N 73°08'28.23''E
2.	33°08'02.33''N 73°07'41.03''E
3.	33°07'44.70''N 73°07'38.85''E
4.	33°07'30.98''N 73°07'37.47''E
5.	33°07'30.94''N 73°07'37.50''E
6.	33°07'20.10''N 73°07'38.61''E
7.	33°07'07.91''N 73°07'43.58''E
8.	33°06'58.42''N 73°07'46.25''E

Testing & Restoration

Before completing the project, the pipeline integrity must be verified using hydrostatic testing. Water is sent through the pipeline and the pressure is increased to above the maximum operational level. If the pipeline remains intact during this test, it is deemed operational.

With the pipeline in position, the crew begins backfilling the trench to cover the pipeline. The original soil goes back into the trench in the reverse order of how it was removed. This means the subsoil goes in first to keep the layering and composition the same as it was originally. Keeping great caution to ensure no damage occurs to the pipeline or the coating. Once the subsoil fills in the trench, the topsoil goes back on top.

2.7 Staffing and Supplies

For construction of well site and campsite, workforce requirement will be approximately ~10 – 20. The drilling rig will be operated by approximately 250 personnel including labors, crew, client, contractors and security staff. The manpower will operate in two shifts with continuous on the rig. Manpower requirement for Feeder line laying activity will be approximately 50-150 workers / staff. Local people will be given priority for unskilled jobs.

During the drilling program, the supplies, with the exception of casing, will be transported to the rig in small trucks. Casing will be carried to the rig in 40 ft. flatbed trucks. General supplies transported will include camp supplies (food, etc.), fuels, oils and chemicals, and equipment maintenance parts etc. Project personnel will travel to and from the rig in smaller vehicles, mostly four-wheel drive pickups. Water supply will be out-sourced / procured from locals / owner of tube well(s) and transportation will be done through bowsters. Proper and justified compensation will be paid to the owner(s) of water well / source for water utilized.

Table 2.5: Summary of expected average water usage during various project activities

Parameter	Rate
Camp Water (during drilling)	~ 50,000 liters per day
Drilling Operation	~ 100,000 liters per day
Water for Hydro testing of oil/gas Feeder line	~31,850 US gallons of water (approximately 4,900 US Gallon/km considering 06-inch inner diameter pipeline)

2.8 Restoration and Rehabilitation

After Drilling of Well

After completion of the drilling and associated operations, the rig will be dismantled and demobilized off the site. The wellhead will remain in situ, but all other equipment and materials including empty drums, used and unused chemicals, fuels and lubricants will be removed from the well site by their respective suppliers. After well evaluation, a decision on whether to abandon or further develop the well will be taken. If it is decided that the well is to be abandoned, the site will be restored, as far as possible, to its original condition.

- All the fencing / barriers surrounding the base / rig camp areas will be removed and the area will be levelled.
- The concrete structures if desired by the land owner may be left intact after taking concurrence in the form of NOC from respective land owner and considering that no environmental hazard / issue will occur. Otherwise, the concrete structures will be broken up and disposed or reused for backfilling of pits / septic tanks (below main rooting zone, 1 - 1.5 m) or provided to locals for re-use (backfilling).
- All waste products, solid and liquid will be disposed of in accordance with the requirements of the EIA.
- All pits will be backfilled with atleast 1 meter of top soil cover after ensuring that hazardous waste is removed.
- Water based mud and drill cuttings will be disposed onsite by either allowing the mud / liquid waste to evaporate (to the extent possible) or treated / disposed of through waste contractor and then burying the dry drill cuttings encapsulated within the HDPE liner and backfilling with at least 1 meter of top soil cover.
- In case the drilling mud pit is an agricultural land, the drilling mud should be disposed of as per the applicable and relevant guidelines of LSO 29 B.
- Remove wastewater from septic tank and restore it after dismantling in place (top roof and atleast 1 meter wall or more if easily possible) and backfilling with atleast 1 meter of native soil cover. Dispose wastewater in an environmentally friendly manner.
- Restore soak pit after removal of wastewater & cover and backfilling it with atleast 1 meter of native soil cover. Dispose wastewater in an environmentally friendly manner.

After laying of Feeder Line / Pipeline

After the pipeline has been laid, the trench is backfilled with the excavated soil to cover the pipeline. The original soil goes back into the trench in the reverse order of how it was removed. This means the subsoil goes in first to keep the layering and composition the same as it was originally. Keeping great caution to ensure no damage occurs to the pipeline or the coating. Once the subsoil fills in the trench, the topsoil goes back on top.

2.9 Noise, Air Emissions, Effluents and Solid Waste Generation

This section provides the details of noise, air emissions, effluents and solid waste generated during drilling of development well, laying of their associated feeder line.

2.9.1 Noise

Noise is likely to be generated by the following construction and drilling activities:

a. Well Site Construction / Laying of Feeder line Phase

- Operations of generator at the base camp
- Movement of vehicles
- Construction works along access tracks, feeder line route and well site and rig camp
- Use of machinery for excavation of trench for feeder line laying

b. Drilling Phase

Vehicular traffic on the access road;

- The operation of drilling rig at the well site; and
- The operation of diesel generators and other equipment at the well site and the camp.

Since the generators will operate throughout night, appropriate noise reduction measures will be implemented, if required. The proponent will ensure the compliance of PEQS standards for Noise.

2.9.2 Emissions

Emissions produced during the proposed activities will consist of the following:

- Dust emissions during well site construction / feeder line laying – these will be controlled by proper water sprinkling and good construction management
- Dust emissions from vehicular traffic on the tracks – these will be controlled by avoiding off road travel, observing speed limits and track maintenance;
- Emissions from vehicles and generators – these will be controlled by proper maintenance and ensuring PEQS compliance.
- Emissions from flares during testing and any abnormal drilling operations – the effects of these emissions will be controlled by maintaining a safe distance from communities and adhering to emergency response plan.

2.9.3 Effluents and Solid Waste

All efforts will be made to minimize the waste generated while the project is in progress. The main types of waste that will be generated are:

- Drill cuttings and mud;
- Formation fluids;
- Fuels, oils, and chemicals;
- Garage waste;
- Sewage;
- Camp waste;
- Medical waste;

Estimated Quantity of solid waste and effluent during project phases	
Well Site Construction Phase	Approx. 50 kg per month (includes hazardous & non-hazardous both).
Feeder line / Pipeline Construction Phase	Approx. 150 kg per months per feeder line / pipeline
Drilling Phase	100 kg / day (each well) excluding drill cuttings.
Wastewater generated (during drilling phase)	400 bbl/day (for treatment purpose)

2.10 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 of 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 should be adopted, with a preference for reduction, reuse and recycling options.

These methods would apply to 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 2.6: List of Different Type of Waste and Disposal Options

Type of Waste	Description	Disposal Options
Food Waste (decayable 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 have 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 Punjab EPA approved waste contractor. - Expired drugs to be taken by contractor for disposal/incineration through Punjab EPA approved waste contractor.
Workshop Waste	Used oil, ferrous/non-ferrous materials, batteries,	- Handover vehicle related waste (excluding hazardous waste) to local contractors for recycling⁷ - Used lubricating oil shall either be provided to OGRA reclamation license holder lubricant reclamation plant for

⁷ PPEPCA Sectoral for Upstream Petroleum Sector – Onshore Volume 2 of 2

Table 2.6: List of Different Type of Waste and Disposal Options

Type of Waste	Description	Disposal Options
		- reclamation or disposed off through PEPA approved waste contractor. - Batteries to be hauled away by contractor for recycling
Demolition Waste	Dirt, concrete, plaster, plumbing, heating and electrical parts	- Dirt, concrete and plaster to be buried at site; and - Plumbing, heating and electrical parts to be hauled away by contractor for recycling
Liquid Waste	Wastewater from kitchen and washing areas, sewerage	All liquid wastes from kitchen, washing areas and sewage are collected and disposed of into septic tank system
Drilling waste	Drill cuttings, excess and spent drilling mud, rig wash water	- WBM cuttings will be stored in a lined pit on the site. - Water based mud and drill cuttings will be disposed onsite by either allowing the mud / liquid to evaporate (to the extent possible) or wastewater will be treated / disposed off through waste contractor and then burying the dry drill cuttings encapsulated within the HDPE liner and backfilling with atleast 1 meter of top soil cover. - In case the drilling mud pit is in an agricultural land, the drilling mud should be disposed of as per the relevant guidelines of LSO 29 B.
Well testing waste, well completion waste, testing fluid / brine solution / acid	Completion fluid (completion brine, crude oil and formation / produced water)	Completion brine is collected in flare pit (made of brick masonry with plastered) for disposal by natural evaporation. Whereas crude oil is collected in storage tanks then transported to nearby operating facility for further processing at Plant. Moreover, formation water, produced during testing, drained into pit provided with impermeable membrane lining for disposal by evaporation.
	Produced Water during hydrocarbon production	- Oil & gas reservoirs contain water known as produced water or formation water produced during hydrocarbon production. Options may include: - Option-1: Injection into the reservoir to enhance oil recovery, - Option -2: Disposal into a dedicated disposal well drilled to a suitable porous subsurface geological formation. - Option-3: Produced water is collected in lined evaporation pits, where the

Table 2.6: List of Different Type of Waste and Disposal Options

Type of Waste	Description	Disposal Options
		water is evaporated (natural or induced) salt cakes (if any) left behind is disposed through PEPA approved waste contractor. Option-4: Produced water treatment and then discharges to surface waters or to land. -This option is considered only if there is no other option available. Discharged produced water should be treated to meet the PEQS.
	Hydrotesting water	Hydrostatic testing of equipment and pipelines involves pressure testing with water to detect leaks and verify equipment and pipeline integrity. The wastewater shall be collected in lined pit for natural evaporation or discharged into the nearby nallah after taking approval from relevant authority / TMA and ensuring wastewater meets PEQS limits for effluent.
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 bunded area lined with an impermeable base. - Finally, the contaminated soil will be disposed of through EPA certified waste contractor.

Wastewater from Feeder line Hydrotesting

Hydrostatic testing of pipelines involves pressure testing with water to detect leaks and verify equipment and pipeline integrity. Approximately 31,850 US gallons of water (approximately 4,900 US Gallon/km considering 06-inch inner diameter pipeline) would be used for hydrotesting of the feeder line. The wastewater shall be collected in lined pit for natural evaporation or discharged into the nearby nullah, only if wastewater is meeting PEQS limits for effluent and after taking approval from relevant authority / TMA.

2.11 General Requirements of Drilling

2.11.1 Power Generation

The drilling process require movement of drill bit through draws works which requires power. The power requirement of the drilling bid will be met by using the diesel generators. The exhaust stack of the diesel generator is likely to vent the emissions.

2.11.2 Chemical Storage

The drilling rig will have normal storage facilities for fuel oil, required chemicals and the necessary tubular and equipment. The storage places will be clearly marked with safe operating facilities and practices.

2.12 Project Alternatives

2.12.1 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 2.7: 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.

Given the benefits to the economy of Pakistan in case of a successful production of oil/gas, the no-project option is not considered a desirable option. Success in producing hydrocarbon 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.

2.12.2 Alternatives with respect to Project Location

Many national and multinational companies, in addition to public sector organizations, are actively engaged in oil and gas exploration and production activities in different concession areas and exploration sites in Pakistan. The site for oil and gas reserve development is

chosen after extensive geological and land surveying, and not every concession area necessarily shows promise. 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.

2.12.3 Alternative with respect to project schedule

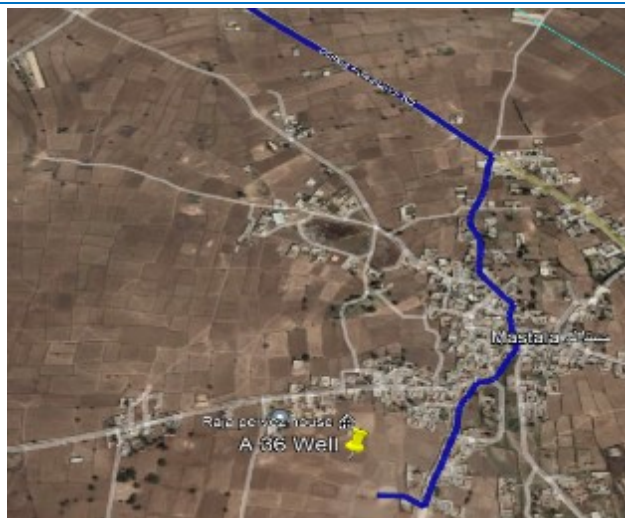
The timing of the operation can be changed on finding of significant impacts associated with the timing of the operation e.g., disturbance to wildlife species during their breeding season. The proponent will carefully schedule the project activities with the ultimate objective to create least possible disturbance to the environment and the communities.

2.12.4 Alternatives to Ancillary Operations

The ancillary operations like setting up of camp sites, camp operation etc. are necessary for conducting the operations and are assessed to have no significant impacts on the environment if the suggested mitigation measures are adopted and EMP is implemented in true sense.

2.13 Road Access

The project site can be accessed from N5 National High track from Islamabad to Gujar Khan. While other small roads Sakko to Gujar khan, Daultala-Rawalpindi Road are the main roads to reach the proposed project area.



Access to wellsite A36



Access to wellsite A37



Access to wellsite A38

Figure 2.5: Road access maps to project area

Inside the Adhi ML, most of the access roads/track are dirt road or gravel topped road. Inside the towns, the access roads are mostly dirt track, however, cemented at some places too.



Unpaved access track in the Adhi ML



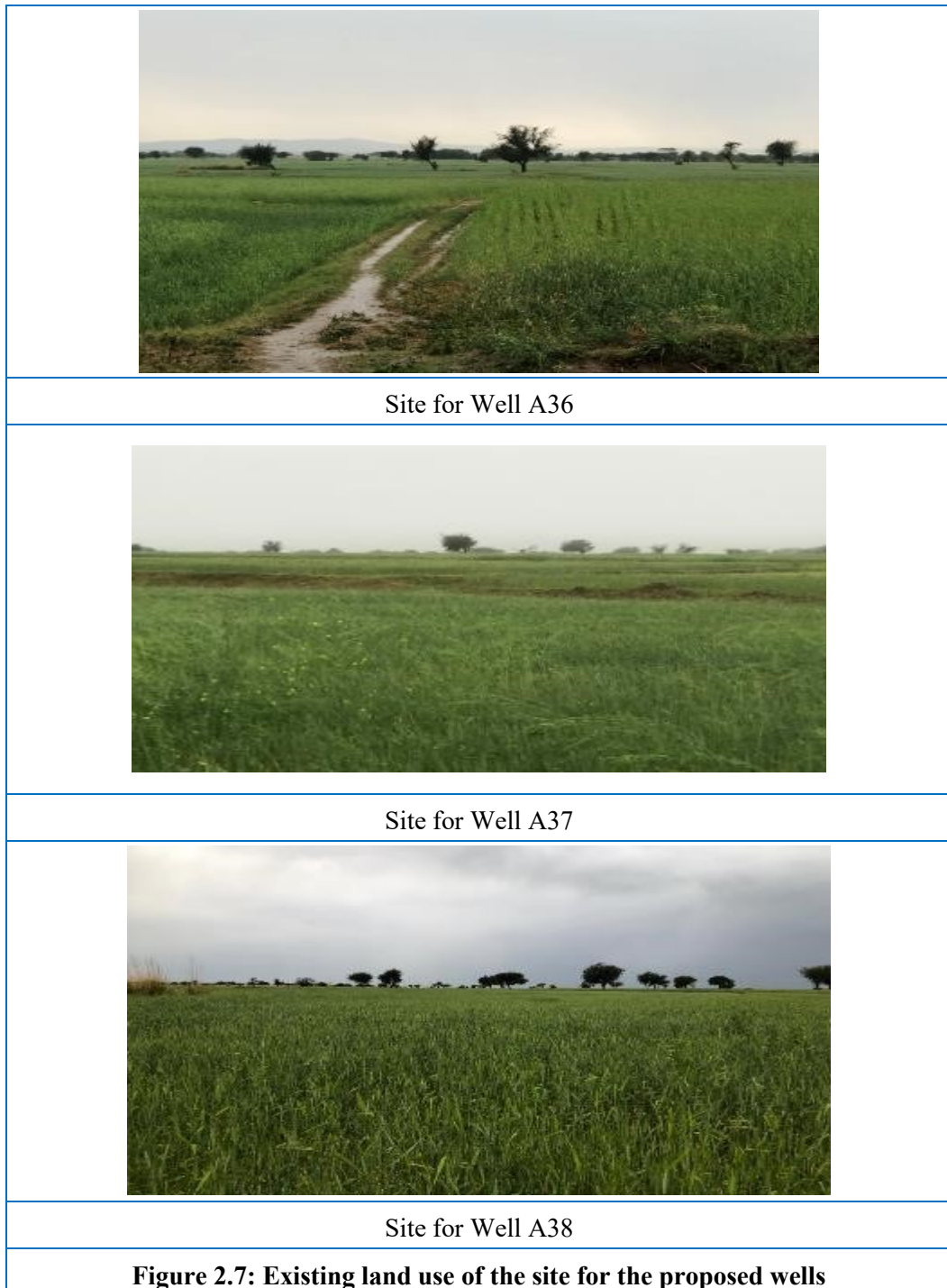
Paved road inside Adhi ML

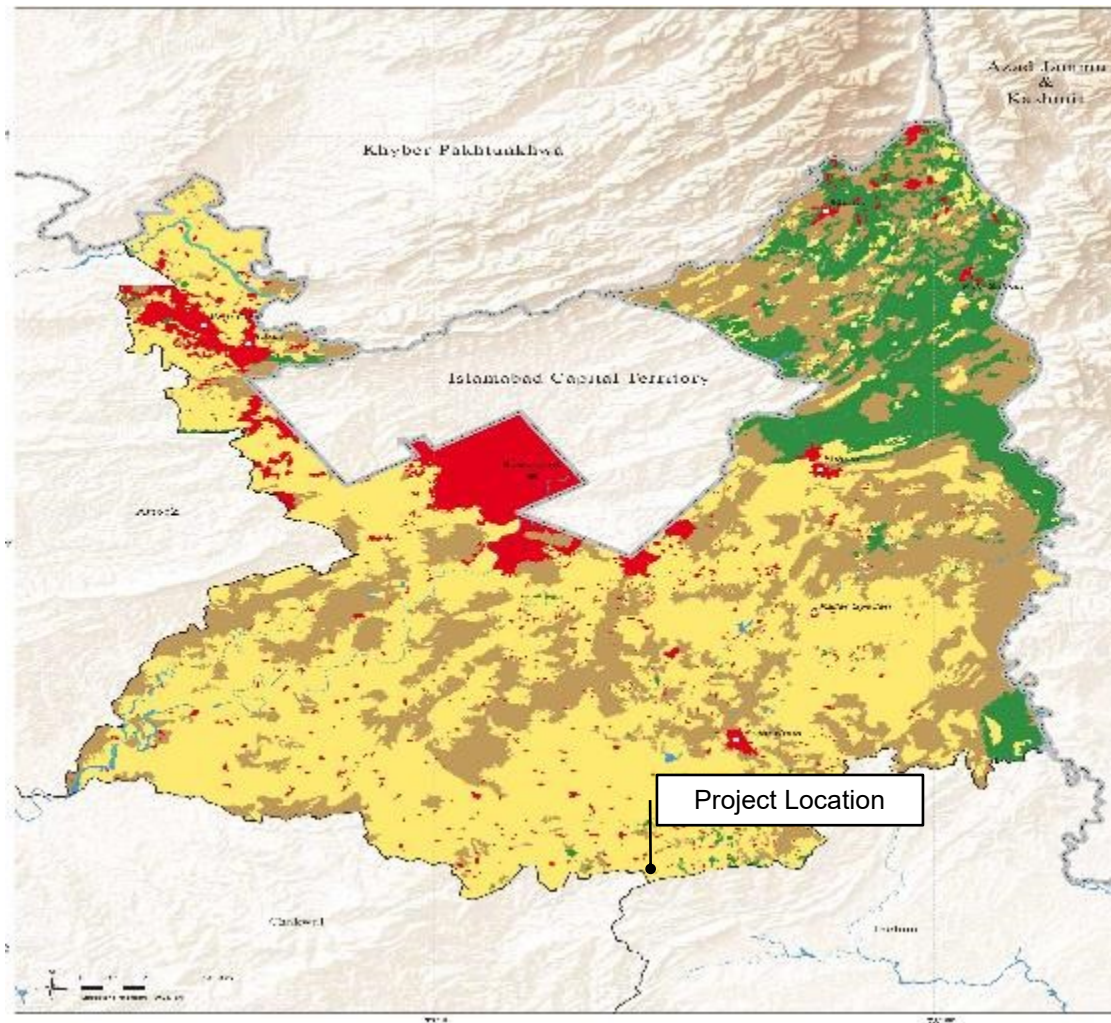
Figure 2.6: Access roads inside Adhi ML

2.14 Vegetation Feature of the project area

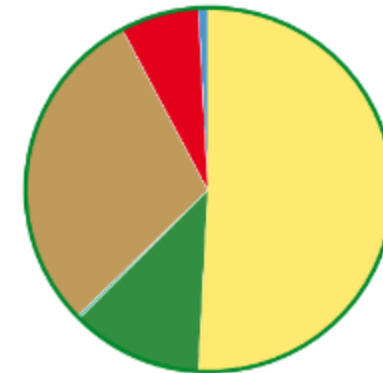
The Adhi Mining Lease is located in District Chakwal and Rawalpindi. The project area is located in Potohar plateau and comprises mainly of semi-urban area, agricultural fields and small hills in Rawalpindi District. The project area is mainly rain fed agricultural area with mainly hilly terrain lying at the beginning of the Potohar plateau, however, no forest land is located within the project area. The land type is semi-arid, semi humid. The vegetation and agriculture are mainly dependent of rain. Common vegetation includes trees of Bari, Sufaيدا, Sheesham, and large variety of grass, shrubs and herbs as the dominant vegetation.

The vegetation cover of the proposed well sites are agricultural fields surrounded with large trees. Similarly, large part of the proposed routes for the feeder lines is also covered with vegetation which belongs to family of grass and shrubs. There is no protected forest or wildlife area near the proposed project areas or inside the Adhi Mining Lease. Tree cutting and clearing of dense patches of vegetation will be kept to minimum possible during land clearing for campsite and access track by taking offsets. Vegetation and crops removal will be minimized by adopting best industrial practices and using offset.





LAND COVER IN PERCENTAGE



DISTRIBUTION OF LAND COVER IN THE DISTRICT

Legend	km ²	%
Orchards	0.54	0.0
Crop Irrigated	0.00	0.0
Crop Marginal and Irrigated Saline	0.00	0.0
Crop in Flood Plain	0.01	0.0
Crop Rainfed	2,719.17	51.0
Forest - Natural Trees and Mangroves	618.30	11.6
Natural Vegetation in Wet Areas	10.20	0.2
Range Lands - Natural Shrubs and Herbs	1,574.04	29.5
Built-up	366.30	6.9
Bare Areas	0.00	0.0
Bare Areas with Sparse Natural Vegetation	0.00	0.0
Wet Areas	39.26	0.7
Snow and Glaciers	0.00	0.0
Grand Total	5,327.83	

Figure 2.9: Vegetation cover map of the district Rawalpindi

2.15 Land use of the project area

The project area is semi-arid, semi-humid land with gentle undulation. The project area has considerable agricultural area. There are standing crops at the wellsites. The land is also covered with natural vegetation belonging to grass, shrubs and herbs and trees such as Sheesham, Sufaida, Phulai, Kikar and other common to the region. There is no river or irrigation canal network in the Adhi Mining Lease area therefore, the agriculture and the natural vegetation are dependent on rainwater and groundwater.

Land use of the proposed well sites and feeder line includes range land, agriculture land, residential settlements and oil and gas wells and production facilities. The settlements in the project area are in form of village / small town with infrastructure of semi-urban / semi-rural. These settlements are situated far apart. Some of the prominent village / small town in the Adhi Mining Lease are Mastala, Lohasar, Dhok Khakkar, Khesiah and Domali.

Table 2.8: Land Utilization

Districts	Reported Area(x1000 acres)	Cultivated Area (x1000 acres)	Un-Cultivated Area (x1000 acres)		
			Cultivable Waste	Forest	Not-Available for Cultivation
Rawalpindi	525	229	83	69	144

Source: Punjab Bureau of Statistics (Development Statistics- 2020)

2.16 Site Suitability

Adhi Block has been granted to PPL by Government of Pakistan. The Adhi Mining Lease covers an area of 212.86 Sq. km and is located in District Rawalpindi and District Chakwal of Punjab. The proposed development wells and their associated feeder lines are in the Tehsil Gujar Khan district Rawalpindi of Punjab province.

The project site is situated in the middle part of the Adhi block. The project area is semi-arid, moderately humid, rain fed agricultural land.

The proposed project sites are not located inside or near any protected area, reserved forest or ecologically sensitive area.

2.17 Cost & Magnitude of Project Operation

The magnitude of the project involves drilling of 03 development Wells and laying of their associated underground feeder lines of combined length of approximately 6.5 km.

Estimated cost of the project activity is 55 million USD for three wells and three feeder-lines.

2.18 Government Approvals

PPL has been granted the Adhi Mining Lease by Government of Pakistan. The mining lease agreement is attached in annexure.

3.0 POLICY, LEGAL & ADMINISTRATIVE FRAMEWORK

This section describes the current legal responsibilities of the Project proponent in the context of the environment and sustainable development, and the institutions that exist in the country that may influence the environmental management of the proposed Project.

Prior to the 18th Amendment to the Constitution of Pakistan in 2010, the legislative powers were distributed between the federal and provincial governments through two 'lists' attached to the Constitution as Schedules. The Federal list covered the subjects over which the federal government had exclusive legislative power, while the 'Concurrent List' contained subjects regarding which both the federal and provincial governments could enact laws. The subject of 'environmental pollution and ecology' was included in the Concurrent List and hence allowed both the national and provincial governments to enact laws on the subject. However, as a result of the 18th Amendment this subject is now in the exclusive domain of the provincial government.

As a result, the Ministry of Environment at the federal level has been abolished. Its functions related to the national environmental management have been transferred to the provinces. The international obligations in the context of environment will be managed by the Ministry of Climate Change.

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:

- National Environmental Laws & Legislations;
- Provincial Environmental Laws & Legislations;
- Environmental and Social Guidelines;
- International Treaties and Conventions;
- Institutional Setup for Environmental Management; and
- Environmental Health and Safety Policy of PPL.

PPL shall guarantee that the operation is conducted to conform to PPL's corporate 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;
- Execute all operations for disposal of all materials (hazardous and non-hazardous) safely and without causing any health, environment and safety risk
- Adopt appropriate industry and corporate standards where adequate law 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.

3.1 PPL's Policy and Commitment to Quality, Health, Safety and Environment⁸

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 business activities.

PPL 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.
- 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.

3.2 National Legislation & Guidelines

3.2.1 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.

⁸ PPL Policy, 2021

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 sectoral and cross sectoral 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

3.2.2 The Biodiversity Action Plan

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.

3.2.3 Hazardous Substances Rules, 2003

These Rules were notified in 2003 to stream line procedures for issuance of licenses to industries/ businesses that generate hazardous substance waste and devises them methods for the removal of hazardous wastes in an environmentally 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.

3.2.4 Self- Monitoring & Reporting Rules, 2001

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.

3.2.5 The Forest Act, 1927

The Act is applicable to all regions of Pakistan. It includes procedures for constituting and managing various types of forests, such as reversed 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 penalties of any infringement of the rules. The project is not a part of or near any protected or reserved forest, mentioned in Forest Act, 1927.

3.2.6 Pakistan Penal Code, 1860

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.

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.

3.2.7 Antiquities Act, 1975

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 (if any) and will also immediately stop and report the concerned department if during the excavation process any such discovery take place in future.

3.2.8 Land Acquisition Act, 1894

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.

Land acquisition and distribution of compensation will be carried out based on prevailing market rate and in accordance with the PPL compensation procedures ensuring transparency. Land can be acquired privately through direct negotiation with landowners and can also be acquired through Govt under the provision of Section 4 & 35 of Land Acquisition Act 1894. In case of private negotiations, rent and crop compensation is determined mutually between company and landowners and recorded in formal land lease agreement. In case of later, Government Award is pronounced through Deputy Commissioner office detailing the area to be acquired along with rate of rent of crop compensation for necessary acquisition & possession of land for national interest.

The feeder lines will be laid along the roadside. Feeder lines will not pass through any settlement or structure.

3.2.9 The Canal and Drainage Act, 1873

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.

There is no irrigation canal/channel at the project site. There are rainwater channels/water course in the Adhi ML since the area is undulating.

3.2.10 The Pakistan Environmental Policy, 2005⁹

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

⁹The Pakistan Environmental Policy, 2005, Govt. of Pakistan, Ministry of Environment

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.

3.2.11 Mines Act, 1923¹⁰

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.

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.

3.2.12 National Mineral Policy, 2013¹¹

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

¹⁰Mines Act, 1923, (IV of 1923)

¹¹National Mineral Policy, 2013

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.

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.

3.3 National Legislation on Oil and Gas Exploration and Production

3.3.1 The Petroleum Act, 1934¹²

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

3.3.2 The Regulation of Mines and Oilfields and Mineral Development (Government Control) Act, 1978

The Regulations of Mines and Oilfields and Mineral Development (Government Control) Act 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.

3.3.3 The Model Petroleum Concession Agreement, 2013

As for safety, the Model Petroleum Concession Agreement (2013) implementing the 2013 Exploration and Production Rules, specifically required observance of the Oil and Gas (Safety in Drilling and Production) Regulation, 1974. The penalties imposed in the 2013 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.

Petroleum Exploration and Production Policy, 2012

¹²The Petroleum Act, 1934

The purpose of this Petroleum Exploration and Production 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 through 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 security 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.

The last policy was revised in 2012 which has made several useful revisions to the tax and pricing regime from the position contemplated in the previous policy.

3.3.4 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 notified The Pakistan Petroleum (Exploration And Production) Rules, 2001.

In these rules, and in every i.e. permit for Reconnaissance Survey, license for Petroleum Exploration and lease for Petroleum Development and Production issued here under, unless there is anything repugnant in the subject or context, in keeping Accounts, Records, Inspection and Reports.

3.3.5 Petroleum Exploration and Production Policy, 2012

The purpose of this Petroleum Exploration and Production policy, 2012 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 through 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 security 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.

3.3.6 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 principal 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.

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

The 1974 Safety Regulations required 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.

3.3.8 Sectorial 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.

3.4 Provincial Environmental Laws and relevant Local Legislations

3.4.1 Punjab Environmental Protection Act, 1997 (Amended 2012 and 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:

Prevention of polluting discharges and Emissions: Section 11 of the Punjab Environmental Protection, 2012 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.

Environmental Quality Standards: The Act provides for fixing the National Environment Quality Standards (NEQS) and their strict enforcement. For default, the Government has been empowered to levy a pollution charge.

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.

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.

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.

3.4.2 Punjab Environmental Protection Review of IEE and EIA Regulations, 2022

The IEE-EIA Regulations 2022 provide the necessary details on the preparation, submission, and review of the IEE and the EIA.

Categorization of projects for IEE and EIA is one of the main components of the IEE/ EIA Regulations 2022. Projects have been classified on the basis of expected degree of adverse environmental impact. Project types listed in Schedule II of the regulations are designated as potentially seriously damaging to the environment and require an EIA, whereas those listed in Schedule I as having potentially less adverse effects and require an IEE.

In accordance of the IEE-EIA Regulations 2022 the proposed project 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.

3.4.3 Punjab Environmental Quality Standards, 2016

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.

Table 3.1: 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 (NO₂)	Annual average	40 µg/m ³	Gas phase Chemiluminescence
	24 hours **	80 µg/m ³	
Ozone (O₃)	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 PM₁₀	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	ASS 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 measurement 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 No 3.2: PEQS for municipal and liquid industrial effluents

No	Parameter	Into in land water	In sewage treatment
1	Temperature or temperature increase	≤3 C	≤3 C
2	pH value (H ⁺)	6-9	6-9
3	Biochemical oxygen demand (BOD ₅) 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 3.3: PEQS for Industrial Gaseous Emissions

No	Parameter	Source of emission	Standard
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 sulphide (H ₂ S)	Any	10
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 3.4: Sulfur dioxide background levels 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 3.5: Standards for motor vehicle exhaust and noise (for in-use vehicles)

No.	Parameter	Standards (maximum permissible 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	

3.4.4 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 Executing department / Adhi Asset of the proposed activities will be responsible to ensure that the proposed activities in Adhi Mining Lease are undertaken in accordance with the environmental management requirements and recommendations given in this EIA as well as the conditions given in the approval which will be issued for this project.

3.4.5 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 development and production 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.

3.4.6 The Punjab Wildlife (Protection, Preservation, Conservation, & Management) Act, 1974

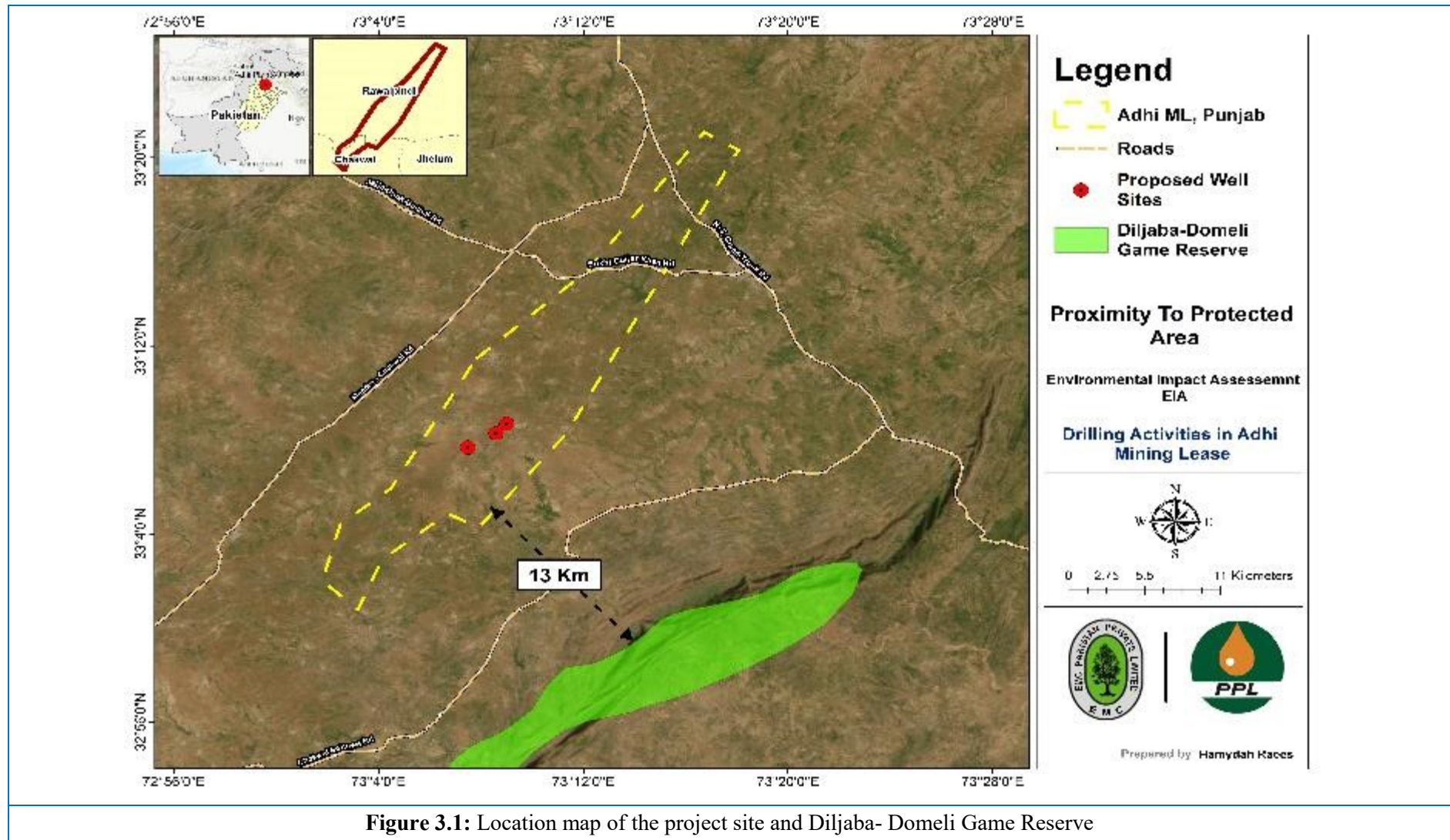
The Punjab Wildlife (Protection, Preservation, Conservation, and Management) Act, 1974 caters to the protection of wildlife resources in the province. Besides ensuring an environment conducive for their rearing and livelihood, the Act also regulates hunting, poaching, possession, and trade in birds and 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:

- Ban on hunting of protected animals unless permitted otherwise in accordance with the requirements of the Act.
- 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.
- Prohibition of any activity (hunting and shooting etc. of a wild animal) in the game reserve, except under a special permit.
- 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.

Diljabba-Domeli Game reserve is a game reserve situated in the east of the Adhi Mining Lease at a distance of 13 Km. The location of project units (wellsite, feeder line etc.) is adequately away from the Game Reserve. Therefore, Drilling and Feeder line/pipeline laying activities will not have any impacts on this Game Reserve.



3.5 Environmental and Social Guidelines

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

3.5.1 Policy & Procedures for the Filing, Review and Approval of Environmental Assessments, 2000

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.

3.5.2 Guidelines for Preparation & Review of Environmental Reports

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.

3.5.3 Guidelines for Operational Health, Safety and Environmental Management, 1996

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

3.5.4 Guidelines of the American Petroleum Institute (API) and Louisiana State Wide Order 29-B (LSO 29-B)

The American Petroleum Institute (API) guidelines for disposal of oil and gas exploration and production wastes and the Louisiana State Wide 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 standards also provide guidelines for closure of pits used for storage of exploration and production wastes in an environmentally friendly. 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.

3.6 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.

3.7 International Treaties

International environmental treaties and conventions, endorsed by Pakistan that are applicable to the proposed project, “Drilling activities in Adhi ML” are as mentioned below:

3.7.1 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 CO₂, methane (CH₄), and nitrous oxide (N₂O) by 2008-2012 and Pakistan has signed and acceded to the agreement.

3.7.2 Waste and Pollution

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

3.7.3 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 their sustainable use.

3.7.4 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.

3.7.5 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.

3.7.6 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).

4.0 ENVIRONMENTAL & SOCIAL BASELINE

4.1 General

The physical, biological and socioeconomic environment of the Adhi Mining Lease is described with respect to watershed, air shed, geology, soil characteristics, seismicity, land cover, flora and fauna, land use and source of income of the locals. An air shed is a part of the atmosphere that behaves in a coherent way with respect to the dispersion of emissions. The watershed of an area is the drainage basin or catchment of all the water that falls in that area in the form precipitation. The watershed consists of surface water-lakes, streams, reservoirs, and wetlands--and all the underlying groundwater. The terrestrial environment is described by its geology, geomorphology, wildlife habitat, land use, vegetation and soil characteristics in terms of stability and seismicity. Description of the socioeconomic environment includes details of the area's population and households, education, health, water supply, agriculture, transport and communications, occupations and income.

4.1.1 The Aim of Baseline Study

This section provides a comprehensive profile of the surrounding environment of Adhi Mining Lease which includes district Rawalpindi where the drilling and feeder line laying activities are to be conducted by PPL.

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 proposed project team in defining the mitigation measures that would be required to minimize, if not eliminate, the negative impacts which are pointed out in this study.

4.1.1 Methodology

The baseline data collected in this section is based on data obtained from field visits, site surveys and assessment of the existing environmental conditions at site. The additional data is based on the literature review of secondary sources, past studies, research conducted in the areas, electronic and print media information, maps prepared by the Geological survey of Pakistan and Soil survey of Pakistan, District Census Reports (DCRs) and other information of districts and archives of the experts.

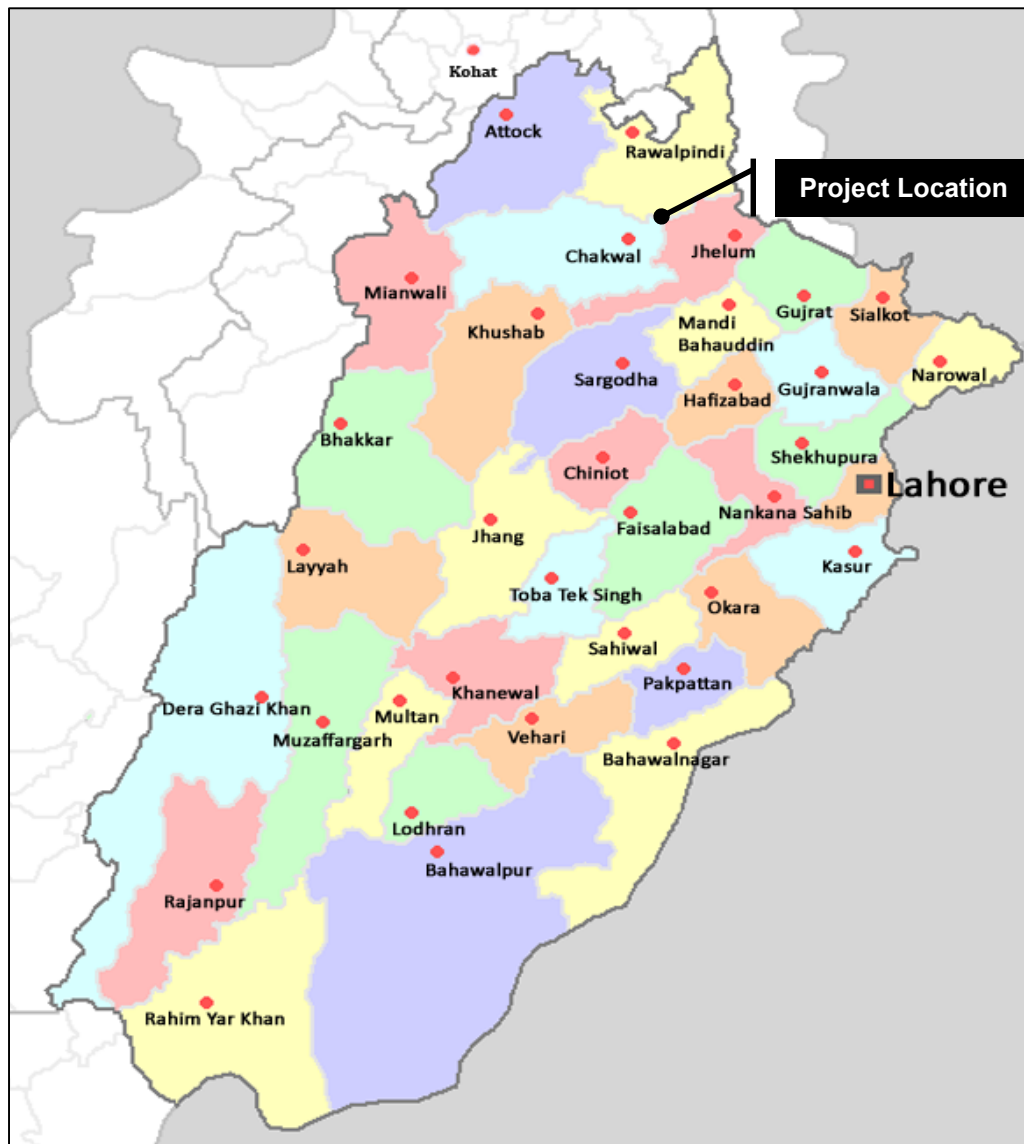
4.2 Physical Environment

4.2.1 Macro and Micro Environment of the Site

The Adhi Mining Lease is situated in the North East of district Chakwal and South, South-East of district Rawalpindi between 33°20'35.22"N, 73°17'29.75"E and 33° 1'19.58"N, 73° 2'15.23"E. Macro environment comprises of the proposed project however comprises of district Rawalpindi. While micro environment comprises of the proposed project area.

The project area is mainly rain fed agricultural area. No forest land is located within the proposed project area. Land use of the proposed well sites include agriculture land, residential settlements and oil and gas production facilities in Adhi Mining lease area. Some

of the residential settlements near the proposed well sites includes Dhoong, Mastala, Dhok Manna, Dhok Budhal Daultala and Adhi in Rawalpindi district.



4.2.2 Land Use

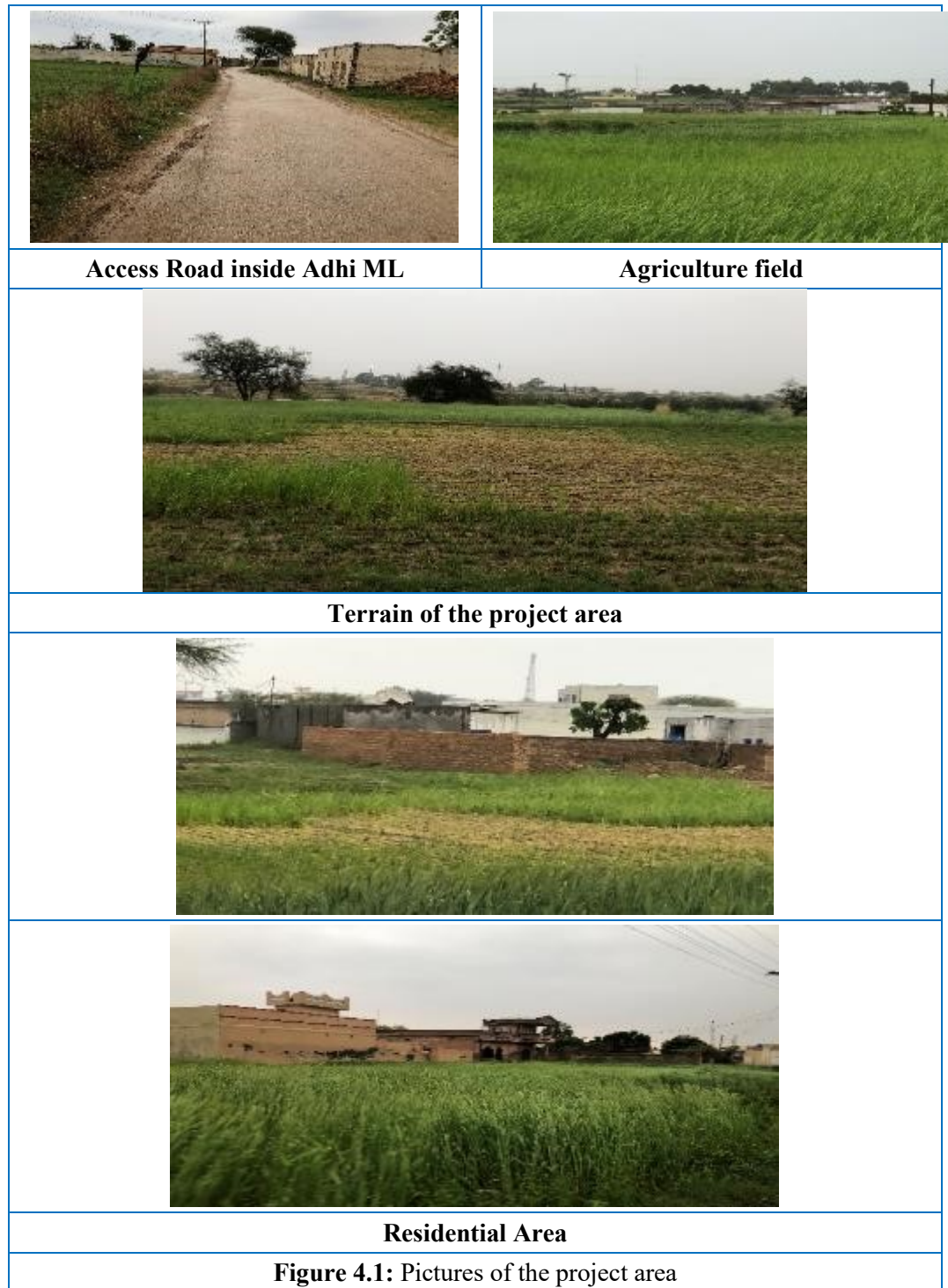
Proposed well sites and feeder lines are located in tehsil Gujar Khan of district Rawalpindi. The dominant land use of the proposed wellsite area and feeder lines is agriculture.

The Adhi Mining Lease area is located in eastern Potohar region. Land use patterns show agriculture as the primary land use, followed by built-up area. Proposed well site area is located in semi urbanized areas i.e., small towns, paved roads, oil and gas wells and plant, surrounded by agricultural fields and low-level built-up structures.

Project area lies in a rain-fed region with mainly hilly terrain lying at the east of the Potohar Plateau. A small Dam (Narali Dam) is located in Adhi Mining Lease area at a linear distance of approximately 2.5 km from the proposed well sites (A-37 wellsite).

Some of the prominent settlements near the proposed well sites includes Dhoong, Mastala, Dhok Manna, Dhok Budhal Daultala and Adhi in Rawalpindi area.

Rawalpindi district is mostly agricultural, with around 11% land coverage by heavy forests, mostly in the Murree Hills. Built up area is concentrated in the city of Rawalpindi and in parts of Taxila. Total area of the district is 5,327.83 Km², out of which 51% of the land covers the rain-fed crops, while 29.5% of the district is covered by rangelands.¹³



¹³ <http://www.fao.org/3/a-be839e.pdf>

4.2.3 Site Suitability

Adhi Mining Lease has been granted to PPL by Government of Pakistan. Total area of Adhi Mining Lease is 212.86 sq. km. The proposed well sites are not located in any protected and ecologically sensitive area.

Diljabba-Domeli Game reserve is a game reserve situated in the east of the Adhi Mining Lease at a distance of 13 Km, outside boundaries of Adhi Mining Lease. The location of project units (wellsite, feeder line etc.) is adequately away from the Game Reserve. Therefore, Drilling and Feeder line/pipeline laying activities will not have any impacts on this Game Reserve.

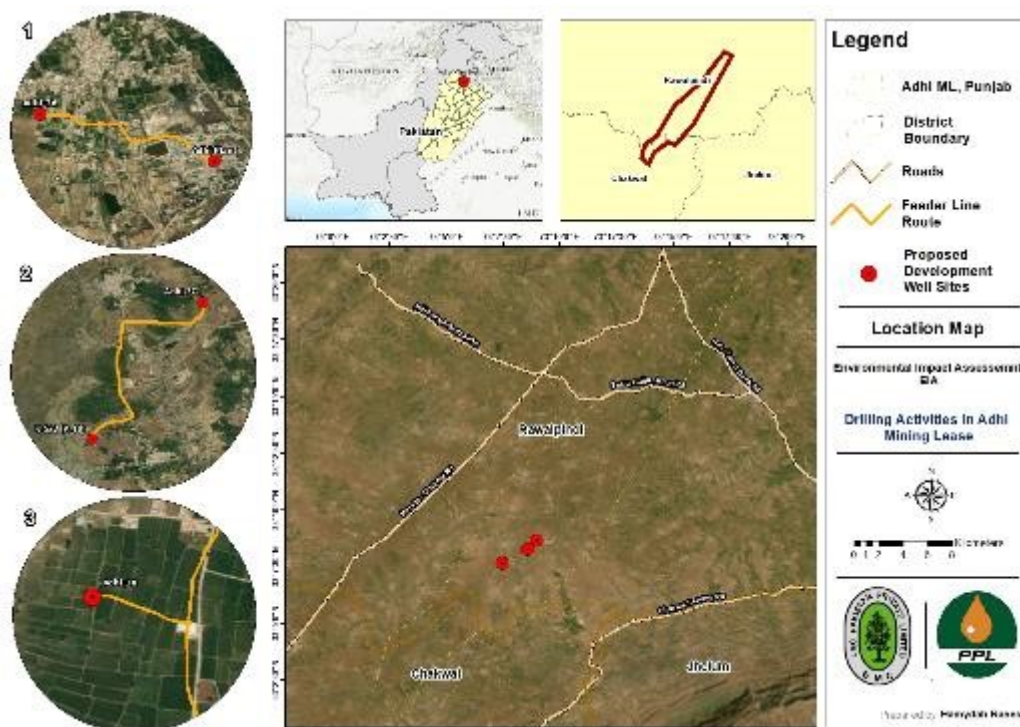


Figure 4.2: Proposed Project Location

4.2.4 Topography

District Rawalpindi falls in the Salt Range and Potohar Plateau region. Physical features of Rawalpindi exhibit a rich variety which is continental in dimensions. In Rawalpindi one can find Mountains, Forests. At the top rise the Murree hills. These hills form offshoot of the Himalayan system. They rise in spurs rising to heights between 2,133 to 2,438m. Rawalpindi is drained by the Soan River and its tributaries.

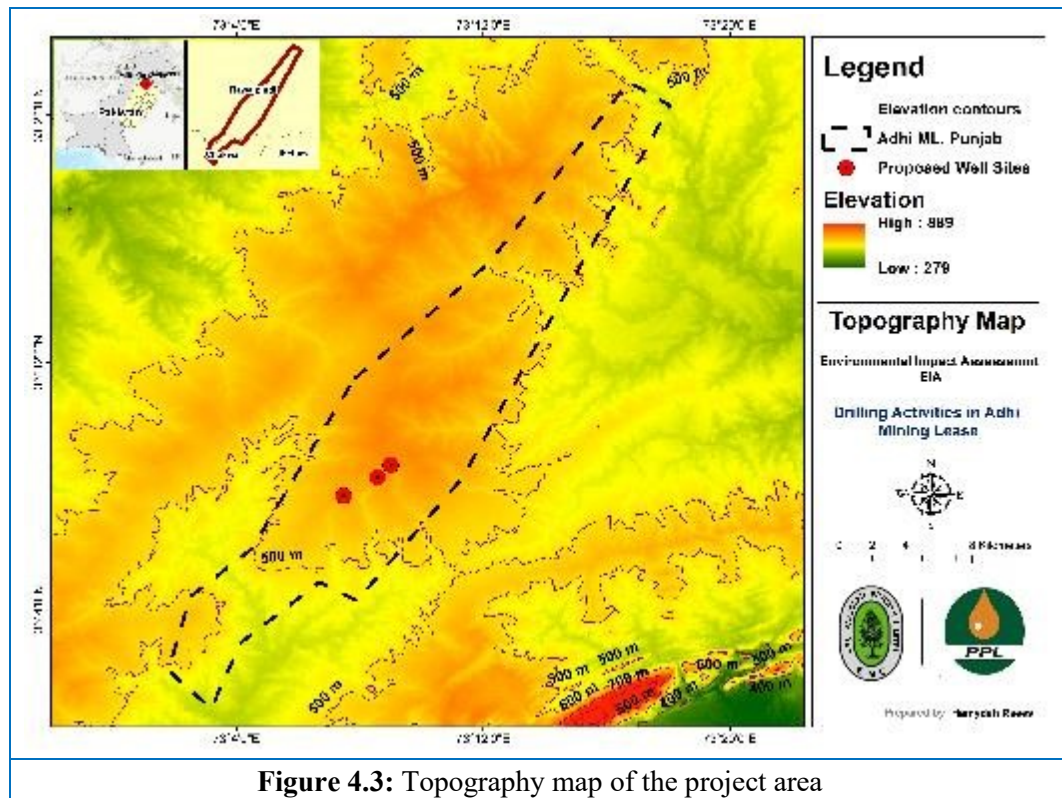


Figure 4.3: Topography map of the project area





Figure 4.3(b): Topography of the study area

4.2.5 Geology & Soils

Geologically, the Potohar region is composed of tertiary sand stone, limestone and alluvial deposits. These sand stones apparently belong to the sirmar and siwalik series of the sub-Himalayan system. Some of the strata yield excellent building material and are also quarried for road material. Lime stone is the character of the Margalla range, and this is the main cause of fertility of village's lies at its base. It is found, but in limited quantity, in Murree hills. The alluvial deposits occur chiefly in the lower portion of Kahuta Tehsils. In Rawalpindi Tehsils, lime stone crops out everywhere along with the low hills and in the plains kankar deposits are common. The pebble ridges, described as alluvial deposits in Kahuta hills are remarkable structural features of Kahuta and Rawalpindi Tehsils. Most of the forests in Rawalpindi are on pebbles ridges. Large isolated, boulders in many places seem to paint to a glacial epoch in the Potohar plain. Clay soils in Rawalpindi exhibit five distinct strata, from bottom to top:

1. Coarse pebbles with sand or clay;
2. An alluvial stratum deposited by and older river system in the Soan Basin;
3. Alluvial deposits of the present river system;
4. An air-borne top layer of silt or clay (loess); and
5. Conglomerate and loose gravel deposits.,

Soils:

Soils of this area have derived their parent material from underlying rocks like sandstone, limestone and shale. The soils are generally homogenized with weak structure and are calcareous. Unbroken lands of thick material like gravels, stones and boulders also exist in the area. Dry farm agriculture is the main land use in the area (Soil Survey of Pakistan, 1975).

The surface crust soils are composed of alluvial deposits consisting of silt, clay, sand, and loam. Clay and silt formations occur in discontinuous layers with limited lateral extent. The present soils consist of red soils and with decayed red rocks. Mostly the area consists of

Potwar Clays; Loess well-sorted grains of eolian silt held together in openwork pattern by films of clay and carbonate with low bulk density. Commonly reworked by sheet wash and small streams, so cross bedded channel fills of sand and gravel are present.

Piedmont bench underlain primarily by folded sandstones and shales of the Rawalpindi Group (Miocene). Although the relief of the piedmont area is generally low and dominated by extensive plains of windblown silt, the piedmont area also includes many ridges and valleys that have been buried by alluvial deposits from the hills.

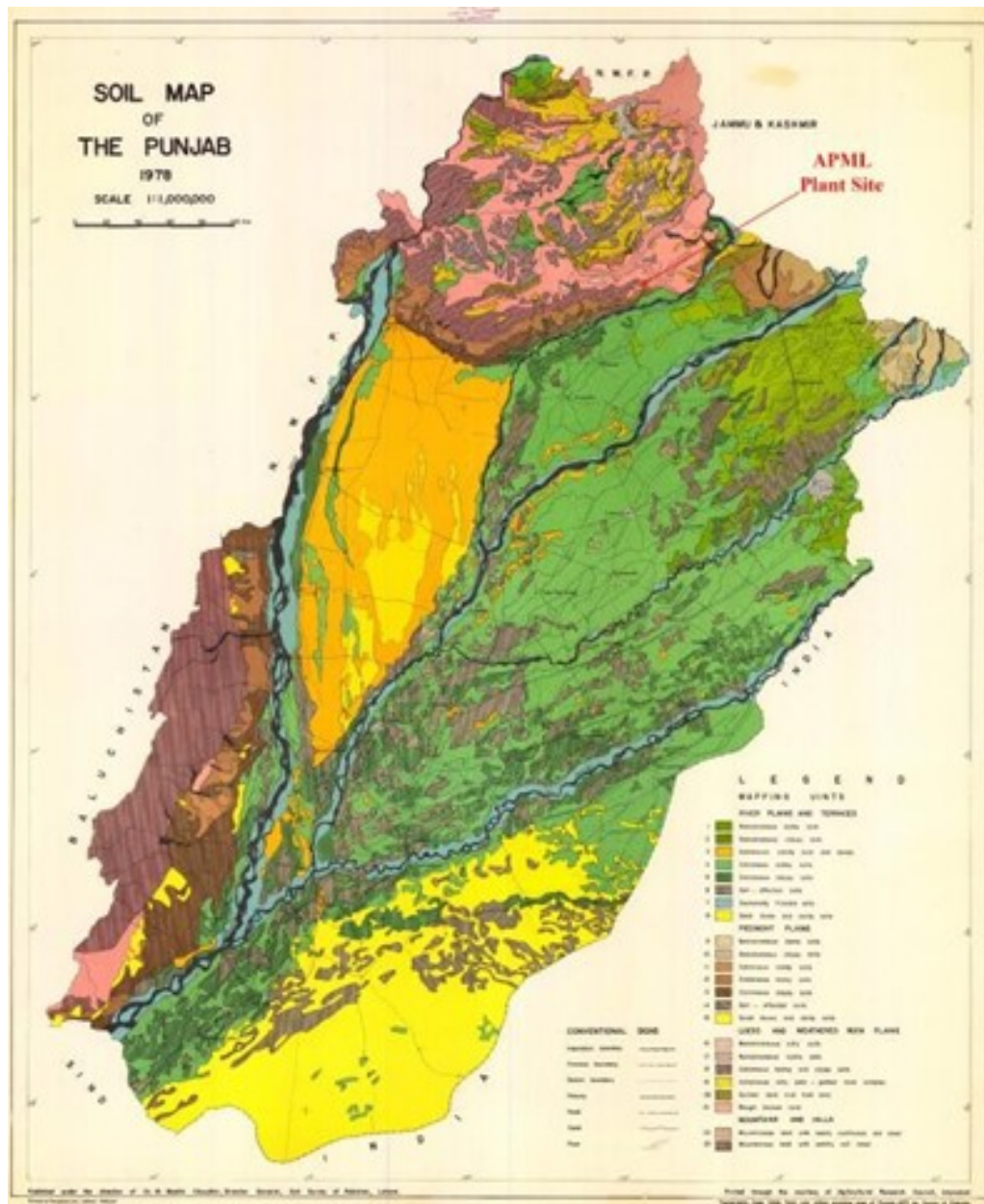


Figure 4.4: Soil type map of Punjab

4.2.6 Seismicity

The project area falls in Seismic Zone – 2B. Zone – 2 is the largest zone with respect to area, but it has the least seismic activity. The intensity of earthquake in the study area is moderate ranging from 5.1 - 6.0. It covers a considerable part of Punjab and Sindh including

the western areas of India. In the south it covers the coastal areas of Sindh where a few but significant historical earthquakes have been recorded; however, generally few earthquakes occur in this zone.

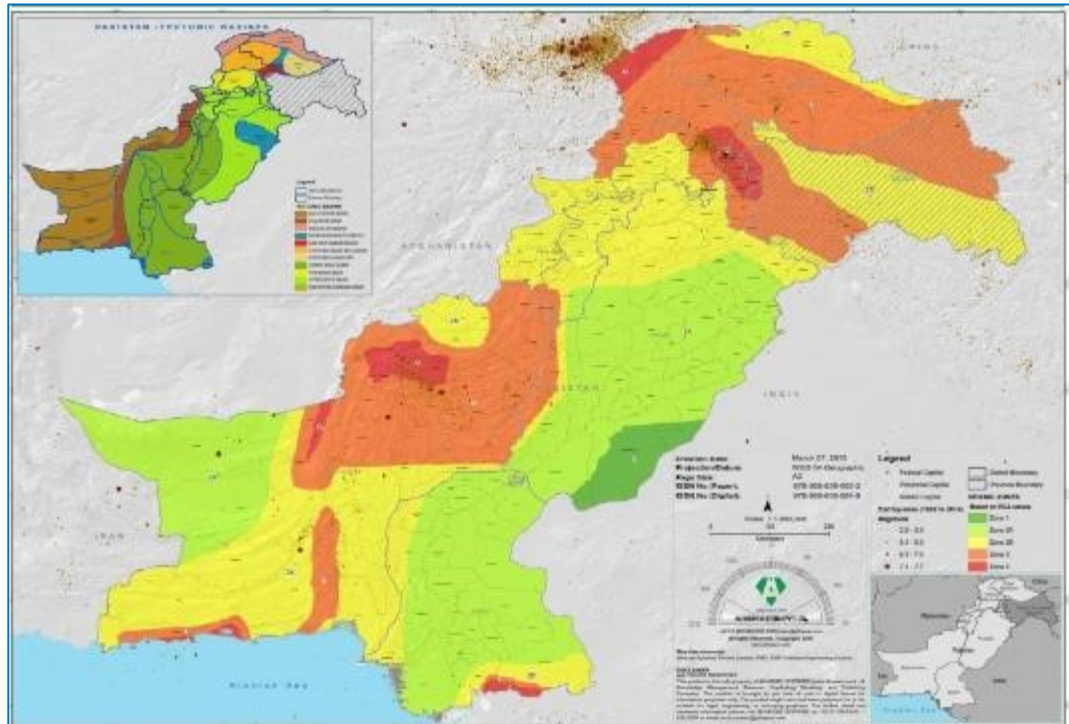


Figure 4.5: Seismic zoning map of Pakistan

4.2.7 Climate¹⁴

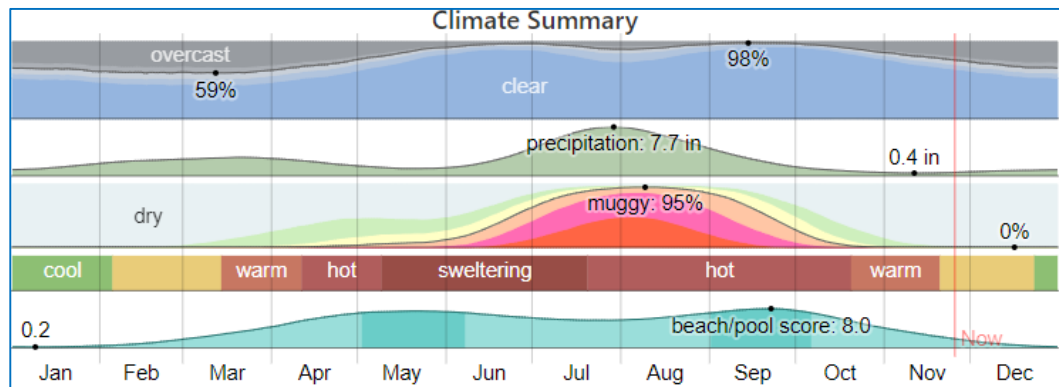
Most areas in Punjab experience extreme weather with foggy winters, often accompanied by rain. By mid-February the temperature begins to rise; springtime weather continues until mid-April, when the summer heat sets in. Climatically, Punjab has three major seasons:

- Hot weather (April to June) when temperature rises as high as 110 °F.
- Rainy season (July to September). Average rainfall annual ranges between 96 cm sub-mountain region and 46 cm in the plains.
- Cooler/ Foggy / mild weather (October to March). Temperature goes down as low as 40 °F.

Rawalpindi:

In Rawalpindi, the summers are short, sweltering, humid, wet, and clear and the winters are short, cold, and mostly clear. Over the course of the year, the temperature typically varies from 39°F to 101°F and is rarely below 34°F or above 108°F.

¹⁴ <https://weatherspark.com/>

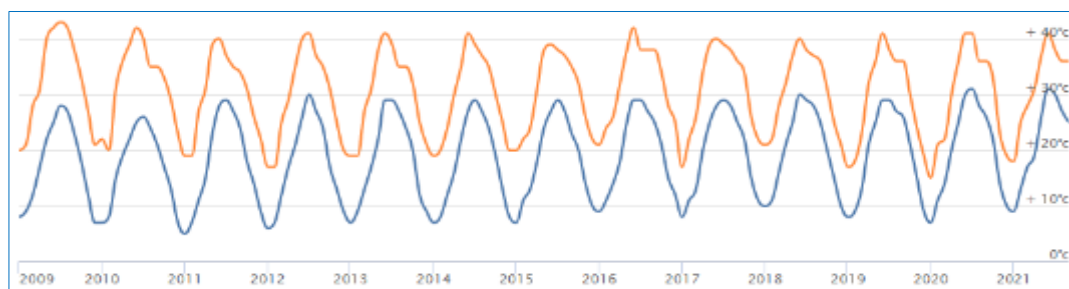


Climate Summary of Rawalpindi District

4.2.8 Temperature¹⁵

Rawalpindi:

The District of Rawalpindi has a varying climate due to a range in elevations across the district. The highest elevation is 9210 feet close in the Murree Hills, and lowest in the southern part of the district is 1100 feet. The climate in the hilly areas is subtropical highland climate, while low lying areas have a humid subtropical climate. The below graph shows the maximum and minimum temperature of District Rawalpindi from 2010-2021.



Temperature Details of District Rawalpindi from 2009-2019

4.2.9 Rainfall

Rawalpindi:

The annual rainfall ranges from about 1142 millimeters in the Murree Hills, to 913 millimeters in the plains¹⁶. The maximum precipitation noted was 252.8 mm in the month of August 2011.



Graphical representation of Avg. Precipitation in District Rawalpindi¹⁷

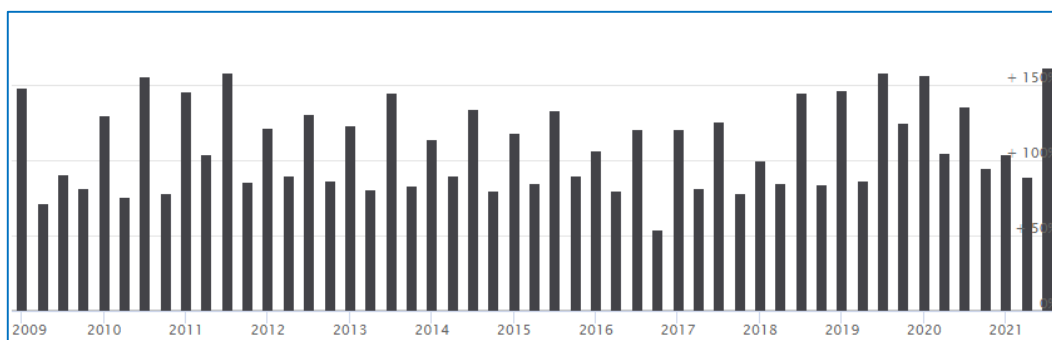
¹⁵ <https://www.worldweatheronline.com>

¹⁶ <http://documents1.worldbank.org/curated/en/916261483004112382/pdf/SFG2802-EA-P158099-Box396342B-PUBLIC-Disclosed-12-28-2016.pdf>

¹⁷ <https://www.worldweatheronline.com/>

4.2.10 Humidity

Mean Monthly Relative Humidity at District Rawalpindi (2010-2021) is shown in figure.

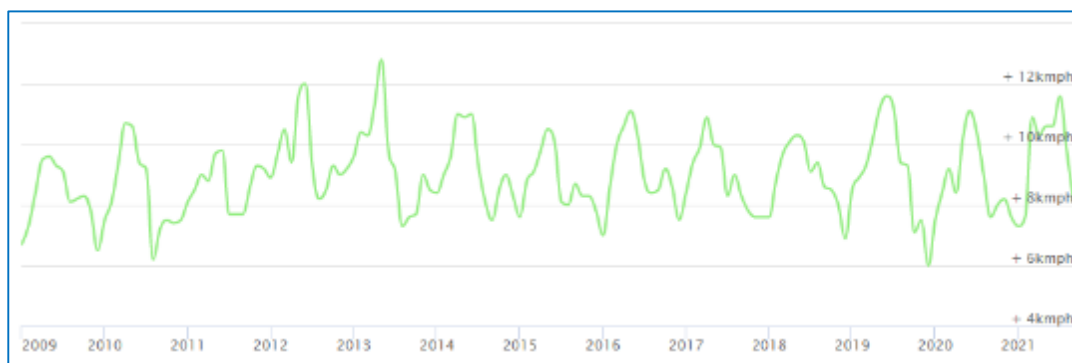


Graphical representation of Avg. Humidity in District Rawalpindi¹⁸

It may be observed from the Relative Humidity (RH) data presented in the above figure that RH remains high in months of January, February, August & September and in the remaining months humidity level is relatively low. The maximum humidity ratio was recorded 67% on August 2010.

4.2.11 Wind

The ten years' wind velocity record (2010-2021) of District Rawalpindi indicates that the velocity varies and ranges between 6 kmph to 12.8 kmph. The Following figure shows the average wind speed (Kmph).

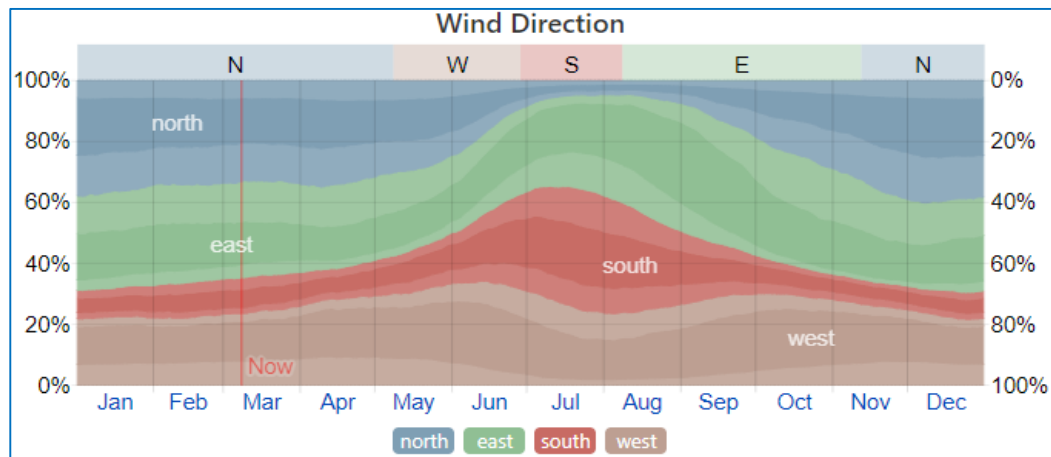


Graphical Representation of Average Wind Speed (Kmph) 2010-2021 District Rawalpindi¹⁹

The predominant average hourly wind direction in Rawalpindi varies throughout the year. The wind is most often from the west for 2 months, from May to June, with a peak percentage of 34% around mid-June. The wind is most often from the east for 3 months, from August to November, with a peak percentage of 43% in September. The wind is most often from the north for 6 months, from November to May, with a peak percentage of 38% in January.

¹⁸ <https://www.worldweatheronline.com/>

¹⁹ <https://www.worldweatheronline.com/>



Wind Direction of Rawalpindi District (Source: weatherspark.com)

4.2.12 Hydrology

The Soan and Kurang Rivers are the main streams draining the Potohar region. Their primary tributaries are the Ling River, draining northwestward into the Soan; Gumreh Kas, draining westward into the Kurang from the area between the Kurang and Soan; and Lei Nala, draining southward into the Soan from the mountain front and urban areas. The Kurang and Soan Rivers are dammed at Rawal and Sambli Lakes, respectively, to supply water for the urban area. Extensive forest reserves in the headwaters of the Kurang and Soan Rivers benefit the quality and quantity of supply. A supplemental network of municipal and private wells as deep as 200 meters (m) produces ground water primarily from Quaternary alluvial gravels. The altitude of the water table decreases from about 600 m at the foot of the Margalla Hills to less than 450 m near the Soan River, so that the saturated zone generally lies 2–20 m below the natural ground surface. Lei Nala carries most of the liquid waste from Rawalpindi and contributes greatly to the pollution of the Soan River below their confluence. Solid-waste disposal practices threaten the quality of ground-water reserves.²⁰

Rawalpindi:

The population in the district of Rawalpindi is mostly dependent on rainwater sources and groundwater pumping through tube-wells and water pumps. Agriculture is mostly rain-fed. Four rivers pass through Rawalpindi district. River Jhelum skirts the district from its northern part near Dewal to its southern boundary covering a distance of 88 kilometers. River Soan takes rise from within a few kilometers of the Murree hills and flows down deep in the valley for the 6 kilometers of its course till it reaches the plains near the old ruined fortress of Pharwala. It flows close to Rawalpindi city and finally joins the Indus near Makhad. Haro River rises near Donga Gali in Abbottabad and enters Rawalpindi near the village of Bhallar-top. It cuts across a small portion of 39 Rawalpindi tehsil and then enters Attock. Korang River rises near Ghora Gali and flows along the Murree-Rawalpindi Road. This river has been dammed at Rawal Dam, after which it joins Soan near Sihala. Five streams and Nullahs including Lai, Kanshi, Ling, Sarin and Tamrah also pass-through Rawalpindi. Lai Nullah carries rain runoff and sewage from a large part of Islamabad, and

²⁰ Sheikh, Iqbal M. et al; Environmental Geology of the Islamabad-Rawalpindi Area, Northern Pakistan, Geo. Survey of Pak, US Geo. Survey, 2007

it also collects untreated local sewage. Domestic solid waste is also dumped in the nullah. The district faces a scarcity of water and poor quality of available water. Bacteriological contamination and upward trend in Nitrate contents have been observed in drinking water samples of Rawalpindi.²¹ EPD survey in Rawalpindi has found that of the 280 sub-soil water samples collected, 180 indicate that the quality of water is not fit for human consumption in accordance with the NSDWQ²²

Surface Water Resources in Project Area:

The project area does not have any permanent surface water source in the form of river, canal or lake. However, the locals have built numerous small reservoirs to store rainwater. These reservoirs are important source of water for drinking and domestic purposes.

The nearest water body from project sites is Narali Dam, at approximately 2.5 km distance from the A37 wellsite.



Narali Dam

Figure 4.6: Surface water resource in the project area

Surface water quality

To assess the surface water quality of the area, surface water sample was collected from Narali Dam and analyzed by EPA approved laboratory. Results of analysis are presented below and lab report is attached as Annexure – III.

²¹ <http://www.pulsepakistan.com/masood/pakistan/punjab.html>

²² Arsenic and Fluoride Contamination in Drinking Water in 35 Districts of Punjab (epd.punjab.gov.pk)



Water Sampling from Narali Dam
33°07'09"N 73°09'49"E



Figure 4.7: Surface water sampling map

Table 4.2: Surface water analysis results			
S #	Parameters	Unit	Result
			Narali Dam
1	pH	-	7.74
2	Temperature	°C	25.2
3	Total Dissolved Solid (TDS)	mg/l	1904.0
4	Total Suspended Solid	mg/l	53.0
5	Biological Oxygen Demand	mg/l	17.0
6	Chemical Oxygen Demand	mg/l	49.0
7	Oil and Grease	mg/l	<0.2

8	Phenolic Compound	mg/l	<0.01
9	Chloride (Cl)	mg/l	849.26
10	Fluoride (F)	mg/l	<0.01
11	Cyanide (CN)	mg/l	<0.01
12	Detergent	mg/l	ND
13	Sulphate	mg/l	499.27
14	Sulphide	mg/l	<0.4
15	Ammonia	mg/l	<0.002
16	Zinc	mg/l	0.834
17	Manganese	mg/l	0.014
18	Silver	mg/l	<0.0032
19	Chlorine	mg/l	<0.1
20	Iron	mg/l	0.902
21	Cadmium	mg/l	0.0028
22	Chromium	mg/l	0.0054
23	Copper	mg/l	0.021
24	Lead	mg/l	<0.013
25	Mercury	mg/l	<0.0008
26	Nickel	mg/l	0.017
27	Arsenic	mg/l	<0.01
28	Barium	mg/l	<0.031
29	Boron	mg/l	<0.1
30	Selenium	mg/l	ND
31	Pesticides	mg/l	ND
32	Total Toxic Metals	mg/l	0.038

Abbreviations:
ND: Not Detected;

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±15%.
** PEQS Limits are not available for surface water inspection.

There is no standard (PEQS) to compare surface water analysis results with.

4.2.13 Ground Water Quality

Two Ground water samples were taken during the site visit of the project area to assess the ground water quality there. One sample was taken from village Ahdi Javed Mour near well A38 and feeder line (33°07'48"N 73°07'19"E). Another sample of groundwater was taken from Mastala near well A36 and feeder line (33°08'45"N 73°09'07"E). Groundwater depth is reported to be 90 to 110 ft. Results are presented in table below and testing reports are attached as Annexure – III.



Table 4.3: Ground water analysis results

Table No.1 Ground water analysis Results					
S No	Parameters	Unit	Result		PEQS For Drinking Water
			Ahdi Javed Mour (Rawalpindi)	Mastala (Rawalpindi)	
PHYSICAL & CHEMICAL ANALYSIS					
1	pH	-	7.38	7.47	6.5-8.5
2	Odor	-	odorless	odorless	Non-Objectionable
3	Taste	-	salty	sweet	Non-Objectionable
4	Color	Pt/Co	<1.0	<1.0	≤15 TCU
5	Turbidity	NTU	<0.1	<0.1	<5 NTU
6	Total Hardness	mg/l	852.0	340.0	< 500 mg/l
7	Total Dissolved Solid (TDS)	mg/l	3528.0	778.0	< 1000
9	Chloride	mg/l	1013.4	60.66	< 250
10	Cyanide (CN)	mg/l	<0.01	<0.01	≤ 0.05
11	Fluoride (F)	mg/l	<0.01	<0.01	≤ 1.5
12	Nitrite	mg/l	<0.01	<0.01	< 3 (P)

13	Nitrate	mg/l	10.01	8.9	≤ 50
14	Phenolic Compd.	mg/l	<0.01	<0.01	-
15	Residual Chlorine	mg/l	<0.01	<0.1	
15	Aluminum (Al)	mg/l	<0.028	<0.028	≤ 0.2
16	Cadmium	mg/l	0.0028	0.0028	0.01
17	Copper	mg/l	0.0045	<0.0045	2
18	Chromium	mg/l	0.0054	0.0054	≤ 0.05 (P)
19	Mercury	mg/l	0.0008	<0.0008	≤ 0.001
20	Antimony (Sb)	mg/l	ND	ND	≤ 0.005 (P)
21	Nickel	mg/l	<0.008	<0.008	≤ 0.02
22	Zinc	mg/l	<0.0033	0.0033	5.0
23	Arsenic	mg/l	<0.01	<0.01	≤ 0.05 (P)
24	Barium	mg/l	<0.031	<0.031	0.7
25	Manganese	mg/l	0.0016	<0.0016	≤ 0.5
26	Pesticides	mg/l	ND	ND	-
27	Boron	mg/l	<0.1	<0.1	0.3
28	Lead	mg/l	<0.013	<0.013	≤ 0.05
29	Selenium	mg/l	ND	ND	0.01 (P)
MICROBIOLOGICAL ANALYSIS					
30	Total Coliforms	CFU/100ml	Absent	04	-
31	Fecal Coliforms (E.coli)	CFU/100ml	Absent	02	0/100ml
Abbreviations: ND: Not Detected PEQS: Punjab Environmental Quality Standard 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±15%.					

A groundwater sample drawn from a well in Ahdi Javed Mour, Tehsil Gujar Khan, Rawalpindi, shows that total hardness, taste, and microbe levels exceed the limits of PEQS. Proper treatment is required for Ahdi Javed Mour's groundwater to be used for drinking purposes. The results of the water sample from Mastala village are within the limits of PEQS.

4.2.14 Ambient Air Quality and Noise Level

The proposed project area is semi-urban area with vast open land, agricultural fields, villages/small town and access roads. No major source of air pollution was found in the project area except for agriculture related activities (tractor exhaust, dust) and vehicles of the natives used for passenger and goods transport. 24 hours' Ambient Air Quality and noise level monitoring was carried out at two locations, (one at Ahdi Javed Mour and other at Mastala near proposed well sites).

Summarized monitoring results are presented in table below and complete analysis reports are attached in Annexure – III.

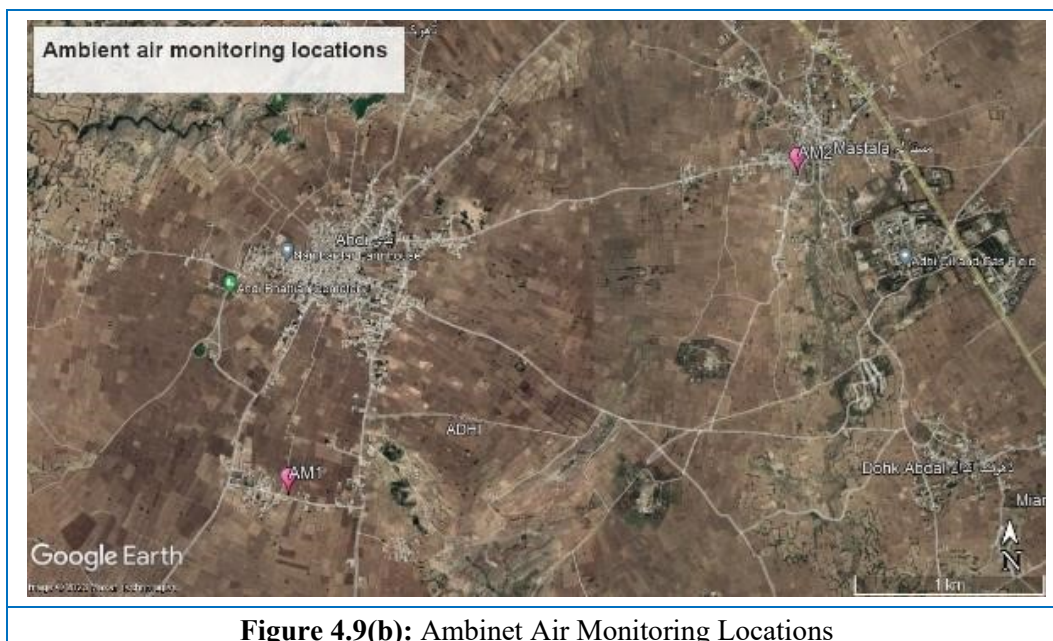
Table 4.4: Ambient Air Quality Monitoring at Proposed Well sites and Feeder lines

Parameter	Unit	Average Concentration		PEQS
		Ahdi Javed Mour	Mastala	
Nitrogen Dioxide (NO ₂)	µg/m ³	19.81	20.62	80.0
Nitrogen Oxide (NO)	µg/m ³	13.92	14.43	40.0
Nitrogen Oxides	µg/m ³	33.72	35.04	120.0
Sulphur Dioxide (SO ₂)	µg/m ³	13.98	16.80	120.0
Carbon Monoxide (CO)	mg/m ³	1.12	1.89	05.0
Ozone (O ₃)	µg/m ³	14.08	14.06	130.0
Particulate Matter (PM _{2.5})	µg/m ³	19.46	21.38	35.0
Particulate Matter (PM ₁₀)	µg/m ³	100.67	100.21	150.0
Total Suspended Particulate (TSP)	µg/m ³	153.15	154.59	500.0
Lead Airborne Particles	µg/m ³	0.26	0.28	1.5

The monitoring results show that the ambient air quality of the project area is within the acceptable limits owing to the fact that the area is dominantly semi-urban/semi-rural in nature with agriculture as the major activity. All the parameters monitored are within the limits of PEQS. The emissions, although very minor, are from the agriculture related machinery, public and domestic vehicles, burning of fire wood and dust generated from blowing wind. Also, being situated on the plateau, the wind is generally persistent, which blows away the pollutant and keeps the air quality in good condition.



Figure 4.9: Ambient Air Monitoring



Noise Level Monitoring

Hourly noise level monitoring was also conducted at the proposed well sites i.e., near proposed well sites and feeder line routes for 24 hours. Average results have been presented here and complete reports are attached in annexure III.

Table 4.5: Noise Level Monitoring in Project area				
S No	Monitoring Location	Average reading	PEQS limit (industrial, daytime)	PEQS limit (residential, daytime)
		dB	dB	dB
1	Point 1 (33°07'44"N 73°07'35"E)	51.5	75	55
2	Point 2 (33°07'46"N 73°07'22"E)	48.6	75	55
3	Point 3 (33°08'17"N 73°08'37"E)	50.3	75	55
4	Point 4 (33°08'41"N 73°08'55"E)	49.3	75	55
5	Point 5 (33°08'39"N 73°09'06"E)	47.8	75	55

The noise level monitoring at the project site revealed that noise levels are within the prescribed limits of PEQS for industrial area as well as for residential area. The reason for this is that the project area is moderately populated and no permanent source of noise exists. Generally, vehicles, machinery related to agricultural activities and high wind create some noise in the area.

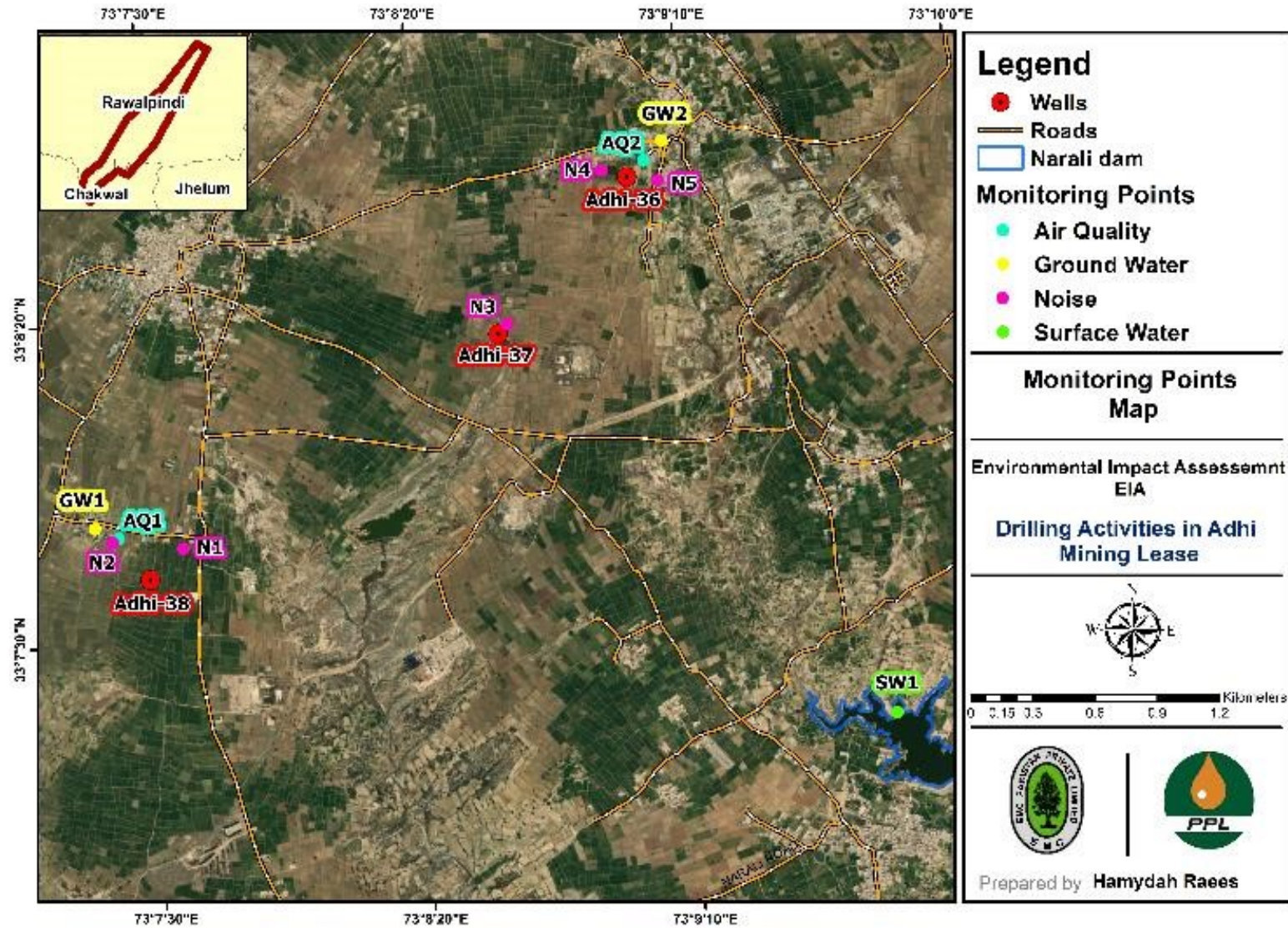


Figure 4.9(c): Environmental Monitoring and Sampling Locations

4.3 Biological Environment

The proposed well sites and feeder lines are located in Rawalpindi District of Punjab Province. The Project area is semi-urban areas, surrounded by agricultural fields and low to moderate-level built-up structures. Project area lies in a rain-fed districts with mainly hilly terrain lying in the Potohar Plateau. The Potohar Plateau provides refuge to Punjab Urial, Jackals, Foxes, Jungle Cats, Hare and Partridges. Data pertaining to flora and fauna of the project area has been taken from secondary sources and previous studies conducted in the area. A walkthrough survey of the project area was also conducted.

4.3.1 Flora

According to available literature, the Potohar region is home to a number of trees of various species, such as Bair (Ziziphus mauritiana), Phulahi (Acacia modesta), Keekar (Acacia nilotica), Dharek (Melia azedarach orchinaberry), Peepal (Ficus religiosa or sacred fig), Banyan (Ficus benghalensis), Tahli or Sheesham (Dalbergia sissoo), amaltas (Cassia fistula), Toot, (White mulberry or Morus alba) and many others²³.

Trees commonly found in the district Rawalpindi are Shisham, (Dalbergia sissoo), Keekar (Acacia Arabica), Shareen (Albizia lebbek), Bari (Ziziphus Jujuba), Guava, Citrus etc. in the recent past some farmers have started growing mini forest of Popular, eucalyptus, Symbol etc. There are some marshy areas along the river Ravi where water stagnates. These areas are popularly known as Baila. These are also covered with tall grasses, reeds and spices²⁴.

The project area is located in the Southeast of district Rawalpindi which is part of the Potohar Plateau. It is covered with scrub vegetation and leveled plains interspersed with dry rocky patches. Land use of the project area surrounding (the micro-environment) is agricultural dependent on rain water. Floral species found during surveys in the project area micro-environment are given in table below.

Table 4.6: List of trees in the project area micro environment

S No.	Common name	Scientific name
1	Tali	<i>Dalbergia sissu</i>
2	Safaidda	<i>Eucalyptus globulus</i>
3	Phulahi	<i>Acacia Modesta</i>
4	Kikar	<i>Acacia nilotica</i>
5	Ber	<i>Zizyphus Jujba</i>
6	Khajhoor	<i>Phoenix dactylifera</i>
7	Ber	<i>Zizyphus nummularia</i>
8	Berge jhao	<i>Tamarix gallica</i>
9	Gandum (wheat)	<i>Triticum aestivum</i>

²³ <https://www.scribd.com/document/489497201/EFYI-Shajarkari-Diminishing-Indigenous-Tree-Species-in-Punjab>

²⁴ <https://rawalpindi.punjab.gov.pk/agriculture>

Floral species in the Project Area



Tamarix gallicia



Eucalyptis globulus



Ziziphus nummularia



Triticum aestivum



Phoenix dactylifera

Shrubs and Grasses



Cynodon dactylon



Parthenium hysterophorus

	
<i>Miscanthus Sinensis Gracilimus</i>	<i>Chrozophora</i>
	
<i>Calotropis gigantean</i>	

4.3.2 Fauna

Fauna of the project area has been affected by anthropogenic activities. The human interferences mainly through agriculture has marked influence on over all biodiversity, and especially on animals for their limited populations or entirely absence of certain species. The reduced floral diversity and sparse plant cover intensify this reduced biodiversity, there is limited availability of the shelter for the wild animals throughout the study area.

The overall diversity of wildlife was also low in general, but particularly large mammalian populations were virtually lacking in the area. There are few noticeable species, usually small to medium sized mammals, while certain smaller species include herpeto-fauna (reptile and amphibians) has been reported from the area. Besides this limited faunal diversity, a noticeable avian species diversity is found within the reference area, which is

dominated, by the migratory species of birds, with many winter migrants from North, and several monsoon migrants of the East.

Mammals

Important among the mammals are Jackals, Wild Boars, Mongoose, field Rats, pangolin, mice, and occasionally Foxes were identified by their dens, and observation of their marks, while Flying foxes (bat species) has also been reported by some informants during surveys. For the western hilly and relatively undisturbed section of the area, whereas in agricultural field areas smaller rodent species and Hedgehogs (*Hysterix indica*, porcupine) are reported to exist in addition to the above-mentioned mammalian species. Among these species most are the pests of crop fields.

Birds

The study area does not represent a large variety of avifauna; however, certain important species are known to exist in the area. Some of them are of ecological importance as well as have importance of conservation level such as a few winter migrants, like occasionally found cranes in pre winter season, and native partridge species.

In addition to the presence of water birds influenced by the dam and rain-fed channels, the survey also observed notable populations and a variety of sparrows and smaller passerines in the study area. The presence of these bird species attracts predator birds such as small buzzards, hawks, and kites to the area.

The study area is characterized by varying vegetative zones, geography, and habitat types. However, the prevailing dry conditions in the area limit the choices for winter visitors and migrant bird species. Despite this limitation, the study area still supports a diverse avian population, including sparrows, passerines, and their associated predator birds. Meanwhile this locality for interim stay or breeding is also less suitable due to lack of vegetation cover as well as no protected areas nearby.

Birds of project area include Cattle Egret (*Bubulcus ibis*), Little Egret (*Egretta garzetta*), Black Kite (*Milvus migrans*), Common Quail (batair) (*Coturnix coturnix*), Red-wattled Lapwing (*Vnellus indicus*), Indian Ring Dove (*Streptopelia decaocto*), Great Grey Shrike (*Lanius excubitor*), etc.

Reptiles

Snakes are considered as the carnivorous reptiles of the suborder Serpents. Despite searching and waiting along agricultural fields, no direct sight for snakes is included, while reported species of snakes of Study Area are listed below.

- Ramphotyphlops braminus
- Coluber ventromaculatus ventromaculatus
- Lytorhynchus paradoxus
- Psammophis leithii leithii
- Spalerosophis diadema

Lizards and Amphibians

Lizards are the dominant group of reptiles in the dry arid regions of Pakistan. They belong to the group showing enormous variations in their morphology to get fit in different habitats, as the Study Area have an excellent variety of topography along with dry climatic conditions, hence area according to local climate, morphology and habitat types. Lizards of area are living in barren soils and sandy areas only.

Some of the Reported species of lizards²⁵ are listed below.

- *Laudakia melanura*
- *Eublepharis macularius*
- *Cyrtopodion montiumsalsorum*
- *Cyrtopodion potoharensis*
- *Mabuya macularia*

Fishes

Local respondents, fisheries department and published reports confirmed that a few fish species exist in the Narali Dam such as Rahu (*Labeo rohita*) and Thaila (*Catla catla*). Besides there is a potential for intrusion of several other fish species into the dam as it provides their natural habitat along with other supportive fauna and flora to support these species in this aquatic habitat.

Additionally, there are known local fish species present in the lakes of the Salt Range, but these natural lakes are situated at a considerable distance, approximately 50 kilometers away from the study area.

4.3.3 Forest Area

Rural section of District Rawalpindi is quite rich in forest resources. An area of 311793.53 acres is under forests, which is about 23.89% of the total area of the district. There is also linear plantation of 647 km. alongside the roads/rails/canals in the district. Trees grown in the area are, phulai, deodar, blue pine and chir pine, etc.²⁶ Due to land use changes, fuel wood requirements, and agricultural activities, the forest cover is getting shrunk with time. Mostly the hilly portions of the district are seen with somewhat intact forest covers.

However, no reserved forest is located at or near the proposed well sites and feeder line route.

4.3.4 Protected Area

Diljabba-Domeli Game reserve is a game reserve situated in the east of the Adhi Mining Lease at a distance of 13 Km, outside boundary of the Adhi Mining Lease. Therefore, Drilling and Feeder line laying activities will not have any impacts on this Game Reserve.

²⁵ IUCN. 2022. *The IUCN Red List of Threatened Species. Version 2022-2*. <https://www.iucnredlist.org>. Accessed on [24 05 2023].

²⁶ District Pre-Investment Study- 2012 Rawalpindi, Directorate of Industries, Punjab

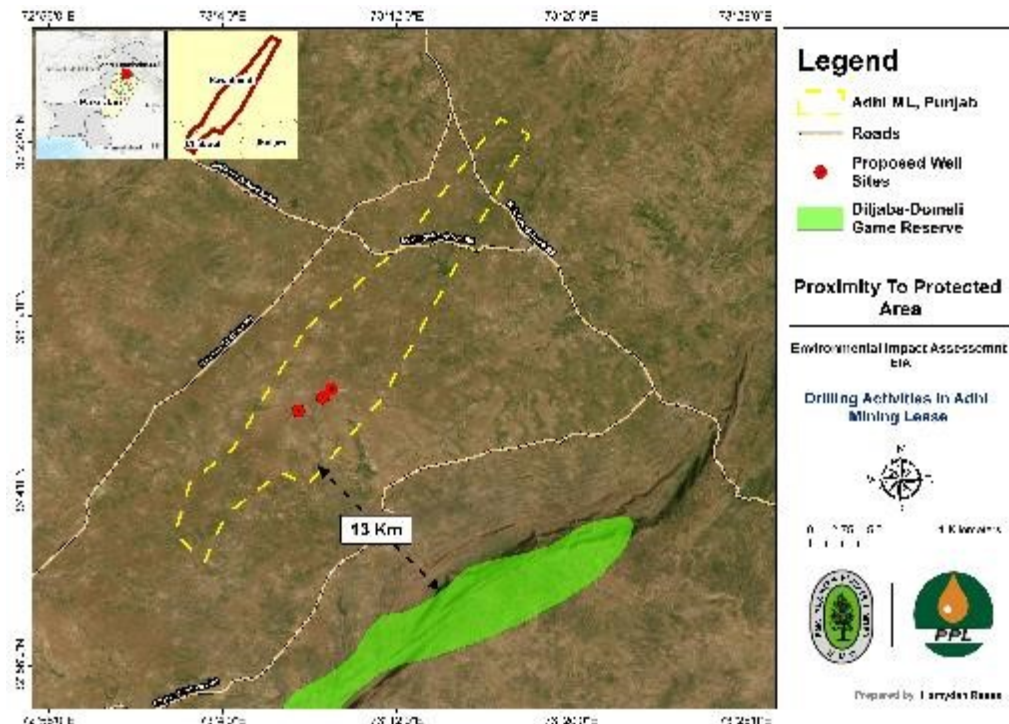


Figure 4.11: Location map of Diljaba - Domeli Game reserve and Adhi Mining Lease

There is no protected area located near the proposed project sites and within the Adhi Mining lease.

4.4 Socio-Economic Conditions

The proposed wells are situated in tehsil Gujar Khan of district Rawalpindi. Settlements in the project area are in form of village / small town with infrastructure of semi-urban / semi-rural. These settlements are modestly populated and situated at moderate distance apart. Some of the prominent village / small town in the Adhi Mining Lease are Mastala, Lohasar, Khesiah, Dhoong and Domali. Houses in these settlements are made of cement/RCC, mud and wood and huts. There is no drainage/sewage network, no solid waste management system. The sewage water from houses flow through small uncovered channels along the streets and drain in waste land. Solid waste is dumped on open land. The roads connecting these settlements are mostly dirt track and gravel top. Only few kilometers are black topped. Streets inside these settlements are both dirt track and cemented. The locals depend on groundwater for drinking and domestic use purposes.



Figure 4.12: Open channel for Sewage water in a village in Adhi ML



Figure 4.12(b): Open dumping of Solid waste in a village in Adhi ML

This section describes the key socio-economic and cultural features of the Micro & Macro environment of the project area i.e., District Rawalpindi.

Various social aspects including the history, administrative set-up, demography, infrastructure facilities, education, health, water supply and road network, cultural heritage, economic scenario etc. are described in subsequent sections.

4.4.1 Historical Background

Rawalpindi:

Rawalpindi is a city in the Potohar Plateau near Islamabad, the current capital of Pakistan. It is the military headquarters of the Pakistan Armed Forces and also served as the nation's capital while Islamabad was being constructed in the 1960s. The city is home to many industries and factories. The first Muslim invader, Mahmud of Ghazni (979-1030), gifted the ruined city to a Gakkhar Chief, Kai Gohar. The town, however, being on an invasion route, could not prosper and remained deserted until Jhanda Khan, another Gakkhar Chief, restored it and named it Rawalpindi after the village Rawal in 1493. Rawalpindi remained under the rule of the Gakkhars till Muqarrab Khan, the last Gakkhar ruler, was defeated by

the Sikhs in 1765. In the 1880s a railway line to Rawalpindi was laid, and a train service was inaugurated on January 1, 1886.²⁷

4.4.2 District Administration

Project falls in Rawalpindi District of Punjab Province. Below table gives the list of tehsils in which project area falls.

Table 4.7: Administrative division			
S. No.	District Name	Tehsil	Project site Falls in Tehsils
1	Rawalpindi	Rawalpindi Taxila Kahuta Gujar Khan Muree Kallar Syedan Kotli Sattian	Gujar Khan

4.4.3 Demography and Population

The project falls in District Rawalpindi of Punjab province. With the reference of census 2017, district population, sex ratio and average annual growth rate are mentioned below:

Table 4.8: Population and population characteristics							
District	Households	Population-2017				Gender Ratio*	Avg. Annual Growth 1998-2017
		Male	Female	Trans-gender	Total		
Rawalpindi	888,765	2,741,872	2,663,075	686	5,405,633	102.96	2.52
Rural	418,177	1,262,511	1,267,536	70	2,530,117	99.6	2.95
Urban	470,588	1,479,361	1,395,539	616	2,875,516	106.01	2.18
*Number of males per 100 females							
Source: Pakistan Bureau of Statistics, Population Census -2017							

4.4.4 Tribes, Ethnic Groups and Languages

There are many tribes and clans settled in district. The majority of the population of project area is Punjabi speaking Muslims.

Major Tribes and Races in Rawalpindi District are Rajpoot, Syed, Gakhars (AKA Kiani,Rajas), Janjuas, Awans, Gujars, Jats, Kassar, Sheikh (Caste), Abbasi, Bhatti, Chauhan, Mughals, Qureshi (Caste), Rawal, and Satti., etc.

Major languages are Urdu, Pothwari & Punjabi.

4.4.5 Agriculture

There is no surface irrigation system, such as canal networks in the project area. Agriculture in this area is predominantly rainfed.

²⁷ <https://www.punjab.gov.pk/rawalpindi>

51% of the land use in Rawalpindi District is for agriculture which mostly is rain fed crops. The main crops grown in the district are Wheat, Maize, Jawar and Ground Nut.



Figure 4.12(c): Agriculture fields at the proposed wellsites and feeder lines surroundings

4.4.6 Livestock

The rich hilly prairies and grazing lands of Rawalpindi provide a very good environment for sheep and cattle rearing. The majority of the farmers maintain their own sheep and goat herds and cattle.

During the site visit it was observed people of the project area also practice livestock as their occupation. Some poultry farms are seen during the site visit. Some sheep & goats are being observed grazing during the site visit.

Table 4.9: District Rawalpindi Livestock

District Rawalpindi							
Cow	Buffalo	Sheep	Goat	Poultry	Duck	Ostrich	Horse
250,895	130,810	24,257	217,994	466,389	2,992	45	515
Mule	Pigeon	Fancy Bird	Ostrich Chick	Camel	Camel Female	Donkey	Total
17	173,207	22,463	100	32	81	8,478	1,298,275

Source: Bureau of Statistics Punjab, Livestock Census -2018



Figure 4.15: Livestock in project area

4.4.7 Education

During the survey of project area, it was observed that people are satisfied from the education system. High Schools and Middle Schools for boys and girls are present in the project area. However, there are no Colleges. For further higher studies people send their children to Rawalpindi & Chakwal City. Some private schools are also available in project area.





Figure 4.14: School and college in project area

According to the Punjab Development Statistics, 2020 data, Rawalpindi is ranked as one of the top districts of Pakistan in terms of education and school infrastructure facilities. Rawalpindi has a total of 1,197 primary, 303 middle, 389 high schools. Out of these, 818 are male schools while 1,071 are for girls.

Table 4.10: Number of Govt. School & Teaching Staff

District	Level	No. of Govt. Schools			Teachers		
		Total	Male	Female	Total	Male	Female
Rawalpindi	Primary	1,197	491	706	4,730	1,979	2,751
	Middle	303	127	176	3,546	1,507	2,039
	High	389	200	189	7,576	3,703	3,873
Total		1,889	818	1,071	15,852	7,189	8,663

Source: Punjab Development Statistics, 2020

4.4.8 Industry

In the project area Oil and Gas facilities of PPL are located in Adhi Oil Field. Besides this, there is no other industrial unit in the project area.

The economy of Rawalpindi has a diverse industrial base, mostly in the urban areas. There are about 2,000 cottage level and small/medium/large scale industrial units functioning in Rawalpindi. The chief industries of the city include oil refineries, gas processing, steel manufacturing, iron mills, railroad yards, a brewery, sawmills, tent factories, textiles, hosiery, pottery, leather goods production, transport and tourism.



Figure 4.15: PPL Adhi Plant, Gujar Khan, Rawalpindi

4.4.9 Occupation

Mostly people are laborers, shopkeepers, farmers, driver and employed in oil facilities. Farming and farming related activities are the main occupation of the people of project area, a small percentage is employed in Armed forces, trading sector, industrial and mining labor and a very small fraction is employed in technical fields like health, education, banking, engineering etc.

4.4.10 Water Supply

Situation of water supply or source of water in district Rawalpindi is as follows:

Table 4.11: Percentage Distribution of Household by Source of Drinking Water							
District	Tap Water	Hand Pump	Motor Pump	Dug Well	Tanker / Truck	Filtration Plant	Other
Rawalpindi	22.84	0.86	46.11	7.45	2.13	12.74	7.87
Urban	32.41	0.57	34.93	2.67	0.34	21.18	7.9
Rural	13	1.17	57.6	12.36	3.97	4.06	7.85

Source: PBS (PSLM-Survey 2019-20)

The project area does not have a drinking water supply system. They rely on groundwater for potable water. The groundwater quality is not good as reported by locals. Reported groundwater depth is 90 - 110ft in project area. In main cities government water supply is available but this facility is not available to the people of surrounding areas of cities and mostly people rely on ground water.

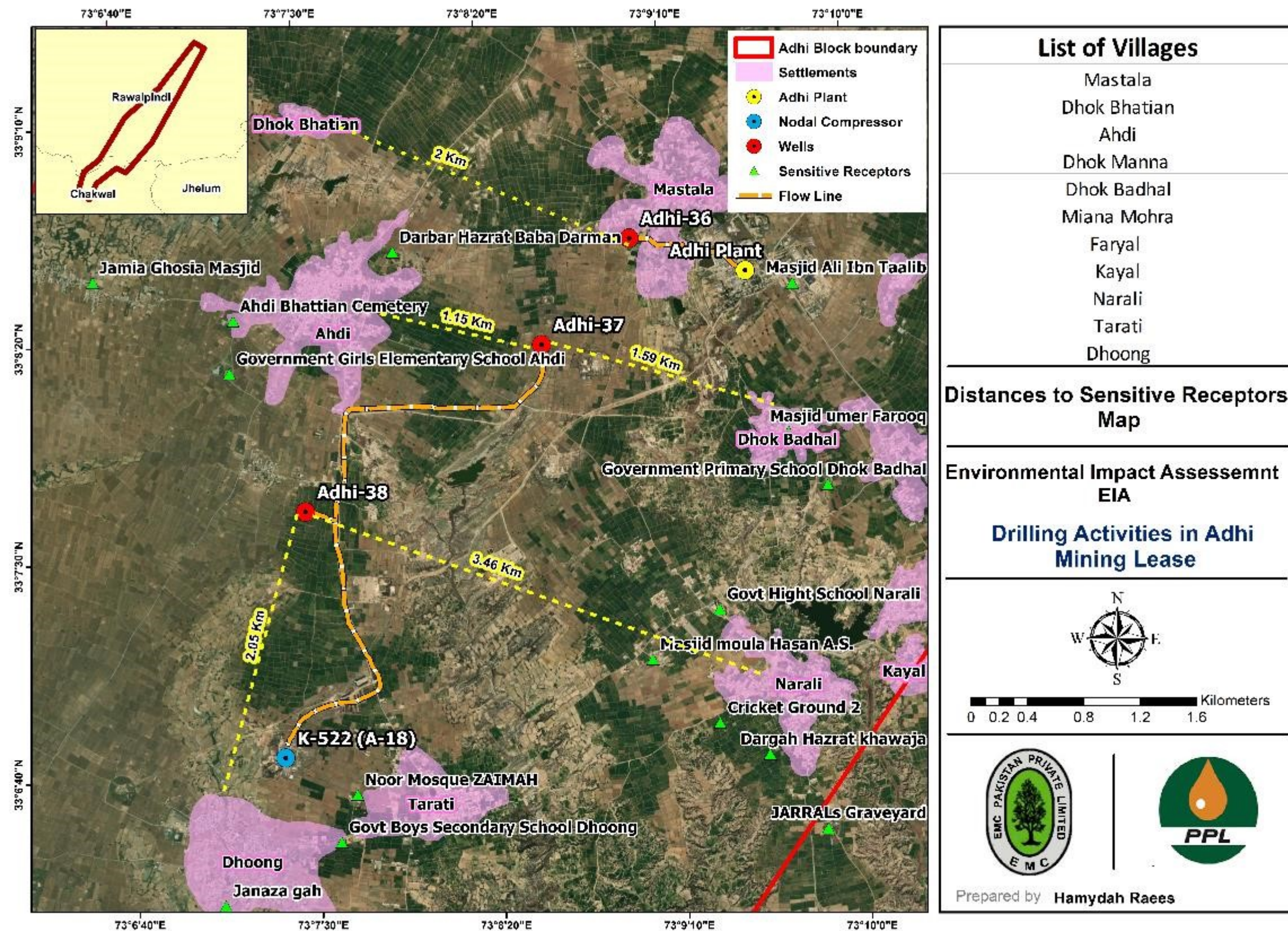


Fig 4.16: Distance from Sensitive Receptors to project components

5.0 STAKEHOLDER CONSULTATION

5.1 General

Public involvement is one of the key features of environmental assessment, which leads to better and more acceptable decision-making. The overall objective of the consultation with stakeholders is to verify the environmental and social issues that have been presumed to arise and to identify those which are not known or are unique to area near the project site. 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.

5.1.1 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.

5.1.2 Proponent

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

5.1.3 Consultation Methodology

EMC team carried out consultations with the Proponent, the local residents in the vicinity (primary stakeholders) of the project and with the relevant departments (secondary stakeholders). The stakeholders were briefed about the objectives of the proposed project. Observations of the respondent were noted and have been incorporated into the text of the EIA report. Stakeholder's concerns regarding the project are discussed in subsequent sections. The consultation approach included:

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

5.2 Consultation with Proponent

PPL (the proponent) has a comprehensive QHSE Management System to continuously improve its performance in the areas of Quality, Health, Safety & Environment.

Starting from the project award to site visits, project understanding, data acquisition, report preparation, review and finalization and report submission, PPL was in contact with

consultant and data and information sharing was done through meeting, telecons and emails. Consultant shared the draft report with PPL for its review and comments. Draft EIA report was reviewed by PPL internal stakeholders and consolidated comments were shared with EMC for incorporation in the report. After receiving the comments, report was finalized for submission in light of comments.

Below is the list of senior staff of PPL involved in the proposed project:

Table 5.1: List of staff members involved in the project		
S#	Name	Designation
1.	Mr. Abdul Malik Kakar	Head of Adhi, Dhok Sultan and Partner Operated Asset (ADS & PO)
2.	Mr. Syed Dost Ali	Senior Manager Production Technology (Drilling and Completions Engineering)
3.	Mr. Tariq Hussain	Senior Manager (Construction)
4.	Mr. Abdul Waheed	Senior Manager Subsurface – ADS&PO
5.	Mr. Zahid Mahmood	Manager (Construction)
6.	Mr. Kamran Sher	Chief Community Development
7.	Mr. M Mohsin Usmani	Chief Engineer (Drilling)
8.	Mr. Mazhar Azim	Chief Engineer (Mechanical) – ADS&PO
9.	Mr. Sohail Ahmed Mallah	Deputy Chief Engineer (Drilling & Completions Engineering)
10.	Mr. Farrukh Daud	Deputy Chief Geologist - ADS&PO
11.	Mr. Sana Ullah Khan	Deputy Chief Engineer (Construction)
12.	Mr. Salman Haider	Senior Community Development Officer
13.	Mr. Jamil Akhtar	Senior Manager (Quality, Health, Safety & Environment)
14.	Mr. Zeeshan Raza	Senior Engineer (Health, Safety & Environment)
15.	Mr. Abid Hussain	Deputy Chief Engineer (Health, Safety & Environment)
16.	Mr. Fawad Ahmed	Senior Engineer (QHSE) - Drilling & Completions Engineering.

5.3 Response of Institutional Stakeholder

5.3.1 District EPA Officer

As the proposed project is located in district Rawalpindi and district Chakwal, consultation with both field offices of Punjab Environmental Protection Agency was conducted on 17th March 2023.

Table 5.2: Consultation with Punjab EPA District Officers			
Sr. #	EPA Offices	Officers Consulted	Date
1.	District Office Rawalpindi, Punjab EPA	Mr. M. Rafique (Deputy Director)	17-03-2023

During consultation proposed project area and project activities were described to the EPA officers and their feedback was noted.

Feedback by Deputy Director EPA, District Rawalpindi:

- Settlement of the proposed project area have concerns of water contamination from project activities. it is recommended that no waste will be dumped in open environment. Produced water, oil and water base mud should be treated prior to disposal.
- The project should be constructed at a safe distance from the settlement.
- Public hearing will be conducted on the project site.



5.3.2 Forest Department

Consultation with Forest Department, Rawalpindi District was conducted and their feedback was noted. During the meeting EMC team briefed the tehsil officer about the proposed project location and activities planned by PPL. He was briefed that an environmental assessment study of the project site has been conducted to determine sensitive receptors and according mitigation measures have been proposed.

Table 5.3: Consultation with Forest Department

Sr. #	Office	Officer Consulted	Date
1.	Forest Department, Rawalpindi District	Mr. Imran (Assistant Forest Officer)	17-03-2023

Feedback:

According to him there is no forest in the surrounding of proposed project. The project lies in Agriculture land use pattern. It is responsibility of project developer to consider different environmental parameter of the area and to treat the waste generation from the proposed project. Open dumping will not be allowed.



Consultation with Mr. Imran (Assistant Forest Officer) Rawalpindi

5.3.3 Wildlife Department

Consultation with Wildlife Department, Rawalpindi District was conducted on 17th March 2023. The expert was briefed about the proposed project activities and location and his concerns and suggestions were noted which are as below;

Table 5.4: Consultation with Environmental Expert

S#	Name	Designation	Date
1	Mr. Ahsan Ahmed Raja	Deputy Director Wildlife (Rawalpindi)	17-03-2023

Feedback:

The location and activities of the Project were explained to the officer. As per him, the proposed project area is agriculture land and settlements are also present. Therefore, no major concern on wildlife anticipated. Furthermore, he suggested to write to the DG of wildlife Punjab, then he will be able to give any official remark on the project.



Consultation with Mr. Ahsan Ahmed Raja (Deputy Director Wildlife) Rawalpindi

5.3.4 TMA Gujar Khan

Consultation with Municipal Department, Rawalpindi was conducted on 17th March 2023. The expert was briefed about the proposed project activities and location and his concerns and suggestions were noted which are as below;

Table 5.4: Consultation with TMA Gujar Khan

S#	Name	Designation	Date
1	Mr. Chand Muneeb	Municipal Officer (Gujar Khan)	17-03-2023

Remarks:

Following the briefing on the project, Mr. Chand Muneeb shared following remark/feedback:

The location and activities of the Project were explained to Mr. Chand Muneeb. The officer said that it was old practice of waste approval from TMA prior of its disposal. Now the approval will be taken from district council office. The PPL has to consult District council for waste disposal activities.



Consultation with Mr. Chand Muneeb (Municipal Officer Gujar Khan)

5.3.5 Agriculture Department

Agriculture Department of District Rawalpindi was contacted for consultation for the proposed project. However, in the absence of formal feedback, agriculture department of District Chakwal was consulted on 17th March 2023.

Table 5.4: Consultation with Agriculture Department

S#	Name	Designation	Date
1	Mr. Arif	Agriculture Officer	17-03-2023

Remarks:

The meeting was held at agriculture office of Chakwal. The waste should not be dumped in agriculture field. The contaminated water and pollutant can be moved up to the food web if it will not be properly disposed of. Therefore, used chemicals and waste should be environmental treated and disposed away from settlement and agriculture field. International standard should be followed for disposal.



Consultation with Mr. Arif (Agriculture Officer) Chakwal

5.3.6 Response of the Environmental Practitioner / Expert

Consultation with environmental expert was conducted on 16th March 2023. The expert was briefed about the proposed project activities and location and his concerns and suggestions were noted which are as below;

Table 5.4: Consultation with Environmental Expert			
S#	Name	Designation	Date
1	Dr. Hamid	Research Associate, Quaid-e-Azam University, Islamabad	16-03-2023

Feedback:

- Strict waste management practices should be implemented. Contamination of land and water resources should be avoided,
- Resource conservation, recycling and reuse policy should be implemented.
- Vegetation clearance should be minimized,
- Social issues that may arise due to project activities should be amicably resolved,
- Special attention should be given to site restoration to restore land to original condition.

5.4 Response of Primary Stakeholders

Consultation with communities of the project area was conducted during January, 2023 through focus group discussion and individual interviews. EMC team briefed the villagers regarding proposed project activities, its objectives and the consultation process. Feedbacks from the communities were recorded and pictures of consultation were taken.

List of Individuals Consulted during Primary Consultations		
Sr No	Name	Occupation
1	Mudasir Hussain	Farmer
2	Mobeen Basharat	Shopkeeper
3	Rauf Ali	Retired govt employee
4	Zahoor Ali	Farmer
5	Abdullah	Student
6	Sareer	Driver
7	Niaz Hassan	Politician
8	Abdul Saboor	Carpenter
9	Waqas	Social worker
10	Illyas raheem	Teacher
11	Sumair Ali	Student
12	Sheraz	Shopkeeper
13	Zain	Govt employee
14	Syed Ghulam Rasool	Cattle farm owner
15	Shakir rehman	Farmer
16	Moneeb	Local resident

Major concerns and recommendation raised by community are;

- The major concern of settlement was contamination and degradation of water source at the area from drilling activities.
- They should construct roads where required in their CSR activities.
- No proper Drainage System in the project area



Consultation with locals



Consultation with locals



Consultation with locals



Consultation with locals



Consultation with locals



Consultation with locals

	
<i>Consultation with locals</i>	<i>Consultation with locals</i>
	
<i>Consultation with locals</i>	<i>Consultation with locals</i>

5.5 Response of Stakeholders for Socioeconomic Profile of Project Area

Wellsite 36A

Road Access

The site can be accessed by main Doltala Rawalpindi road. The coordinates of Well 36-A are 33° 8'40.20"N 73° 9'0.34"E. The Mastala village settlement comes under 120-meter radius of well site.



Main Doltala - Rawalpindi Road

Site status

The proposed well site is located in the district of Rawalpindi's Tehsil Gujar Khan. On the project side, agriculture fields are surrounded. Standing crops were observed on Well 36-A. On the North, East, Northwest and Northeast side of the project area, Mastala village is located, which is approximately 0.13km away from the project site.

List of Industries in vicinity

Adhi Oil and Gas field is located at approximately 0.53 kilometers. That is situated in the south-east of the project side, and no other industries were seen while on the site.

Social Baseline

Settlements in the project area are in form of village / small town with infrastructure of semi-urban / semi-rural. These settlements are modestly populated and situated at moderate distance apart. The prominent village / small town near proposed site is Mastala. Settlements are present in scattered form.

Houses in the area are concrete base only few of them are kacha. Mostly people are farmer and labors, few of them are shopkeeper and do trading.

Education

Government boys as well girls' elementary schools are available in Mastala village while government boys and girls high school exists nearby at Ahdi, Dhoong and Narali while a Government Degree College exists at Daultala for further higher studies.

Hospital

A Medical dispensary exists at village Mastala which is being operated by PPL for providing primary healthcare. A Basic Health Unit (BHU) also operates at Dhong while for secondary healthcare, people visit to RHC Daultala but for emergency and sever treatment people go to Tehsil Head-Quarter hospital at Gujar Khan.

Mode of Transport

People mostly use local transport (Rickshaw and Qinchhi) or bikes from one place to another.

Source of Income and Occupation

Mostly people are laborers, shopkeepers, farmers, drivers, and working in different oil storage terminals facilities.

Social issue faced by locals in Project Area

- During consultation with local, the major concern was water contamination and degradation from drilling activities. it should be treated. the other concern was to build road at settlement. The depth of water in project area is 60 to 70 ft. following are some concerns of locals:

- Unavailability of basic healthcare facilities
- Limited Education facilities
- Poverty
- Water issues (quality and availability)

Irrigation Channel near project area

There was no irrigation channel /canal found in study area.

Religious Site in the Project Vicinity

No Religious site is observed in close vicinity of well site. Mosques are found in nearby settlement.

Cultural Site in the Project Vicinity

No Cultural Site is observed in study area.

Waste Management Setup

There was no waste collection system. Locals dumped their waste openly in the streets, field, open lands etc.

Sewerage and Drainage System

There was no proper sewerage system observed in study area.

Settlements

The Nearest settlement at the project site was Mastala village which is located in the North-West side of the well injection facility. According to the Pakistan bureau of statistics the total number of households in Mastala village are 441 and total population in Mastala village is 2,448.

Livestock

Cows, Buffalos and Goats are kept by locals as livestock. Livestock is kept for personal use as well for selling purposes. Some cattle farms are also observed in study area during the site visit.

Major crops

Major crops grown in the village include wheat, maize, peanut, gram, millet and mustard.

Wellsite A37

Road Access

The Access Road to well 37-A is from Mastala village road. Which is approximately is 0.78km from the project site. The coordinates of well 37-A are 33° 8'16.51"N 73° 8'35.30"E.

Nearby Villages

- Dhok Budhal village (approximately 1.65km)
- Ahdi village (approximately 1.19 Km)

List of Industries in vicinity

Adhi Plant is located at approximately 1.20km in the north-east of the project. No other industry is found in the area.

Social Baseline

The land use pattern of the project site is agriculture. Settlements in the project area are in form of village / small town with infrastructure of semi-urban / semi-rural.

Houses at the area are concrete base only few of them are kacha pakka. Mostly people are farmer and worker few of them are shopkeeper and do business. Community based settlement is present.

Education

Government boys as well girls' elementary schools are available in Mastala village while government boys and girls high school exists nearby at Ahdi, Dhoong and Narali while a Government Degree College exists at Daultala for further higher studies.

Hospital

A Medical dispensary exists at village Mastala which is being operated by PPL for providing primary healthcare. A Basic Health Unit (BHU) also operates at Dhong while for secondary healthcare, people visit to RHC Daultala but for emergency and severe treatment people go to Tehsil Head-Quarter hospital at Gujar Khan.

Mode of Transport

People mostly use private transport or bikes to travel from one place to another.

Source of Income and Occupation

Mostly people are laborers, shopkeepers, farmers, drivers and working in different oil storage terminals facilities.

Social issue faced by locals in Project Area

According to local people they don't have a clean water for drinking and they get water from nearby sources (Narali Village approximately 1.28 km from the Dhok Budhal village) where they get clean water, the depth of water in project area is 70 to 100 ft. the social issue faced by locals in Project Area are:

- Unavailability of basic healthcare facilities
- Limited Education facilities
- Power Outage

- Poverty
- Water issues (quality and availability)

Irrigation Channel near project area

There was no irrigation channel /canal found in study area.

Religious Site in the Project Vicinity

No Religious site is observed in close vicinity of well site. Mosques are found in nearby settlement.

Cultural Site in the Project Vicinity

No Cultural Site is observed in closed vicinity of the study area.

Waste Management Setup

There was no waste collection system. Locals dumped their waste openly in the streets, field, open lands etc.

Sewerage and Drainage System

There was no proper sewerage system observed in study area.

Settlements

The nearest settlements to the project site are Dhok Budhal and Ahdi villages.

Livestock

Cows, Buffalos and Goats are kept by locals as livestock. Livestock is kept for personal use as well for selling purposes. Some cattle farms are also observed in study area during the site visit.

Major crops

Major crops grown in the village include wheat, maize, peanut, gram, millet and mustard.

Wellsite A38

Road Access

The site can be accessed by Nabeel Shaheed road. The coordinates of well 38-A are: 33° 7'40.20"N 73° 7'28.96"E. The project site is approximately 0.24 km away from nabeel shaheed road.



Nabeel Shaheed road to wellsite A38

Nearby Village

- Dhoong village (approximately 2.37 km)

List of Industries in vicinity

Adhi Plant is located at about 3.29 km. No other industry in the vicinity of proposed site.

Social Baseline

The project area is located in residential area. The infrastructure near the project area is brick constructed. The project is located in Union Council Narali.

Education

Government boys as well girls' elementary schools are available in Mastala village while government boys and girls high schools exists nearby at Ahdi, Dhoong and Narali while a Government Degree College exists at Daultala for further higher studies.

Hospital

A Medical dispensary exists at village Mastala which is being operated by PPL for providing primary healthcare. A Basic Health Unit (BHU) also operates at Dhong while for secondary healthcare, people visit to RHC Daultala but for emergency and severe treatment people go to Tehsil Head-Quarter hospital at Gujar Khan.

Mode of Transport

People mostly use their own transport no local transport is available in the project site.

Source of Income and Occupation

Mostly people are laborers, shopkeepers, farmers, and working in different oil storage terminals facilities.

Social issue faced by locals in Project Area

According to local people they don't have a clean water for drinking and they get water from nearby water well or else where they get clean water, the depth of water in project area is 60 to 70 ft. the social issue faced by locals in Project Area are

- Unavailability of basic healthcare facilities
- Limited Education facilities
- Power Outage
- Poverty
- Water issues (quality and availability)

Irrigation Channel near project area

There was no irrigation channel /canal found in study area.

Religious Site in the Project Vicinity

No Religious site is observed in close vicinity of well site. Mosques are found in nearby settlement.

Cultural Site in the Project Vicinity

No Cultural Site is observed in study area.

Waste Management Setup

There was no waste collection system. Locals dumped their waste openly in the streets, field, open lands etc.

Sewerage and Drainage System

There was no proper sewerage system observed in study area.

Settlements

During site visit according to locals the total number of households in Dhoong village are 102 and total population in Dhoong village is approximately 600 which is located near the well 38-A.

Livestock

Cows, Buffalos and Goats are kept by locals as livestock. Livestock is kept for personal use as well for selling purposes. Some cattle farms are also observed in study area during the site visit.

Major crops

Major crops grown in the village include wheat, maize, peanut, gram, millet and mustard.

6.0 POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 Introduction

This section discusses the potential environmental and socioeconomic impacts that would result due to project activities such as well drilling, feeder line laying activity, construction of campsites and access tracks, waste management (e.g., wastewater and solid waste) and restoration of sites after completion of project activities. This section further suggests appropriate mitigation measures in order to reduce, overcome or compensate negative impacts associated with the project activities.

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

6.2 Methodology

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 drilling and feeder line laying 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 judgment based on experience and professionalism.

6.3 Screening of Potential Environmental and Social Impacts at Project Siting / Location Stage

6.3.1 Site Suitability

Development well for Oil / Gas Reservoir

Adhi Mining Lease has been granted to PPL by Government of Pakistan. Total area of Adhi ML is 212.86 sq. km. There are no ecologically sensitive areas located within the Adhi Mining Lease area.

6.3.2 Protected area and Forest land

The project site has no protected area such as game reserve, wildlife sanctuary, national parks, archaeological sites or cultural heritage in its vicinity. There is no forest land located within the Adhi ML. Therefore, no environmental impacts are envisaged due to the siting of the Project.

6.3.3 Physical Cultural Resources

No structure of historical or cultural significance has been identified in the project area.

6.4 Screening of Potential Environmental and Social Impacts during Construction Phase

6.4.1 Impacts on land

Land impacts are linked with land disturbance, habitat destruction, and soil erosion due to proposed project activities. Impacts include changes in runoff patterns, project emissions and sediment runoff due to preparation of camp sites, construction of access road, construction of well site, quarrying of gravel or sand. Many impacts can be reduced or avoided when considered during siting and design of the project.

Construction of access road

Gravel top access tracks will be prepared to access the well sites (where required). Construction of the access road 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 disturbance during the entire length of the road have been recommended at the end of this section.

Preparation of campsites

For drilling activities campsites will be developed to house the crew and equipment/machinery. For feeder line installation activities, campsite may be developed or already built housing / guest house will be used to house the crew.

Campsite development will require flat and clear land which is easily accessible. This could have impact on soil and landscape due to movement of vehicle and construction activities.

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.

During Construction of Drilling Site

The existing land and land use pattern of the project area surrounding will get affected from the construction of drilling site and associated activities, like leveling of land, installation of rig & machineries, temporary storage of domestic waste and other kind of waste material etc. The proposed well site areas are uneven terrain with gentle slopes. The surrounding land is used for agricultural and animal grazing purposes.

These impacts may happen in terms of temporary clearing land (as this much area is required for well drilling), changes in the aesthetic looks of the area, changes in soil

characteristics from temporary dumping of the earth and fill material required for site elevation etc.

During Well Drilling

The entire drilling operation, being a temporary activity, will require acquisition of land for temporary basis. The drilling activity would require a land of around 600 ft. x 600 ft., which involves cleaning of undergrowth for movement of truck loaded with drilling rig and associated machineries and crews. During the entire drilling operations, drill cuttings and domestic waste and sewage from camps etc. may cause soil contamination. The road area within the village land may get affected from heavy vehicular movement, as the movement of approximately 20-25 truckloads will be there only during mobilization / demobilization phase of drilling activities of each well. The movement of trucks may cause traffic congestion in the village road as well as in the nearby roads since the microenvironment roads are very narrow.

Feeder line laying

Excavation of approximately 3 ft. wide and 4 ft. deep will be done for laying of the feeder line. The feeder line will be underground and site restoration work can adequately restore the ROW to its natural condition. Therefore, there will be no significant change in existing land use of the area from laying of proposed feeder line. Feeder line/Pipeline laying activities (such as excavation, movement of trucks and crane) may cause difficulty to the residents of the nearby settlements/villages during their daily works.

Mitigation Measures

- Clearing of vegetation will be kept to minimum. Cutting of trees will be avoided.
- Where it is necessary to cut down trees in government land, relevant department will be taken on board before cutting of trees. In case of private land, compensation will be paid to land owner.
- Total land uptake by the camps and access road will be kept to the minimum required.
- During project, movement of vehicle/equipment will be restricted to work areas only to avoid unnecessary disturbance of soils in the project area.
- Access tracks (other than the main access track for the project) to be used by water tankers, dumper trucks and other vehicles shall be monitored by the PPL construction and drilling Department.
- Vehicle speed will be regulated and monitored to avoid excessive dust emissions.
- Stream crossings, when built, shall be such that the slopes of the stream bank are properly adjusted and compacted resulting in a stabilized and sealed surface.
- Photographs will be taken at intervals throughout the project activities to monitor any changes in soil and its 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.
- Septic tank and soak pit for disposal of black water and separate soak for disposal of grey water will be constructed.

- 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.
- Dispose of wastewater from septic tank & soak pit / holding tank into nearest municipal drain after taking written approval from TMA/ relevant authority and ensuring quality of wastewater meeting PEQS standards. Dispose wastewater in an environment friendly manner.
- 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 soil cover.
- Restore soak pit / holding tank after removal of wastewater & cover and backfilling it with at least 1 meter of soil cover.
- Concrete structure can be disposed of after 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.
- Where improvement of existing tracks or development of short lengths of new tracks is unavoidable the width of the access track will be 9 to 10 meters.
- The construction of well site and campsites will be done preferably on flat land (if available) to minimize disturbance to soils and landscape shall be ensured.
- The access track shall be properly compacted at the time of construction and thereafter properly maintained by watering and compaction (where required) throughout the entire construction and drilling and feeder line operations.
- During 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 hindrance in the movement of vehicles and pedestrians.
- Special care must be taken during feeder line laying activities in village / town to protect houses and utility infrastructure from damage due to movement to trucks, crane etc.
- The land should be properly restored after feeder line laying activities.

6.4.2 Soil and Water contamination from waste/spill

Soil and water contamination may occur due to activities associated with well drilling and feeder line laying activities. Possible causes of soil and water contamination have been discussed below.

Domestic wastes

Domestic wastes generated during project activities will include sewage, grey water (from kitchen, laundry and showers), kitchen wastes, combustible wastes and recyclable wastes. Sewage will be treated and disposed of by means of a septic tank followed by soak pit / holding tank. Grey water will also be collected in soak pits / holding tank. Soak pits / holding tank will be designed to accommodate wastewater generated during total duration of the operation. In case the soak pits / holding tank get filled during operation, grey water will be sprinkled over access tracks if it is meeting PEQS standards. Sprinkling of grey water will be done in such a manner that the ponding of water is avoided. The water sprinkled will evaporate with time and will not contain any contaminant at level that may be harmful to either soil or water.

Combustible material that have no reuse will be handed over to waste contractor / vendors for appropriate disposal. All kind of food wastes will be buried safely or handed over to waste contractor for disposed of in an environmentally friendly manner.

Medical wastes

Medical Waste will be segregated from other wastes, stored separately and will be sent to the nearest incineration facility through Punjab EPA approved waste contractor.

Recyclable and reusable wastes

Recyclable and reusable wastes will include glass, metals 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.

Oil Stains and spills

Fuel or oil stains, leakage or spill during drilling and excavation 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.

Oil spills will be contained and controlled using shovels, sands and native soil. The equipment and materials will be made available at camp / housing sites and during the operation. The contaminated soil will be excavated and temporarily stored in a metal drum or a bunded area lined with an impermeable base.

Finally, the contaminated soil will be disposed of through PEPA approved waste contractor.

Drilling mud and cuttings

Water based mud will be used for drilling. Drilling muds are composed of numerous chemicals, some of which are toxic, and which are harmful to the environment and its flora and fauna.

Feeder Line Hydrotesting water

Hydrotesting (or hydrostatic testing) is the most common method for testing the integrity of the pipeline and checking for any potential leaks (e.g. from faulty welds or cracked pipe) prior to commissioning. The test involves placing water inside the pipeline at a certain pressure to check that the pipeline is not damaged and will not leak during operation. The

water used in hydrotesting may be contaminated with oil and grease content, debris, paint or pipe coating material or any other chemical used during the test. Therefore, this water is source of soil and water contamination and handling and disposal of this wastewater must be done with great care.

Mitigation Measures

- Develop a spill prevention and response plan for addressing storage locations of hazardous wastes, spill prevention measures, training requirements, waste-specific spill response actions, spill response kits.
- Provide secondary containment around all the fuel storage tanks and chemical storage area of suitable size (110% of the 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.
- Document accidental releases so that corrective actions may be taken.
- Vehicles will only be washed in designated areas within campsites.
- Vehicles will be daily checked for fuel or oil leaks. Vehicles with leaks will not be operated until repaired.
- Fuel and oil storage areas will have secondary containment in the form of cemented or brick masonry bunds with plastered. 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.
- All fuel tanks will be properly marked to highlight their contents.
- Fuel tanks will be daily checked for leaks and all such leaks will be plugged immediately.
- Liquid chemicals used during the drilling operation will be stored on brick masonry pads with plastered and contained with bunds.
- The soil contaminated from spills will be collected and handed over to EPA approved waste contractor for disposal.
- Shovels, plastic bags and absorbent material will 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 Lubricant Recycler for reclamation/recycle. Other option is to dispose of the used oil through EPA approved waste contractor.
- Vehicles related waste (excluding hazardous waste) will be transported / handed over to local contractors for recycling approved by the PPL HSE.
- The well testing fluid and produced formation fluid will be disposed-of according to the environmentally sound practice. Completion brine is collected in flare pit (made of brick masonry with plastered) for disposal by natural evaporation. Whereas crude oil is collected in storage tanks then transported to nearby operating facility for further processing at Plant. Moreover, formation water, produced during testing, drained into pit provided with impermeable membrane lining for disposal by evaporation.

- Restore flare pit in an environmentally friendly manner.
- Disposal options for produced water / formation water produced during hydrocarbon production may include injection into the reservoir to enhance oil recovery, or injection into a dedicated disposal well drilled to a suitable receiving subsurface geological formation.
- If reinjection of produced water is not possible then it should be collected in dedicated evaporation pits for natural evaporation and salt cakes (if any) left behind is disposed off through Punjab EPA approved waste contractor.
- Flare pit will be located not less than 90 meters horizontally crosswind or downwind from any source of inflammable gas and vapor.
- Hydrostatic test water quality should be monitored before discharge (if discharges into any water bodies / nullahs). If water quality is exceeding PEQS limits for effluents then it should be treated to comply with PEQS. Wastewater disposal to local nullah will only be carried out after taken approval from relevant authority / TMA and ensuring it is meeting PEQS limits.
- Reduce the need for chemicals by minimizing the time that test water remains in the equipment or pipeline;
- It will be ensured that the used water from hydrotesting is not discharged in nearby canals or other surface water body.
- The drill cuttings and water-based mud will be disposed into a pit lined with an impermeable geo-membrane. The pit will be of larger than the required capacity to accommodate emergency flows.
- At the time of restoration, the pit will be backfilled with the cuttings encapsulated within the liner and with a topsoil cover.
- In case the drilling mud pit is an agricultural land, the drilling mud should be disposed of as per the applicable and relevant guidelines of LSO 29 B.

6.4.3 Impact due to Noise pollution

The primary impacts due to noise pollution generated from construction of site, well drilling activity and feeder line laying activity etc., would be localized disturbance to the workers and settlers.

Drilling

Primary sources of noise during drilling phase would be equipment (bulldozers, drill rigs, and diesel engines etc.) and vehicular traffic during construction. Noise would be limited to the immediate vicinity of the work in development. The movement of heavy vehicles and drilling could cause infrequent-to-continuous noise.

Feeder line laying

Major source of noise during feeder line / pipeline laying activities include crane used for lifting and lowering of pipes, vehicle used for ground leveling, excavator, trucks used to deliver material etc.

Since the feeder line / pipeline route passes close to some houses, therefore, impact of noise during construction phase activities may occur. Therefore, mitigation measures have been recommended below for the protection of worker and residents of the project area.

Mitigation Measures

- Well site and camp site will be located as far away from the major residential community as reasonably possible.
- 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.
- Schedule all high noise activities to be conducted during daytime i.e. between 6 am to 10 pm when working inside and near the residential area.
- All equipment should have sound-control devices.
- Route heavy truck traffic away from residences and other sensitive receptors.
- It shall be ensured that generators, vehicles and other potentially noisy equipment used are kept in good condition.
- Noise levels at communities nearest to the well site, campsites / housing site, access tracks and feeder line / pipeline route 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.

6.4.4 Impact on 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). A variety of air pollutants are emitted during well drilling and feeder lines installation activities from a number of sources as detailed below:

Well Drilling

Emissions generated during the drilling phase include vehicles, large construction / earth moving equipment and generators, storage/dispensing of fuels, flare stacks; and dust from many sources, such as disturbance and moving soils (clearing, grading, excavating, trenching, backfilling, dumping, truck and equipment traffic), mixing concrete etc.

Feeder line laying

In addition to the emissions from operation of heavy machinery and electricity generation, other source of emission during feeder line / pipeline laying activities include land clearing and leveling, excavation and backfilling of trench that will generate dust emissions. However, these impacts will be temporary and localized.

During windless conditions (especially in areas of thermal inversion), project-related odors may be detectable at large distance from the source.

Mitigation Measures

- 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.
- Train workers to handle construction materials and debris during construction and dismantlement to reduce fugitive emissions.
- 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.
- Well site and 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.
- Generators, vehicles and other equipment used will be maintained in a good condition to ensure that emissions are kept to a minimum level.
- During operation phase, emissions from all point sources should 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, leveling or widening (for the access road and feeder line ROW) will be done in sections, immediately followed by sprinkling of water and also preferably compaction (where required).

6.4.5 Blockage of Natural Drainage

The project area is part of the Potohar Plateau and has slight gradient of elevation. Therefore, there are non-perennial streambed/water channels in project area. for the proposed project, the feeder line from A36 to Adhi plant crosses one water drain at Mastala, which mainly carries community wastewater and rainwater. Feeder line from A37 crosses a natural drain just 400m south of wellsite, carrying primarily agriculture discharges and rainwater. The possibility of blockage of natural drainage exists from either the

construction of access track, land clearing/preparation, establishment of campsite and laying of feeder line.

Mitigation Measures

- Area around the well and camp site will be constructed such that it will not block natural drainage.
- Bridge Crossings for access route will be provided at all stream crossings to avoid blocking of natural drainage. Pipe culverts will be provided at small drainage channels if any.
- Feeder lines should be laid beneath the streambeds and should not hinder the natural and normal flow of stream/water channel.

6.4.6 Impacts on water availability

Extraction of water for project activities can affect groundwater availability in the short term, which implies that the volume of groundwater available for the communities may reduce. This would not, however, affect the long-term availability of the area's water resources. There are human settlement in the surroundings of the feeder line route.

The living community in the project relies on groundwater sources of water for domestic purposes.

PPL (or its contractors) will outsource / procure water from local(s) / owner(s) of water well and transportation will be done through bowsers. It will be ensured that the project's water consumption does not affect the availability of water for the locals.

Mitigation Measures

- Avoid abstraction of water from surface water resources. If there is no other source of water available, then for abstraction of water from surface water body, acquire prior approval from relevant government department.
- The quantity of water used during construction and drilling will be kept to the minimum required by taking prudent water conservation measures on site. A complete record of water consumption will be maintained by PPL.
- Water from the tube well will only be used after ensuring that the available capacity of that resource is roughly 50% greater than the project demand.
- Water acquisition for hydrotesting purposes should not adversely affect the water level or flow rate of a natural water body, and the test water volume should not exceed 50% of the water source.
- Discharge from the PPL installed tube well or tube well owned by locals will be regularly monitored to check any changes in the yield of the wells.
- If a new water well is to be installed, the well should not be located within 300 m from existing local wells and will be designed to abstract water preferably from deep aquifer not being used by local communities.
- For all water obtained from local wells, the owner will be paid for water abstracted as per market rate.

6.4.7 Impacts on water resources (Surface water and ground water)

The proposed project activities could affect the water quality of the surface and groundwater resources.

Drilling

During drilling, impacts to water resources could occur due to water quality degradation if water-based mud, chemicals etc. are not handled / managed properly and discharged into the water bodies.

Drilling activities may affect surface and groundwater flows. If a well is completed improperly such that subsurface formations are not sealed off by the well casing and cement, aquifers can be impacted by other non-potable formation waters. The interaction between surface water and groundwater may also be affected if the two are hydrological connected, potentially resulting in unwanted dewatering or recharging.

Feeder line laying

The feeder line / pipeline route may cross temporary surface water body, natural rain water drainage channels and pass through land of various water table level. Poor designing, poor route selection and unplanned construction activities may result in the contamination of surface and subsurface water bodies and channels, blockage of rain water channels, damage of the canal banks.

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.
- Construct drainage ditches only where necessary. Use appropriate structures at culvert outlets to prevent erosion.
- Do not alter or restrict existing drainage systems, 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 movement 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.
- Closely monitor construction near aquifer recharge areas to reduce potential contamination of the aquifer.
- Reestablish the original grade and drainage pattern to the extent practicable.

- Restore the banks of water bodies to their natural condition as far as possible.
- Ensure that casing is installed from surface to a depth deeper than the target depth to protect the underground water source from contamination with produced water.

6.4.8 Site Restoration

Site Restoration after drilling activities

Restoration of the well site, access track and campsite will depend on whether the drilled well is a success or failure. The restoration measures that will be carried out have been separately listed as follows for the two possibilities;

Complete restoration – Dry well

If there are no indications of a commercial quantity of oil and gas, either before or after testing / study, then the well will be declared dry and will be plugged and abandoned in line with the local regulations and good industrial practices. The well site, camp and portion of access track which leads to the well site from the main community track will be restored.

Mitigation measure – Complete restoration

- All equipment and machinery at the well site will be demobilized
- All wastes at the well site will be disposed of according to the requirements of the EIA.
- All the fencing / barriers surrounding the base camp area will be removed, and the area will be levelled.
- The concrete structures if desired by the land owner may be left intact after taking concurrence in the form of NOC from respective land owner and considering that no environmental hazard / issue will occur. Otherwise, the concrete structures will be broken up and disposed or reused for backfilling of pits / septic tanks (below main rooting zone, 1 - 1.5 m) or provided to locals for re-use (backfilling).
- 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. Dispose wastewater in an environmentally friendly manner.
- Restore soak pit after removal of wastewater & cover and backfilling it with at least 1 meter of native soil cover. Dispose wastewater in an environmentally friendly manner.
- Contaminated bricks of black/grey water & others shall not be given to locals for any purpose.
- Water based mud and drill cuttings can be disposed onsite by either allowing the mud / liquid waste to evaporate (to the extent possible) or treated / disposed off through waste contractor and then burying the dry drill cuttings encapsulated within the HDPE liner and backfilling with at least 1 meter of native top soil cover.
- In case the drilling mud pit is an agricultural land, the drilling mud should be disposed after analysis and compliance with permissible limits of LSO 29 B.
- General restoration of the site area including landscaping and restoration of drainage where required. For reference purpose a photographic record of the project site prior to the set up and after the restoration will be taken.

- The access roads and other construction works / foundations etc. may be left intact if local people desire to use them. If not, they too will be restored and the land returned to its original use.

Partial Restoration – Producing Oil / Gas Well

An alternative situation is if commercial quantities of oil and gas are discovered after testing then the well may be suspended while testing results of produced hydrocarbon are analyzed and procurement of completion equipment. In this case, the well will be secured by running kill sting and well will be partially restored. After availability of required equipment and installation of wellhead and downhole completion equipment, the well will be produced.

Mitigation measure – Partial restoration

- The well site and access roads will be retained to support well access work for further testing.
- The outer chain link fence may be retained as a safety measure to keep wildlife away from the pit areas.
- All wastes at the well site will be disposed of in environment friendly manner.
- The wellhead will be enclosed by a locked steel cage. This will serve as both a safety and security measure as the site will be down-manned pending further development operations work.
- Liquid / wastewater and drill cuttings shall be removed from the site and disposed of in environmentally friendly manner.
- During partial restoration, either liquid / wastewater and drill cuttings will be removed from the site and disposed off in an environmentally friendly manner or WBM pit(s) will be closed as per PPEPCA sectoral guidelines.
- Contaminated bricks of black/grey water & others shall not be given to locals for any purpose.

Restoration after laying of Feeder line / Pipeline

ROW of the feeder line will be restored to its original condition, as the proposed feeder lines are underground, and excavated soil will be backfilled. For reference purpose a photographic record of the project site prior to the set up and after the restoration will be taken.

Mitigation Measures

- Restore the land after laying the feeder line to its original level. For reference purpose a photographic record of the project site prior to the set up and after the restoration will be taken,
- Compact the surface after backfilling, in the village/town where the feeder line will be laid in the street/pathway, to ensure hassle free movement of the residents,
- Demobilization of all equipment and machinery,
- Disposal of any waste material remaining at the time of completion of the operation,

- General restoration of the site area including landscaping and restoration of drainage where required,
- Relieve compacted areas to enable re-vegetation in the open land.

6.4.9 Impact on Ecology

Drilling of wells and laying of feeder line involve mobilization of a large number of workers, vehicles and also removal of vegetation during land clearance. 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.

During construction phase, topsoil would be removed for the development of well pads, access roads, trench would be excavated for the feeder line and construction of other ancillary facilities. This would lead to loss of wildlife habitat, reduction in plant diversity, potential for increased erosion and potential for the introduction of invasive or noxious weeds. Indirect impacts to vegetation would include increased deposition of dust, spread of invasive and noxious weeds and the increased potential for wildfires.

Dust settling on vegetation may change or limit plant's abilities to photosynthesize and /or reproduce. Over time, a composition of native and /or invasive vegetation would become established in areas disturbed by wildfire. Minor impacts are envisaged that may cause the disturbance to the wildlife and their habitat, which may be addressed properly.

The area around the proposed well sites has notable vegetation which include trees, grass and shrubs and cultivated farms.

No notable or protected or endangered wildlife and plant species have been reported in the project area. Therefore, adverse impacts on ecological resources can be ruled out. However, some mitigation measures have been recommended for the protection of whatever flora and fauna exists in the project area.

Mitigation Measures

- The sites of the camps will be selected away from the wildlife sensitive areas to minimize any impacts of its operation on the wildlife
- Existing tracks will be preferred to avoid the need to construct new tracks
- Prior to commencement of construction and drilling operations, awareness trainings will be provided to contractor's management and field crew on matters related to the wildlife protection.
- Land uptake by well site, camp sites and access road will be minimized
- The total duration of construction and drilling will be minimized by good management.
- All mitigation measures to minimize noise levels, dust emissions, air emissions and waste management required by the EIA will be adhered to.
- Food wastes will not be disposed of in the open area. Food wastes collected in waste segregation units will be buried on site or disposed off through waste contractor.

- Construction work near areas which show small mammal and reptile populations will commence after a soft start up and will be randomly monitored.
- Vehicle speeds on access road will be controlled to avoid incidental mortalities of reptiles. Any such incident will be reported to the PPL Site Management.
- Vehicle speeds will be randomly checked.
- Cuttings of trees will be avoided. Where it is necessary to cut down trees in government land, relevant department will be taken on board before cutting of trees. In case of private land, compensation will be paid to land owner.
- Movement of all project personnel will be restricted to work areas.
- Movement of project vehicles will be restricted only to the project access road or to routes approved by the PPL Site Management
- All mitigation related to minimizing the noise will be adhered to.
- Light used at the well site, Feeder line route and camp site will be kept to the minimum requirement
- Hunting and trapping of wildlife will be prohibited.
- Feeding or harassment of wildlife will not be allowed
- Restoration and rehabilitation of site will be done once construction is completed.

6.4.10 Impacts due to Hazardous Material 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.

Drilling

Solid and industrial waste would be generated during drilling activities. Much of the solid wastes generated during drilling would be expected to be non-hazardous; consisting of containers and packaging materials, miscellaneous wastes from equipment assembly and construction crews (food wrappers and scraps) and woody vegetation. Drilling wastes include hydraulic fluids, pipe dope, used oils and oil filters, rig wash, spilled fuel, drill cuttings and associated wastewater, drums and containers, solid waste and garbage etc. Adverse impacts could result if wastes are not properly handled and are released to the environment.

Produced water (water that coexists with oil and gas in the formation and is recovered during well development) generation can be an issue during the drilling/development phase, although it usually becomes a greater waste management concern over the long-term operation of an oil or gas field because water production typically increases with the age of the production well.

In some locations, produced water / drilling mud may carry naturally occurring radioactive materials (NORM) to the surface. Typically, the NORM radio nuclides (primarily radium-226, radium-228, and their progeny) are dissolved in the produced water / drilling mud but a portion of the NORM can precipitate into solid form in scales that accumulates in pipelines and storage vessels. Proper management of NORM-bearing produced water and solid wastes are important to prevent both occupational and public human health risks and

environmental contamination. NORM wastes are a problem generally associated with long-term operation of an oil or gas field, but can also be associated with the drilling phase.

Feeder line laying

Site clearing, trenching, laying of feeder line and painting of pipeline produce excavated earth, wood remains, bitumen drums, empty paint drums etc. This waste has the potential to cause adverse impact on the surroundings, such as contaminate soil, if not properly managed and disposed to approved dumpsites.

Mitigation Measures

- Prepare a comprehensive list of all hazardous materials to be used, stored, transported and disposed of during all phases of activity.
- Develop a waste management plan identifying anticipated solid and liquid waste streams and addressing determination, inspection and waste minimization procedures, storage locations and waste-specific management and disposal requirements.
- Include a recycling strategy to be practiced by workers during all project phases.
- Develop a spill prevention and response plan for addressing all spill prevention measures, training requirements, waste-specific spill response actions, spill response kits.
- Develop a storm water management plan to avoid the project site runoff water from contaminating the soil and surface water body, to ensure compliance with regulations and prevent off-site migration of contaminated storm water or increased soil erosion.
- 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
- Containerize and periodically remove wastes for disposal at appropriate off-site permitted disposal facilities. The goal would be to minimize the amount of hazardous materials and waste onsite.

6.5 Potential Impacts during Commissioning of Feeder line

Succeeding completion of construction work, feeder line commissioning will be carried out to check whether pipeline and associated facilities are complete in all respect. Activities performed during commissioning would include:

- Hydrotesting of feeder line / pipeline
- Flushing and cleaning of feeder line
- System dry-out
- Inerting

During commissioning activities, the main environmental concerns pertain to:

- Water sourcing
- Disposal of Wastewater from hydrotesting
- Noise
- Vehicular Emissions

Water sourcing and Wastewater from Hydrostatic Testing

It is estimated that approximately 31,850 US gallons of water (approximately 4,900 US Gallon/km considering 06-inch inner diameter pipeline) would be required for hydrostatic testing of the feeder line. The water procurement will be outsourced / procured from locals to ensure uninterrupted operation.

Hydrotesting (or hydrostatic testing) is the most common method for testing the integrity of the pipeline and checking for any potential leaks (e.g. from faulty welds or cracked pipe) prior to commissioning. The test involves placing water inside the pipeline at a certain pressure to check that the pipeline is not damaged and will not leak during operation. After hydrostatic testing the pipeline is dewatered and dried.

Following guidelines for Hydrostatic Testing should be implemented:

- Water sourcing for hydrotesting purposes should not adversely affect the water level or flow rate of a natural water body, and the test water withdrawal rate (or volume) should not exceed 50 percent of the water source.
- The disposal options for test waters following hydrotesting include (1) injection into a disposal well if one is available or (2) discharge into natural drainage nallahs after ensuring it meets the PEQS or (3) collect in lined pit for natural evaporation.
- If a disposal well is unavailable and discharge to surface waters or land surface is necessary, the following pollution prevention and control measures should be considered:
 - Reduce the need for chemicals by minimizing the time that test water remains in the equipment or pipeline;
 - If chemical use is necessary, carefully select chemical additives in terms of dose concentration, toxicity, biodegradability, bioavailability and bioaccumulation potential;
 - Hydrostatic test water quality should be monitored before discharge (if discharges into any water bodies / nallahs). If water quality is exceeding PEQS limits for effluents then it should be treated to comply with PEQS. Wastewater disposal to local nallah will only be carried out after taken approval from relevant authority / TMA.

Mitigation Measures

The water required for hydrotesting will probably be outsourced service. It is planned that no chemical additives will be added to the hydrotesting water. Hence, after hydrotesting water can be safely disposed of without treatment. Other measures that will be adopted in this regard include the following:

- Water source will be carefully selected so as not to impact water availability for the local users.
- It will be ensured that the used water from hydrotesting is not discharged in nearby canals or other surface water body.

Noise

During cleaning, Gauging and Hydrostatic Testing activities, ambient noise levels may significantly increase from baseline noise levels. The increase is due to the noise emissions expected from the equipment used during the commissioning and start-up activities.

The impact from noise during commissioning activities will be temporary since the high-pressure discharges during hydrotesting are one-off events at a given testing pipeline section and in general the commissioning and start-up works would be moving along the pipeline route alignment and thus would be at a single location for a short period of time.

Mitigation Measures

- Inform the locals / population living near the feeder line about the high noise activities.
- Ensure use of appropriate PPEs among the workers to prevent high noise related injuries.
- The contractor should not exceed scheduled period for hydrotesting and this should be minimized as far as practicable.

Vehicular emissions

The main source of air emissions during pre- commissioning/commissioning phase is related to vehicular traffic generated by onsite workers. The number of workers on site during the pre- commissioning/commissioning phase is expected to be much less than that during construction, and all other potential emissions are expected to be much lower than that during operations. Hence, potential impacts from these activities on ambient air quality are expected to be insignificant.

6.6 Potential Impacts during Operation Phase of the Feeder Line

Activities during operation phase of the feeder line will be limited including hydrocarbon transmission, maintenance and monitoring. Consequently, very few environmental impacts are envisaged on the ambient environment during operation. Main scenarios in this regard include:

- a. Soil erosion due to movement of vehicle for patrolling and maintenance
- b. Small scale hydrocarbon emissions in the event of pipeline leakage
- c. Emergency scenarios

a. Soil erosion due to movement for patrolling and maintenance

Soil erosion may occur due to movement of patrolling and maintenance vehicle.

Mitigation measure

- Monitor ROW for signs of soil erosion during routine visits.

b. Small scale hydrocarbon emissions in the event of leakage

During operation phase of the feeder line sources of hydrocarbon emissions will be leakage due to rupture of pipeline, spillage during refueling. During potential leakage, small scale gaseous emissions may be release to ambient air and liquid hydrocarbon on land. Main constitute of leaked hydrocarbon include mainly methane along with hydrocarbon constituents. The probability of these spills / emissions is low since mechanical integrity program / inspection program will be done.

Mitigation Measures

- Implement mechanical integrity / inspection program during operation phase.
- Any leaks detected will be immediately fixed.
- Site to be restored immediately after repair.
- Use drip pans during refueling to contain accidental spillage.

c. Emergency Scenarios

Earthquake

The Geological Survey of Pakistan categorizes the project area in Seismic Zone 2B region. This suggests the possibility of moderate to major seismic hazard i.e. probability of earthquakes of intensity VII to IX MM scale. The peak ground level acceleration (PGA) for this zone is 1.6-2.4 m/s².

Mitigation Measures

- Natural hazards will be managed by Emergency preparedness and response planning.

Fire and Explosion Hazard

Fire is one major hazard in storage of petroleum products, due to chances of spills or leakages. Fires can cause loss of life and property. However, at the same time fires have the potential to severely harm the people in the vicinity and affect the environment.

Following are some mitigation measures to combat the chances of fire and explosions:

Mitigation Measures

- Risks involved with the fire and explosions hazard can be reduced by adopting following measures:
- Potential impacts due to fire and explosion will be minimized through use of leak detection systems and a fire suppression system consistent with international guidelines
- Control Systems and Operational Procedures will be in place to minimize the potential for a fire or explosion and the resultant impacts to the operation, population and personnel.

6.7 Socio-economic, Archaeological and Cultural Environment

Socio-economic impacts vary from project to project and are not easily quantifiable. The potential employment related issue includes dissatisfaction among local communities over distribution of jobs within the local community.

There are settlement at safe distance from the proposed well sites and the route of the feeder lines / pipeline (See figure below). Since the settlements are at safe distance from the proposed project components, therefore, impact on socioeconomic conditions of these settlements during the construction and operation phase activities are not anticipated.

Acquisition of Grazing Land

The proposed sites may be livestock grazing areas, however, compared to the total available grazing area, the uptake by the project will not be significant and will not have any measurable significant effect. Project vehicles will follow safe speed limits, especially on seeing a livestock herd near the road to avoid any road accidents.

Displacement of inhabitants

There are no major communities residing within the 200-meter radius of proposed well sites. Therefore, displacement of communities would not be required for drilling phase.

Use of groundwater

There is shortage of irrigation water in the project area. Rain water is the only source of water to recharge the aquifer. The use of water can lead to indirect effects, irrespective of what their magnitude maybe.

a. Positive impacts

Positive impacts of project may include:

- Increase turnover of local businesses, shops, hiring of vehicle and water bowsers due to an increased demand from project contractors and their employees.
- Increased income of local residents due to employment in the projects.

b. Water availability

The project area has water scarcity due to absence of surface water source and canal and limited rain fall. Local communities meet their domestic water requirement from groundwater sources or bring potable water from a distant village (Narali). Due to scarcity of rain, the ground water too is of poor quality.

Following measures are recommended for judicious use of water by PPL and for water conservation;

- Use water from a local well only after ensuring that the available capacity at the well (safe yield minus local demand) is at least 50% greater than the project demand. Regularly monitor discharge from the water well to monitor any changes in the yield of the wells. If a single well fails to meet this requirement, obtain water from multiple wells such that each well meets the above-mentioned requirement.
- If a new well is to be bored, If a new water well is to be installed, the well should not be located within 300 m from existing local wells and will be designed to abstract water preferably from deep aquifer not being used by local communities.
- Instead of use of raw water, reuse of greywater should be considered for sprinkling for dust suppression during wellsite construction, drilling and feeder line laying activities, if it meets PEQS limits.

- Sensitizing the workers to use water prudently at project sites.
- Due to climate change, weather patterns have changed and rains are now not limited to the typical monsoon season beginning in July and ending in September, but rather, there are changes of spells of rain most of the months of the year. Therefore, rainwater harvesting should also be studied for use besides the traditional groundwater source.

c. Mobility and Transportation

There are quite a few Villages/small town present inside the Adhi Mining Lease. Few of these are near the proposed well sites. The road that connects these villages/small towns are partly carpeted with large patches of unpaved tracks. The access path inside these village/small towns are all narrow dirt tracks. Due to small size of population and rural setup, motorized traffic is not an issue of the area. The movement of vehicles for transportation of labor, supplies and construction material would not cause any disturbance and hindrance to the local traffic on the main roads (whatever there is). However, mitigation measure have been recommended to avoid accidents.

d. Damage to Educational, Cultural, Religious and Archaeological Resource

As mentioned above, the project area has considerable sized villages/small town. Therefore, there are quite a few infrastructures of sensitive nature such as mosques, graveyards, shrines and schools. However, the well sites have been located at safe distance away from villages, mosques, graveyard and other sensitive receptors.

There are no sites of archaeological importance at or near the project site / feeder line route.

Recommended controls and Mitigation Measures

- All community grievances will be recorded, addressed and maintained in a Community Complaint's Register.
- Local source of drinking water will not be exploited unless measures listed in water use mitigation measures are followed
- The access road will be watered regularly to minimize the dust emissions (if required).
- Construction of bypass to all major settlements and where necessary rerouting the access road so that a safe distance is maintained from a settlement.
- Drivers will be trained in responsible and safe driving practices, a speed limit will be set and maintained; in addition, vehicle logbooks will be maintained and inspected for compliance.
- Contractors will employ local residents during the project activities as much as possible.
- Use of local firewood for cooking by contractor staff will be prohibited
- The vehicle speed for traveling along the access road will be limited
- The well site will be located at a safe distance away from major residential communities. Thereby mitigating the effect of noise and emissions.
- Generators and vehicles will be regularly maintained and checked against PEQS standards to minimize emissions.

- Trench excavated for laying feeder lines should be barricaded to eliminate the risk of falling of locals or their cattle.
- Excavations inside the residential area should be highlighted by signage, reflective tapes and lights to caution the residents, especially during nighttime.
- Any land acquired and distribution of compensation will be carried out transparently based on prevailing market rate and in accordance with the PPL compensation procedures.
- Project staff will respect cultural norms
- Damage to any artifacts/local old sites during construction will be prohibited and construction activities near these areas will be monitored by PPL.
- The access route and Feeder Line ROW will be aligned to maintain safe distance from the edge of any graveyard and shrine (if any).
- Camps will be established well away from the communities (preferably 500m away).
- The privacy of locals shall be preserved through appropriate control measures e.g. Installation of green nets and restriction in movement of workers / contractors at nearby settlements.
- Flare pit shall be provided with adequate safety measures (e.g. bund wall) to protect surrounding communities / crops from heat.
- The site specific emergency response plan should include the communication protocols with locals in case of real emergency (e.g. uncontrolled gas release from well). The plan shall include advance communication to them about our activity, how real emergency will be communicated to them e.g. ensuring contact number of focal persons of school & village, what to do in case of actual emergency etc.

6.8 Potential impacts of Feeder Line Decommissioning and Site Restoration Phase

Feeder line decommissioning is the termination of all oil and gas transport through a pipeline at the end of well life. Decommissioning of pipelines requires adequate planning, manpower, and resources in line with local land use and environmental regulations.

Decommissioning options for pipelines include leaving them in place, or removing them for reuse, recycling or disposal, especially if they are above ground and interfere with human activities. Environmental impacts related with the decommissioning of Feeder line are

- Oil spillage from pipelines.
- Generation of dust,
- Noise due to the movement/operation of heavy machinery involved in decommissioning activities.
- Vehicular emissions,
- Occupational health and safety risks
- Waste management

A preliminary decommissioning and restoration plan should be developed that identifies disposal options for all equipment and materials, including products used and wastes generated on site. The plan should consider the removal of oil from pipelines, pipeline decommissioning and site restoration.

Mitigation Measures

- The exposure of construction workers to dust should be minimized by ensuring dust mask use among the workers.
- Truckloads of loose soil will be covered with tarpaulin.
- Soil and material piles at the site will be barricaded to avoid material escape / generation of dust.
- Construction machinery, vehicles should be properly tuned and kept in good working condition, minimizing exhaust and vehicular emissions. It should be ensured that exhausts from these equipment and vehicles comply with relevant PEQS.
- Revegetation of land where possible.
- Pipelines left in place should be disconnected and isolated from all potential sources of hydrocarbons; cleaned and purged to remove hydrocarbons; and sealed at their ends.
- Repair any damaged property
- Demobilize all materials and equipment from the camp site
- Dispose all left over wastes
- Feeder line trench in the residential area should be barricaded to eliminate falling hazard. In addition, the trench should be marked by signage, reflective tapes and lights to prevent fall incidents during night.
- Backfill excavation and trench with topsoil
- Ensure use of appropriate PPE by the workers
- High noise activities should be carried out during daytime, especially in the residential area.

6.9 Potential Environmental Enhancement Measures

Tree Plantation

Tree plantation will be done by PPL in project vicinity. This will improve the aesthetics of microenvironment and increase local flora. The objective shall be to ensure a green cover providing conducive ambient environment. Suitable tree species need to be selected with adoption of simple techniques which require minimum investment and care. Plants suitable and indigenous to local area will be planted.

Dust suppression

During project associated activities, regular dust suppression using water will be done, where needed, to prevent dust generation. Stock piles shall be covered. Vehicular speed limits shall be implemented and water sprinkling shall be done at unpaved roads and paths.

Resource Conservation

- Water conservation practices shall be followed during construction activities of the project.



- Reduce, reuse and recycle approach shall be implemented to minimize waste generation.
- Recyclable and reusable waste shall be segregated and handed over to recycling contractor.
- Energy efficient equipment and lighting shall be preferred.
- Construction workers shall be sensitized to switch off the machinery/equipment when not in use to save energy and fuel.

Table 6.1: Environmental Impacts & Characterization Matrix							
Activity & Source	Nature of Impact	Duration	Extent	Reversibility	Likelihood	Severity	Significance
Landscape & Soil Erosion							
- Construction of proposed well site location, - Camp siting - Construction of access tracks. - Excavation for feeder line (if constructed)	Direct	Medium-term; depend on the availability of hydrocarbon reserves.	Local	Reversible	Possible	Moderate	Medium
Noise pollution							
- Transportation of heavy machinery, materials, equipment & personnel. - Drilling operations. - Feeder line/Pipeline laying & commissioning	Direct	Short to medium term	Local	Reversible	Possible	Low	Low
Dust Emission							
- Dirt tracks by project related vehicles. - Earthworks and construction for campsite. - Combustion products (NO_x, SO₂, PM, CO and VOC) from diesel generators used in the camps to generate electricity.	Direct	Medium term	Local	Reversible	Possible	Low	Low
Air Emissions							
- Exhaust emissions produced by generators. - Exhaust fumes from vehicles and construction machinery.	Direct	Short to medium term	Local	Reversible	Unlikely as mitigation measures will ensure that air emissions remain within acceptable limits.	Low	Low
Water Abstraction							

Table 6.1: Environmental Impacts & Characterization Matrix							
Activity & Source	Nature of Impact	Duration	Extent	Reversibility	Likelihood	Severity	Significance
- Water required for drilling operation and other project activities. - Water for hydrotesting of feeder line (if constructed)	Direct	Medium term; depend on the rainfall pattern and recharge regime of the deep aquifer.	Local	Reversible	Possible	Low	Low
Soil and Water Contamination							
- Domestic waste (sanitary & kitchen discharge). - Oil and grease from vehicles and machinery. - Produced water and drilling mud - Sediments from altered land surfaces (campsite). - Stored fuel, oil and other chemicals. - Disposal of produced water.	Direct	Medium term (after implementation of mitigation and control measures)	Local	Reversible	Possible	Low	Low
Impacts on Wildlife							
- Improvement and construction of the access road. - Removal of vegetation (only where required). - Laying of feeder line (if required)	Direct	Short term to medium term	Local	Reversible	Possible	Low	Low

7.0 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 Adhi Mining Lease.

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 reduce these risks to as low as reasonably practical, various control measures are adopted. PPL endeavors to perform its field activities in a manner to either eliminate or minimize the risks to the lowest possible level.

Environmental management of the Project 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
- Contractor and Subcontractor
- 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 and the EMP will rest with PPL's concerned Depts. (i.e., Construction, Drilling and Production Technology Depts. and Adhi Asset Head).

- Carry out project activities in environmentally sound manner;
- Coordination with the HSE officer to resolve issues arising during project execution;
- Manage construction crew and reduce the environmental impacts;
- Appoint dedicated environment officers that will understand and tackle environmental issues more easily;
- Discuss weekly progress report with their management and issues concerned to environmental management.

7.5.3 Environmental Protection Agency

Punjab EPA as regulatory body has the responsibility to ensure project's 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 and the EMP will rest with PPL's concerned Depts. (i.e. Construction, Drilling and Production Technology Depts. and Adhi Asset Head)

The responsibilities of PPL's Site Incharge and concerned PPL Depts. at HO 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 EPA 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 the Contractor.

7.5.7 Training

The key objective of the training program is to ensure that the requirements of the EMP and EIA 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 shall be 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 incidences 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 Matrix

Mitigation Matrixes are provided in (table 7.4 and 7.5 a & b). The Mitigation 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 concerned

departments will hold the primary and overall responsibility for ensuring full implementation of the EMP.

7.7 Environmental Monitoring

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 7.6 (a), (b) & (c).
- 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 construction, drilling and feeder line laying activities.

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
1. Changes in Landscape and Soil Erosion.				
1.1	Well site and campsite areas will be kept to a minimum.	PPL Construction Dept.	Check compliance	After marking of the site layout on ground by the CC and prior to clearing of land at these areas.
1.2	The construction of well sites and campsites on leveled land to minimize disturbance to soils and landscape	PPL Construction Dept.	Location of camp site and well site in level areas.	Prior to site layout in ground
1.3	Existing access roads will be used as much as possible. Development of new track lengths will be avoided as much as possible	PPL Construction Dept.	Monitor off road travel and record non-compliances. Development & marking of access track during construction	During construction
1.4	The width of the improved track (if applicable) will be kept at 9 to 10 m, except at bends where safety considerations will dictate additional width.	PPL Construction Dept. / CC	Randomly check the width of the improved access track	During construction
1.5	The access track will be properly compacted at the time of construction and thereafter properly maintained by watering and compaction (where required) throughout the entire construction and drilling operation.	PPL Construction Dept. / CC	Check compliance	Compaction during construction, dust emissions and loose sections of the track for the entire period of use of the track for this operation
1.6	Off-road travel will be strictly prohibited and observance of this will be monitored during the operation.	CC, DC, PPL Construction & Drilling Depts.	Advise all personnel, address any staff complaints & ban off road travel	During the entire operation
1.7	Vehicle speeds will be regulated and monitored to avoid excessive dust emissions.	CC / DC / PPL Construction & Drilling Depts.	Set speed limits, train drivers and monitor non-compliances	During the entire operation

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
1.8	Areas along the access track, well site and campsites will be visually monitored and any area showing signs of soil erosion will be watered and compacted.	PPL Construction Dept. / CC	Check compliance	During drilling activities
1.9	Cutting of vegetation will be kept to the minimum required. Unnecessary clearing within the corridors along the access track or on the periphery of the well site and campsites will be avoided.	PPL Construction Dept. / CC	Monitor land clearing activities	During construction
1.10	Movement of construction equipment will be restricted to work areas only to avoid unnecessary disturbance to soils in the project area.	PPL Construction Dept. / CC	Monitor movement of vehicles and off road travel	During Construction activity
1.11	When tracks are to be used for obtaining water from water wells, the tracks will be regularly sprinkled with water for dust suppression (where required)	PPL Construction Dept. / CC	Sprinkling of water on access track to water wells	During the entire operation
1.12	During construction, a single track will be identified and approved along sections of the main track on which work is in progress. Vehicles will be allowed to travel only on the approved track.	PPL Construction Dept.	Check compliance	During Construction
1.13	During construction stage, gravel should not be dumped on or close to the access track being improved or constructed such that it causes hindrance in the movement of vehicles and pedestrians.	PPL Construction Dept. / CC	Gravel or sand dumping on access track	During Construction
1.14	Periodic trainings will be provided to drivers on mitigation measures related to off road travel and speeds limits.	PPL Construction Dept. / CC,	Check training log, provide trainings	During the entire project
2. Contamination of Soil and Water				
2.1	Approvals to start construction or drilling will only be given by PPL Construction and Drilling Heads after ensuring that all waste management facilities (waste segregation units, soak pits, septic tanks etc.), equipment (waste bins, drip pans, tarpaulins	PPL Construction and Drilling Heads	Approval for waste contractor , waste management systems and start of work	Before construction and drilling activity

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
	etc.) and procedures (approvals for waste contractors etc.) are as per the EMP/EIA requirements.			
2.2	Food waste will not be disposed of in an open land. Food waste collected in waste segregation units will be buried on site or disposed of through contractor.	PPL Construction and Drilling Depts. / CC / DC	Provision of sufficient waste bins, segregation of waste, disposal through third party contractor.	During the entire operation
	Combustible packaging wastes that have no re-use will be stored temporarily onsite within designated waste segregation areas and will be handed over to waste contractor / vendor for appropriate disposal.	PPL Construction and Drilling Depts. / CC / DC		
2.3	Dedicated waste segregation units / containers will be built or placed at campsites and well site.	PPL Construction and Drilling Depts. / CC / DC	Construction and monitoring of waste segregation units	During entire project
2.4	Recyclable wastes including glass, tins and metal scrap will be handed over to recycling contractors.	PPL Construction and Drilling Depts. / CC / DC	PPL's concerned Depts. to approve waste contractors. Monitor waste segregation and safe transportation to the recycling contractor's facility	During the entire operation
2.5	Used oil shall either be provided to OGRA reclamation license holder lubricant reclamation plant for reclamation or disposed of through PEPA approved waste contractor.	PPL Construction and Drilling Depts. / CC / DC	PPL's concerned Depts. to approve waste contractor and monitor safe transportation of the waste oil	During the entire operation
2.6	Medical wastes will temporarily be stored onsite separately and incinerated at a suitable location through PEPA approved waste contractor.	PPL Construction and Drilling Depts. / CC / DC	PPL's concerned Depts. to approve disposal arrangement. Monitor waste segregation and safe storage onsite	During the entire operation
2.7	Wastes will not be disposed of in the open area.	PPL Construction and	Monitor during routine visits	During the entire operation

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
		Drilling Depts. / CC / DC		
2.8	Adequate number of waste bins will be provided for collection of wastes at the well site and campsites.	PPL Construction and Drilling Depts. / CC / DC	Monitor provision of sufficient waste bins	During the entire operation
2.9	Grey wastewater will be collected in soak pits. The wastewater, if found to meet the PEQS, could be sprinkled over the access road or transferred from the site in tankers and disposed of at TMA drain after taking approval from TMA and ensuring its quality meets PEQS standards.	PPL Construction and Drilling Depts. / CC, DC	Check provision of soak pits and quality of waste water. Monitor sprinkling of wastewater	During the entire operation
2.10	Sewage generated from the toilets will be collected and treated in septic tank and soak pit system. The septic tanks will be built of concrete construction such that wastewater will not infiltrate into the ground	PPL Construction and Drilling Depts. / CC / DC	Check provision of septic tank and soak pit. Monitor wastewater levels in the soak pits.	During the entire operation
2.11	Soak pits will be built in absorbent soil and located preferably 300 m away from a perennial surface water source or ground water well.	PPL Construction Dept. / CC	Check soil condition and distance between the soak pits and the nearest water bodies	During design and construction
2.12	Soak pits will be covered and constructed such that surface runoff cannot enter the pits.	PPL Construction Dept. / CC	Monitor provision of covers and berms	Provision of berms during construction and proper covers during the entire operation
2.13	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 bunded area lined with an impermeable base. Finally, the contaminated soil will be disposed of through PEPA approved waste contractor.	PPL Construction and Drilling Depts. / CC / DC	Monitor any oil leaks and contamination of soil. Ensure provision of equipment and material to control and handle such spills on site. Monitor disposal as per the requirements of EIA.	During the entire operation

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
2.14	Fuel and oil storage areas will have secondary containment in the form of cemented or brick masonry bunds with plastered. The volume of the containment area will be equal to atleast 110 % of the total volume of fuel / oil stored or 110% of the volume of one largest tank.	PPL Construction Dept. / CC	Ensure secondary containment	During construction activity
2.15	All fuel tanks will be properly marked to highlight their contents.	PPL Construction and Drilling Depts. / CC / DC	Ensure that proper signs are placed with the tanks	During the entire operation
2.16	During fuel and oil transfer operations such as refueling, drips and spills will be avoided and drip pans will be used.	PPL Construction and Drilling Depts. / CC / DC	Ensure provision of drips pans, provide training on safe refueling practices, monitor oil or fuel stains	During the entire operation
2.17	Fuel tanks will be daily checked for leaks and all such leaks will be plugged immediately.	PPL Construction and Drilling Depts.	Inspect fuel tanks for leaks	During the entire operation
2.18	Liquid chemicals used during the drilling operation will be stored on brick masonry pads with plastered and contained with bunds.	PPL Construction and Drilling Depts. / CC / DC	Ensure provision of brick masonry pads with plastered and banded.	During construction activity
2.19	Shovels, plastic bags, and absorbent material will be present near fuel and oil storage or handling areas to attend spills and leaks.	PPL Construction and Drilling Depts. / CC / DC	Monitor presence of materials and equipment	During the entire operation
2.20	Vehicles will only be washed within designated areas within campsites. Mechanical maintenance works will be done only in workshops	CC, DC, PPL	Ensure provision of washing areas and maintenance workshops and monitor any non-compliances with the EIA requirement during routine monitoring	During the entire operation

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
2.21	Vehicles will be daily checked for fuel or oil leaks. Vehicles with leaks will not be operated until repaired.	CC / DC / PPL Construction and Drilling Depts.	Randomly inspect vehicles and designated parking areas	During the entire operation
2.22	Produced formation fluids and well testing fluids during testing will be disposed-of according to the environmentally sound practice. Options may include: Option-1: Injection into the reservoir to enhance oil recovery, Option -2: Disposal into a dedicated disposal well drilled to a suitable porous subsurface geological formation. Option-3: Produced water is collected in lined evaporation pits, where the water is evaporated (natural or induced) and salt cakes left behind is disposed through PEPA approved waste contractor. Option-4: Produced water treatment and then discharges to surface waters or to land. -This option is considered only if there is no other option available. Discharged produced water should be treated to meet the PEQS.	Production Contractor / PPL Production Technology Dept.	Check compliance	Prior to and during disposal of waste fluids
3. Deterioration of air quality				
3.1	Generators and vehicles used during the operation will be properly tuned and maintained to minimize air emissions	PPL Construction & Drilling Depts./CC/DC	Check maintenance logs	During the entire operation
3.2	Well site and campsites will be located at safe distance away from major residential communities.	PPL Construction Dept. / CC	Check distances of well site and camp site from communities	Prior to construction of well site and camp sites
3.3	Dust emissions due to road travel will be minimized by regulating vehicle speeds and watering of the access track	PPL Construction and Drilling Depts / CC / DC	Set and monitor speed limits. Monitor sprinkling of access track	During the entire operation

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
3.4	Dust emissions during construction activities will 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.	PPL Construction Dept. / CC	Monitor dust emissions during earthworks. Train CC on good management practices	During the construction operation
3.5	During construction, leveling or widening along the access road will be done in sections, followed by sprinkling of water and also preferably compaction (where required)	PPL Construction Dept. / CC	Access road construction	During construction activity
4. Noise Pollution				
4.1	It will be ensured that the generators, vehicles and other potentially noisy machinery used are in good condition.	PPL Construction and Drilling Depts / CC / DC	Monitor noise levels	Prior to use of machinery and vehicles
4.2	Noise levels at communities nearest to the well site, camp site and access tracks will be monitored by Contractor. In case these are found to exceed safe acceptable limits appropriate mitigation will be taken.	PPL Construction and Drilling Depts. / CC / DC	Monitor noise levels	During Construction, Drilling and Operation
4.3	Well site and camp sites will be located at safe distance away from major residential communities.	PPL	Check distances from the community	Prior to construction of the well site and camp sites
4.4	The use of horns by project vehicles will be minimized. The use of pressure horns will not be allowed	CC / DC / PPL Construction and Drilling Depts.	Train drivers, check vehicles and record non-compliances	During the entire operation
4.5	Movement of all project vehicles and personnel will be restricted to within work areas.	CC / DC / PPL Construction and Drilling Depts.	Advise all drivers and investigate non-compliances from staff	During the entire operation
5. Use of Water				
5.1	Avoid abstraction of water from surface water resources. If there is no other source of water available, then for abstraction of water from surface water body, acquire prior approval from relevant government department.	PPL Construction Dept. / CC	Check compliance	During the entire operation

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
5.2	For all water obtained from local wells, the owner will be paid for water abstracted at the market rate	PPL Construction Dept. / Contractor	Check compliance	During entire operation
5.3	If a new water well is to be installed, the well will be located 300 m from existing local wells and will be designed to abstract water preferably from deep aquifer not being used by local communities	PPL Construction Dept. / Contractor	Monitor distance from the existing wells	Before the start of the operation
5.4	The quantity of water used during construction and drilling will be kept to the minimum required by taking prudent water conservation measures on site. A complete record of water consumption will be maintained by the PPL	PPL Construction and Drilling Depts. / CC / DC	Monitor water consumption, advise water conservation measures	During the entire operation
5.5	Discharge from the tube wells will be regularly monitored to supervise any changes in the yield of the wells.	PPL Construction Dept. / Contractor	Monitor discharge from the tube wells.	During entire operation
5.6	Contamination of surface and groundwater resources will be avoided.	PPL Construction and Drilling Depts. / CC / DC	Check compliance	During the entire Operation
6. Blockage of Natural Drainage				
6.1	Area around the well and camp site will be constructed such that it will not block natural drainage.	PPL Construction Dept. / CC	Monitor landscaping and any obstruction caused to natural drainage	During the construction activity
6.2	Bridge Crossings for access route will be provided at all stream crossings to avoid blocking of natural drainage. Pipe culverts will be provided at small drainage channels if any.	PPL Construction Dept. / CC	Ensure construction of Fjord crossings & pipe culverts & randomly check along the access track	During construction of the access track
7. Site Restoration- Dry Well				

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
7.1	All equipment and machinery at the well site will be demobilized	PPL Construction and Drilling Dept. / CC / DC	Check compliance	During site restoration
7.2	All wastes at the well site will be disposed of according to the requirements of the EIA.	PPL Construction and Drilling Dept. / CC / DC	Check compliance	During site restoration
7.3	All the fencing / barriers surrounding the base / rig camp areas will be removed and the area will be levelled. The concrete structures if desired by the land owner may be left intact after taking concurrence in the form of NOC from respective land owner and considering that no environmental hazard / issue will occur. Otherwise, the concrete structures will be broken up and disposed or reused for backfilling of pits / septic tanks (below main rooting zone, 1 - 1.5 m) or provided to locals for re-use (backfilling).	PPL Construction Dept. / CC	Check compliance	During site restoration
7.4	All pits at the well site will be backfilled	PPL Construction Dept. / CC	Check compliance	During site restoration
7.5	The areas covered by the portion of the access track that will be of no use for other wells will be restored, in that all gravel topping will be removed. This scenario will be applicable only if the locals require the portions of the track to be restored or otherwise it may be left on the site on the consent of the locals	PPL Construction Dept. / CC	Check compliance	During site restoration
7.6	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.	PPL Construction Dept. / CC	Check compliance	During restoration

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
	Dispose of wastewater from septic tank & soak pit into nearest municipal drain after taking approval from TMA / relevant authority and ensuring quality of wastewater meeting PEQS standards. Dispose wastewater from septic tank in an environment friendly manner.			
7.7	Restore soak pit after removal of wastewater & cover and backfilling it with at least 1 meter of native soil cover. Dispose wastewater of soak pit in an environment friendly manner.	PPL Construction Dept. / CC	Check compliance	During restoration
7.8	Contaminated bricks of black / grey water pits and others shall not be given to locals for any purpose.	PPL Construction Dept. / CC	Check compliance	During restoration
7.9	Water based mud and drill cuttings can be disposed onsite by either allowing the mud / liquid waste to evaporate (to the extent possible) or treated / disposed of through waste contractor and then burying the dry drill cuttings encapsulated within the HDPE liner and backfilling with at least 1 meter of top soil cover.	PPL	Check Compliance, ensure that the HDPE liner is not ruptured and completely wraps the dried mud	During site restoration
7.10	In case the drilling mud pit is an agricultural land, the drilling mud should be disposed of as per the applicable and relevant guidelines of LSO 29 B.	PPL	Check Compliance, Ensure the waste does not contain hazardous compounds	During site restoration
7.11	Restore flare pit in an environmentally friendly manner.	PPL Construction Dept. / CC	Check compliance	During site restoration
7.12	General restoration of the site area and drainage where required.	PPL Construction Dept. / CC	Check compliance	During site restoration

8. Partial Restoration - Producing Well

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
8.1	The well site and access roads will be retained to support well access work for further testing or during the development phase.	PPL Construction Dept.	Check compliance	During site restoration
8.2	The outer chain link fence will be retained as a safety measure to keep wildlife away from the pit areas.	PPL Construction Dept.	Check compliance	During site restoration
8.3	All wastes at the well site will be disposed off in an environment friendly manner.	PPL Construction and Drilling Depts.	Check compliance	During site restoration
8.4	The wellhead will be enclosed by a locked steel cage. This will serve as both a safety and security measure as the site will be down-manned pending further development operations work.	PPL	Inspect well head is enclosed by locked steel cage	During site restoration
8.5	Either liquid / wastewater and drill cuttings will be removed from the site and disposed off in an environmentally friendly manner or WBM pit(s) will be closed / restored as per PPEPCA sectoral guidelines.	PPL	Ensure that all liquid and solid waste is removed	During site restoration
8.6	In partial restoration, wastewater will be removed from septic tank / soak pit and disposed of in an environmentally friendly manner and entrance pipe will be blocked so that the rain water do not enter into the pit or septic tank,	PPL Construction Dept. / CC	Check compliance	During site restoration
8.7	Contaminated bricks of black / grey water pits and others shall not be given to locals for any purpose.	PPL Construction Dept. / CC	Ensure compliance	During site restoration
9. Clearing of vegetation and loss of habitat				
9.1	Clearing of vegetation will be minimized by keeping the road width to 9 to 10 m (except at bends where greater width will be required for safety reasons), and by keeping the length of new sections of the road to a minimum.	PPL Construction Dept. / CC	Check width	During the construction activity

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
9.2	Off-road travel, required at sections of the road where construction work is in progress, will be minimized and if required will be allowed only after approval from PPL Site Management	PPL Construction Dept. / CC	Train drivers and investigate non-compliances	During the entire operation
9.3	During construction good management practices will be adopted to avoid disturbance to areas adjacent to work areas including the access track, well site and camp sites.	PPL Construction Dept. / CC	Train construction supervisors, monitor construction activities	During construction operation
9.4	Well site and campsite areas will be kept to a minimum.	PPL Construction Dept. / CC	Check compliance	After marking of the site layout on ground by the CC and prior to clearing of land at these areas.
9.5	Camp sites established for the purpose of construction will be located in existing clear /open land if possible. Vegetation clearing from these sites will be kept to a minimum.	PPL Construction Dept. / CC	Supervise camp setup	During setup of the construction camps
9.6	Cuttings of trees will be avoided.	PPL Construction Dept. / CC	Supervise land clearing activities	During land clearing for the access track, well site and drilling camp site
9.7	Use of local vegetation as fuel will not be allowed.	PPL Construction and Drilling Depts. / CC / DC	Check compliance	Use of local vegetation as fuel will not be allowed. Check compliance during the entire operation
10. Disturbance to Wildlife				
10.1	Prior to commencement of construction and drilling operations, awareness trainings will be provided to contractor's management and field crew on matters related to the wildlife protection.	PPL Construction & Drilling Depts / CC / DC	Provide environmental awareness training	Before commencement of drilling activity

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
10.2	Land uptake by well site, camp sites and access road will be minimized	PPL Construction Dept./ CC	Check compliance	After marking of the site layout on ground by the CC and prior to clearing of land at these areas.
10.3	The total duration of construction and drilling will be minimized by good management.	PPL Construction and Drilling Depts.	Check compliance	During the entire operation for the time specified
10.4	All mitigation measures to minimize noise levels, dust emissions, air emissions and waste management required by the EIA will be adhered to.	PPL Construction & Drilling Depts / CC / DC	Check compliance	During the entire Project
10.5	Food wastes will not be disposed of in the open area. Food wastes collected in waste segregation units will be buried on site or disposed off through waste contractor.	PPL Construction and Drilling Depts / CC / DC	Monitor collection and disposal of food waste	During the entire operation
10.6	Construction work near areas which show small mammal and reptile populations will commence after a soft start up and will be randomly monitored.	PPL Construction Dept. / CC	Check compliance	During construction activity
10.7	Vehicle speeds on access road will be controlled to avoid incidental mortalities of reptiles. Any such incident will be reported to the PPL Site Management. Vehicle speeds will be randomly checked.	PPL Construction and Drilling Depts / DC/ CC	Monitor speed limits	During the entire operation
10.8	Cuttings of trees will be avoided. Where it is necessary to cut down trees in government land, relevant department will be taken on board before cutting of trees. In case of private land, compensation will be paid to land owner.	PPL Construction Dept. / CC	Check compliance	During Construction activity
10.9	Movement of all project personnel will be restricted to work areas.	PPL Construction and	Check compliance	During entire project

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
		Drilling Depts / DC / CC		
10.10	Movement of project vehicles will be restricted only to the project access road or to routes approved by the PPL Site Management	PPL Construction and Drilling Depts / DC / CC	Check compliance	During entire project
10.12	Light used at the well site and camp site will be kept to the minimum requirement	PPL Construction and Drilling Depts / DC / CC	Ensure that EIA requirements should meet	During the entire project
10.13	Hunting and trapping of wildlife will be prohibited.	PPL Construction and Drilling Depts / DC / CC	Check compliance	During the entire operation
10.14	Feeding or harassment of wildlife will not be allowed	PPL Construction and Drilling Depts / DC / CC	Check Compliance	During the entire operation
11. Hazardous material and solid waste				
11.1	Prepare a comprehensive list of all hazardous materials to be used, stored, transported and disposed of during all phases of activity.	PPL Construction and Drilling Depts / DC / CC	Check Compliance	Before the commencement of activities
11.2	Include a recycling strategy to be practiced by workers during all project phases.	PPL Construction and Drilling Depts / DC / CC	Check Compliance	Before the commencement of activities
11.3	Develop a spill prevention and response plan for addressing spill prevention measures, training requirements, waste-specific spill response actions, spill response kits.	PPL Construction and	Check Compliance	Before the commencement of activities

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
		Drilling Depts / DC / CC		
11.4	Develop a storm water management plan to avoid the project site runoff water from contaminating the soil and surface water body, to ensure compliance with regulations and prevent off-site migration of contaminated storm water or increased soil erosion.	PPL Construction and Drilling Depts / DC / CC	Check Compliance	Before the commencement of activities
11.5	Train employees to promptly contain, report and/or clean up any oil or hazardous material spill.	PPL Construction and Drilling Depts / DC / CC	Check Compliance	During the entire project
11.6	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.	PPL Construction and Drilling Depts / DC / CC	Check Compliance	During the construction of the storage tanks
12. Socio-economic, archaeology and cultural Environment				
12.1	All community grievances will be recorded, addressed and maintained in a Community Complaint's Register.	PPL Construction and Drilling Depts.	Check the provision of complaint register and its access for communities	During the entire operation
12.2	Local source of drinking water will not be used as primary drinking water source.	PPL Construction and Drilling Depts. / DC / CC	Monitor adherence with the requirements	During the entire project
12.3	The access road will be watered regularly to minimize the dust emissions (if required).	PPL Construction Dept. / CC,	Check alimnet of access routes	During construction activity

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
12.4	Construction of bypass to all major settlements and where necessary rerouting the access road so that a safe distance is maintained from a settlement.	PPL Construction Dept. / CC	Check alignment of access routes	During construction activity
12.5	Drivers will be trained in responsible and safe driving practices, a speed limit will be set and maintained; in addition, vehicle logbooks will be maintained and inspected for compliance.	PPL Construction and Drilling Depts. / DC / CC	Provide training and monitor compliance	During the entire operation
12.6	Contractors will employ local residents during the project activities as much as possible.	PPL Construction and Drilling Depts. / DC / CC	Monitor adherence with the requirement and maintain record of labor	During the entire operation
12.7	Use of local firewood for cooking by contractor staff will be prohibited	PPL Construction and Drilling Depts. / DC / CC	Monitor adherence with the requirement	During the entire operation
12.8	The vehicle speed for traveling along the access road will be limited	PPL Construction & Drilling Depts. /CC/DC	Monitor speed limits	During the entire operation
12.9	The well site will be located at safe distance away from major residential communities. Thereby mitigating the effect of noise and emissions.	PPL	Check the alignment of access route	Before construction activity
12.10	Generators and vehicles will be regularly maintained and check against PEQS standards to minimize emissions.	PPL Construction & Drilling Depts./DC/CC	Monitor air emissions	During the entire operation
12.11	Any land acquired and distribution of compensation will be carried out transparently based on prevailing market rate and in accordance with the PPL compensation procedures.	PPL	Check compliance	During the entire operation

Table 7.4: Mitigation Matrix for Construction and Drilling Phase Activities

No.	Impact and Mitigation Measures	Execution	Action / Monitoring Parameter / Monitoring Method	Timing
12.12	Project staff will respect cultural norms	PPL Construction & Drilling Depts./DC/CC	Check compliance	During the entire operation
12.13	Damage to any artifacts/local old sites during construction will be prohibited and construction activities near these areas will be monitored by PPL.	PPL Construction Dept.	Check compliance	Before and during the construction activity
12.14	The access route ROW will be aligned to maintain safe distance from the edge of any graveyard and shrine (if any).	PPL Construction Dept. / CC	Check distance	Before and during construction

DC = Drilling Contractor; CC = Construction Contractor

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities

No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
1. Changes in Landscape and Soil Erosion.				
1.1	Minimum land clearance for feeder line ROW	PPL Construction Dept. / CC	Check compliance	After marking of the site layout on ground by the CC and prior to clearing of land at these areas.
1.2	Cutting of vegetation will be kept to the minimum required. Unnecessary clearing within the corridors along the feeder line route or on the periphery of the campsite(s) will be avoided.	PPL Construction Dept. / CC	Monitor land clearing activities	During construction
1.3	The access track / ROW will be properly levelled & graded / compacted at the time of construction and thereafter properly maintained by watering and compaction (where required) during pipeline laying operation.	PPL Construction Dept. / CC	Check compliance	Compaction during construction, dust emissions and loose sections of the track for the entire period of use of the track for this operation

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities				
No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
1.4	Off-road travel will be strictly prohibited and observance of this will be monitored during the operation.	PPL Construction Depts./CC	Advise all personnel, address any staff complaints & ban off road travel	During the entire operation
1.5	Vehicle speeds will be regulated and monitored to avoid excessive dust emissions.	PPL Construction Depts./CC	Set speed limits, train drivers and monitor non-compliances	During the entire operation
1.6	Areas along the access track and campsite(s) (if developed) will be visually monitored and any area showing signs of soil erosion will be watered and compacted. The contractor may use already developed area / local hotel for housing of their employees.	PPL Construction Dept. / CC	Check compliance	During FL laying activities
1.7	Movement of construction equipment will be restricted to work areas only to avoid unnecessary disturbance to soils in the project area.	PPL Construction Dept. / CC	Monitor movement of vehicles and off-road travel	During Construction activity
1.8	When tracks are to be used for obtaining water from water wells, the tracks will be regularly sprinkled with water for dust suppression (where required)	PPL Construction Dept. / CC	Sprinkling of water on access track to water wells	During the entire operation
1.9	During construction, a single track will be identified and approved along sections of the main track on which work is in progress. Vehicles will be allowed to travel only on the approved track.	PPL Construction Dept.	Check compliance	During Construction
2. Contamination of Soil and Water				
2.1	Approvals to start construction will only be given by PPL Construction Head after ensuring that all waste management facilities (waste segregation units, soak pits, septic tanks etc.), equipment (waste bins, drip pans, tarpaulins etc.) and procedures (approvals for waste contractors etc.) are as per the EIA requirements.	PPL Construction Heads	Approval for waste contractor , waste management systems and start of work	Before construction and FL laying activity
2.2	Hydrostatic test water quality should be monitored before discharge (if discharges into any water bodies / nallahs). If water quality is exceeding PEQS limits for effluents then it should be treated to comply with PEQS.	PPL Construction Dept. / CC,	Check compliance, monitoring reports	Before use and before discharge

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities				
No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
	Wastewater disposal to local nallah, if needed, will only be carried out after taken approval from relevant authority / TMA and ensuring it meets PEQS limits.			
2.3	Reduce the need for chemicals by minimizing the time that test water remains in the pipeline.	PPL Construction Dept., CC	Check compliance,	At the time of testing
2.4	It will be ensured that the used water from hydrotesting is not discharged in nearby canals or other surface water body.	PPL Construction Dept., CC	Check compliance,	At the time of discharge
2.5	Food waste will not be disposed of in an open land. Food waste collected in waste segregation units will be buried on site or disposed of through contractor.	PPL Construction Depts. / CC	Provision of sufficient waste bins, segregation of waste, disposal through third party contractor.	During the entire operation
2.6	Combustible packaging wastes that have no re-use will be stored temporarily onsite within designated waste segregation areas and will be handed over to third party waste contractor / vendor for appropriate disposal.	PPL Construction Depts. / CC		
2.7	Dedicated waste segregation units / containers will be built or placed at campsites.	PPL Construction Depts. / CC	PPL's concerned Depts. to approve waste contractors. Monitor waste segregation and safe transportation to the recycling contractor's facility	During the entire operation
2.8	Recyclable wastes including glass, tins and metal scrap will be handed over to recycling contractors.	PPL Construction Depts. / CC	PPL's concerned Depts. to approve waste contractor and monitor safe transportation of the waste oil	During the entire operation
2.9	Used oil shall be provided to OGRA reclamation license holder lubricant plant for reclamation or disposed of through PEPA approved waste contractor.	PPL Construction Depts. / CC	PPL's concerned Depts. to approve waste contractor and monitor safe transportation of the waste oil	During the entire operation

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities				
No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
2.10	Medical wastes will temporarily be stored onsite separately and incinerated at a suitable location through PEPA approved waste contractor.	PPL Construction Depts. / CC	PPL's concerned Depts. to approved disposal arrangement. Monitor waste segregation safe storage onsite	During the entire operation
2.11	Wastes will not be disposed of in the open area.	PPL Construction Depts. / CC	Monitor during routine visits	During the entire operation
2.12	Grey wastewater will be collected in soak pits. The wastewater, if found to meet the PEQS, could be sprinkled over the access road or transferred from the site in tankers and disposed of at TMA drain after taking approval from TMA and ensuring its quality meets the PEQS.	PPL Construction Dept. / CC	Check provision of soak pits and quality of waste water. Monitor sprinkling of wastewater	During the entire operation
2.13	Sewage generated from the toilets will be collected and treated in septic tank and soak pit system. The septic tanks will be built of concrete construction such that wastewater will not infiltrate into the ground	PPL Construction Depts. / CC	Check provision of septic tank and soak pit. Monitor wastewater levels in the soak pits.	During the entire operation
2.14	Soak pits will be built in absorbent soil and located preferably 300 m away from a perennial surface water source or ground water well.	PPL Construction Dept. / CC	Check soil condition and distance between the soak pits and the nearest water bodies	During design and construction
2.15	Soak pits will be covered and constructed such that surface runoff cannot enter the pits.	PPL Construction Dept. / CC	Monitor provision of covers and berms	Provision of berms during construction and proper covers during the entire operation
2.16	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 bunded area lined with an impermeable base. Finally, the contaminated soil will be disposed of through PEPA approved waste contractor.	PPL Construction Depts. / CC	Monitor any oil leaks and contamination of soil. Ensure provision of equipment and material to control and handle such spills on site.	During the entire operation

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities				
No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
			Monitor disposal as per the requirements of EIA.	
2.17	Fuel and oil storage areas (if developed) will have secondary containment in the form of cemented or brick masonry bunds with plastered. The volume of the containment area will be equal to atleast 110 % of the total volume of fuel / oil stored or 110% of the volume of one largest tank.	PPL Construction Dept. / CC	Ensure secondary containment	During construction activity
2.18	All fuel tanks will be properly marked to highlight their contents.	PPL Construction Dept. / CC	Ensure that proper signs are placed with the tanks	During the entire operation
2.19	During fuel and oil transfer operations such as refueling, drips and spills will be avoided and drip pans will be used.	PPL Construction Dept. / CC	Ensure provision of drips pans, provide training on safe refueling practices, monitor oil or fuel stains	During the entire operation
2.20	Fuel tanks will be daily checked for leaks and all such leaks will be plugged immediately.	PPL Construction Depts.	Inspect fuel tanks for leaks	During the entire operation
2.21	Liquid chemicals used during the feeder line laying operation will be stored on brick masonry pads with plastered and contained with bunds.	PPL Construction Dept. / CC	Ensure provision of brick masonry pads with plastered and bundled.	During construction activity
2.22	Shovels, plastic bags, and absorbent material will be present near fuel and oil storage or handling areas to attend spills and leaks.	PPL Construction Dept. / CC	Monitor presence of materials and equipment	During the entire operation
2.23	Vehicles will only be washed within designated areas within campsites. Mechanical maintenance works will be done only in workshops	PPL Construction Dept. / CC	Ensure provision of washing areas and maintenance workshops and monitor any non-compliances with the EIA requirement during routine monitoring	During the entire operation

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities				
No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
2.24	Vehicles will be daily checked for fuel or oil leaks. Vehicles with leaks will not be operated until repaired.	PPL Construction Dept. / CC	Randomly inspect vehicles and designated parking areas	During the entire operation
3. Deterioration of air quality				
3.1	Generators and vehicles used during the operation will be properly tuned and maintained to minimize air emissions.	PPL Construction Dept./ CC	Check maintenance logs	During the entire operation
3.2	Feeder Line/pipeline route and campsite(s) (if developed) will be located at safe distance away from major residential communities.	PPL Construction Dept. / CC	Check distances of well site and camp site from communities	Prior to construction of well site and camp sites
3.3	Dust emissions due to road travel will be minimized by regulating vehicle speeds and watering of the ROW / access track	PPL Construction Dept. / CC	Set and monitor speed limits. Monitor sprinkling of access track	During the entire operation
3.4	Dust emissions during construction activities will 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.	PPL Construction Dept. / CC	Monitor dust emissions during earthworks. Train CC on good management practices	During the construction operation
3.5	During construction, leveling or widening along the ROW will be done in sections, followed by sprinkling of water (if required) and also preferably compaction (where required)	PPL Construction Dept. / CC	Access road construction	During construction activity
4. Noise Pollution				
4.1	Feeder Line/pipeline ROW will be located at safe distance away from the nearest major communities.	PPL Construction Dept., CC	Check distances from the community	Prior to construction of the well site and camp sites
4.2	It will be ensured that the generators, vehicles and other potentially noisy machinery used are in good condition.	PPL Construction Dept. / CC	Monitor noise levels	Prior to use of machinery and vehicles
4.3	Noise levels at communities nearest to the Feeder Line/pipeline Route, camp /housing site will be monitored by Contractor. In	PPL Construction Dept. / CC	Monitor noise levels	During Construction, Drilling and Operation

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities				
No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
	case these are found to exceed safe acceptable limits appropriate mitigation will be taken.			
4.4	The use of horns by project vehicles will be minimized. The use of pressure horns will not be allowed	PPL Construction Dept. / CC	Train drivers, check vehicles and record non-compliances	During the entire operation
4.5	Movement of all project vehicles and personnel will be restricted to within work areas.	PPL Construction Dept. / CC	Advise all drivers and investigate non-compliances from staff	During the entire operation
5. Use of Water				
5.1	Water acquisition for hydrotesting purposes should not adversely affect the water level or flow rate of a natural water body, and the test water volume should not exceed 50 percent of the water source.	PPL Construction Dept., CC	Monitor volume of water taken	At the time of test, during commissioning phase
5.2	Avoid abstraction of water from surface water resources. If there is no other source of water available, then for abstraction of water from surface water body, acquire prior approval from relevant government department.	PPL Construction Dept. / CC	Check compliance	During the entire operation
5.3	For all water obtained from local wells, the owner will be paid for water abstracted at the market rate	PPL Construction Dept. / CC	Check compliance	During entire operation
5.4	Contamination of surface and groundwater resources will be avoided.	PPL Construction Dept. / CC	Check compliance	During the entire Operation
6. Blockage of Natural Drainage				
6.1	Crossings for the Feeder Line/pipeline (if any) will be provided at all stream crossings to avoid blocking of natural drainage. Pipe culverts will be provided at small drainage channels if any.	PPL Construction Dept., CC	Ensure construction of Fjord crossings & pipe culverts & randomly check along the access track	During construction of the access track

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities				
No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
6.2	Camp site (if built) will be constructed such that it will not block natural drainage.	PPL Construction Dept. / CC	Monitor landscaping and any obstruction caused to natural drainage	During the construction activity
7. Restoration after Feeder line/pipeline laying				
7.1	Demobilization of all equipment and machinery	PPL Construction Dept., CC	Ensure compliance	During restoration phase
7.2	Disposal of any waste material remaining at the time of completion of the operation.	PPL Construction Dept., CC	Ensure compliance, route visit	During restoration phase
7.3	General restoration of the site area including landscaping and restoration of drainage where required.	PPL Construction Dept., CC	Ensure compliance, site visit to witness restoration and land	During restoration phase
7.4	Relieve compacted areas to enable re-vegetation.	PPL Construction Dept., CC	Ensure compliance	During restoration phase
8. Clearing of vegetation and loss of habitat				
8.1	Feeder Line/pipeline ROW access track width will be kept to minimum possible.	PPL construction deptt., CC	Check compliance	After marking of the site layout on ground by the CC and prior to clearing of land at these areas.
8.2	Cuttings of trees will be avoided. Where it is necessary to cut down trees, tree plantation will be done to compensate the tree cutting. In case of government land, relevant department will be taken on board before cutting of trees. In case of private land, compensation will be paid to land owner.	PPL Construction Dept. / CC	Supervise land clearing activities	During land clearing for the access track, well site and drilling camp site
8.3	Camp sites established for the purpose of construction will be located in existing clearing if possible. Vegetation clearing from these sites will be kept to a minimum.	PPL Construction Dept. / CC	Supervise camp setup	During setup of the construction camps
9. Disturbance to Wildlife				

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities				
No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
9.1	Prior to commencement of construction and trench excavation, awareness trainings will be provided to contractor's management and field crew on matters related to the wildlife protection.	PPL construction deptt.	Provide environmental awareness training	Before commencement of drilling activity
9.2	Land uptake by Feeder Line /pipeline and associated access track / ROW will be minimized	PPL construction deptt, CC	Check compliance	After marking of the site layout on ground by the CC and prior to clearing of land at these areas.
9.3	The total duration of construction of feeder line/pipeline will be minimized by good management.	PPL construction deptt, CC	Check compliance	During the entire operation for the time specified
9.4	Food wastes will not be disposed of in the open area. Food wastes collected in waste segregation units will be buried on site or disposed off through waste contractor.	PPL Construction Depts / CC	Monitor collection and disposal of food waste	During the entire operation
9.5	Construction work near areas which show small mammal and reptile populations will commence after a soft start up and will be randomly monitored.	PPL Construction Dept. / CC	Check compliance	During construction activity
9.6	All mitigation related to minimizing the noise will be adhered to.	PPL Construction Depts / CC	Check compliance	During the entire project
9.7	Light used at the work site and camp / housing site will be kept to the minimum requirement	PPL Construction Depts / CC	Ensure that EIA requirements should meet	During the entire project
9.8	Hunting and trapping of wildlife will be prohibited.	PPL Construction Depts / CC	Check compliance	During the entire operation
9.9	Feeding or harassment of wildlife will not be allowed	PPL Construction Depts / CC	Check Compliance	During the entire operation
10. Socio-economic, archaeology and cultural Environment				

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities				
No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
10.1	The road and Feeder Line/pipeline route will be aligned to maintain safe distance from the edge of any graveyard and shrine (if any).	PPL construction deptt, CC	Check distance	Before and during construction
10.2	All community grievances will be recorded, addressed and maintained in a Community Complaint's Register.	PPL construction deptt, CC	Check the provision of complaint register and its access for communities	During the entire operation
10.3	Local source of drinking water will not be exploited unless measures listed in water use mitigation measures are followed	PPL construction deptt, CC	Monitor adherence with the requirements	During the entire project
10.4	The access road will be watered regularly to minimize the dust emissions (if required).	PPL construction deptt, CC	Check aliment of access routes	During construction activity
10.5	Construction of bypass to all major settlements and where necessary rerouting the access road so that a safe distance is maintained from a settlement.	PPL construction deptt, CC	Check alignment of access routes	During construction activity
10.6	Trench excavated for the feeder line should be barricaded and highlighted with signage, reflective tape and light to eliminate the fall hazard for the residents and their animals.	PPL construction deptt, CC	Ensure compliance	During construction activity
Hazardous material and solid waste				
11.1	Prepare a comprehensive list of all hazardous materials to be used, stored, transported and disposed of during Feeder line laying and associated activities.	PPL Construction Dept. / DC / CC	Check Compliance	Before the commencement of activities
11.2	Include a recycling strategy to be practiced by workers during all project phases.	PPL Construction Dept. / CC	Check Compliance	Before the commencement of activities
11.3	Develop a spill prevention and response plan for addressing spill prevention measures, training requirements, waste-specific spill response actions and spill response kits,.	PPL Construction Dept. / CC	Check Compliance	Before the commencement of activities

Table 7.5 (a): Mitigation Management Matrix for Feeder Line laying and Commissioning Activities				
No.	Impact and Mitigation Measures	Execution	Action/Monitoring Parameter / Monitoring Method	Timing
11.4	Develop a storm water management plan to avoid the project site runoff water from contaminating the soil and surface water body, to ensure compliance with regulations and prevent off-site migration of contaminated storm water or increased soil erosion.	PPL Construction Dept. / CC	Check Compliance	Before the commencement of activities
11.5	Train employees to promptly contain, report and/or clean up any oil or hazardous material spill.	PPL Construction Dept. / CC	Check Compliance	During the entire project
11.6	Provide secondary containment around all the fuel storage tanks and chemical storage area (if built) 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.	PPL Construction Dept. / CC	Check Compliance	During the construction of the storage tanks
CC = Construction Contractor				

Table 7.5 (b): Mitigation matrix for Feeder Line Decommissioning and Site Restoration phase				
No.	Impact and mitigation measures	Execution	Action / Monitoring Parameter / Monitoring method	Timing
1. Air quality				
	The exposure of construction workers to dust should be minimized by ensuring dust mask use among the workers. Truckloads of loose soil will be covered with tarpaulin. Soil and material piles at the site will be barricaded to avoid material escape / generation of dust. Construction machinery, vehicles should be properly tuned and kept in good working condition, minimizing exhaust and vehicular emissions. It should be ensured that exhausts from these equipment and vehicles comply with relevant PEQS.	PPL, CC	Ensure compliance, monitoring	During and after the decommissioning and dismantling

2. Land restoration and Soil erosion				
	The trench should be backfilled with soil ensuring that the top soil is spread at the top and compacted. The natural contour of the land should be restored. The trench, while removing the pipeline, should be barricaded and highlighted with signage, reflective tapes and light to reduce the risk of locals falling it.	PPL, CC	Ensure compliance	During restoration
3. Waste Management				
	Oil should be completely drained before removal of the feeder line to avoid soil contamination. Similarly, water should be completely drained from the pipeline to avoid soil contamination. Scrap metal should be segregated	PPL, CC	Ensure compliance	During dismantling / decommissioning and restoration
4. General mitigation measures include:				
	Pipelines left in place should be disconnected and isolated from all potential sources of hydrocarbons; Cleaned and purged to remove hydrocarbons and water; and sealed at their ends. Repair any damaged property Demobilize all materials and equipment from the camp site Dispose all left over wastes Ensure use of appropriate PPE by the workers	PPL, CC	Ensure compliance	During dismantling / decommissioning and restoration

Table 7.6 (a): Environmental Monitoring Plan for Well Site Construction and Well Drilling						
S. No.	Monitoring Aspects	Monitoring locations	Parameters	Frequency	Responsibility	Documentation
1	Ambient air Quality Monitoring	Well site, camp site surrounding	SO ₂ , NO, NO ₂ , SPM, PM ₁₀ , PM _{2.5} , O ₃ , Pb, CO	Once during the well drilling	Contractor	Laboratory test Reports
2	Exhaust Emissions Monitoring and	Vehicles, Generators & Fuel operated Machinery	CO, Smoke and Noise for Vehicles CO, NO _x , SO ₂ and PM for engine / generator.	Once during the project	Contractor	Laboratory test Reports

3	Waste water	Campsite	Effluent Flow, Temperature, pH, COD, BOD ₅ , TSS, TDS, Oil & Grease, Chloride & Phenolic Compounds	Quarterly (if wastewater discharged into any nullah)	Contractor	Laboratory test Reports
4	Noise level	Boundaries of the well and camp sites	Noise level (dBA)	Once in a project during construction and drilling operations (when work is started)	Contractor	Internally / externally
5	Solid Waste	Project site	Solid waste collection, storage, transportation and disposal	During routine monitoring	Contractor	Complete record waste generation record, waste disposal record & disposal certificate)
6	Drilling Mud	Drilling Site	Collection, storage, transportation and disposal	During routine monitoring	Contractor / HSE Monitor	Complete record
7	Occupational Safety	Well sites, campsite, project roads	HSE Records, Incidents and injuries	During routine monitoring	Contractor	Record of observations.

Table 7.6 (b): Environmental Monitoring Plan for Construction and Commissioning Phases of Feeder Lines

S. No.	Monitoring Aspects	Monitoring locations	Parameters	Frequency	Responsibility	Documentation
1	Exhaust and Emissions Monitoring	Vehicles, Generators & Fuel operated Machinery	CO, Smoke and Noise for Vehicles CO, NO _x , SO ₂ and PM for engine / generator.	Once during the project	Contractor	Laboratory test Reports
2	Noise Levels	Along pipeline route, nearest to sensitive receptors like	Noise Level dBA	Once in a project when work is started.	Contractor	Internally / externally

		communities and at boundary of camp site.				
3	Feeder line / Pipeline Hydrostatic Testing Wastewater (during commissioning)	Waste discharge point	Effluent Flow, Temperature, pH, COD, BOD5, TSS, TDS, Oil & Grease, Chloride and Phenolic Compounds	One time during hydrostatic testing (if wastewater discharged into any nullah)	Contractor	Laboratory test Reports
4	Solid Waste	Project Site	Solid waste collection, storage, transportation and disposal.	During routine monitoring	Contractor	Complete record (waste generation record, waste disposal record & disposal certificate)

Table 7.6 (c): Environmental Monitoring Plan for Operation & Maintenance Phase of Oil/Gas Wells and associated Feeder Lines						
S. No.	Monitoring Aspects	Monitoring locations	Parameters	Frequency	Responsibility	Documentation
1	Exhaust and Emissions Monitoring	Vehicles, Generators & Fuel operated Machinery	CO, Smoke and Noise for Vehicles CO, NOx, SO2 and PM for engine / generator.	Once in a year Once in a quarter	Adhi Field Incharge	Laboratory test Reports
2	Soil Survey / Visual Inspection	Along the Feeder line route and Well Sites	Visual inspection on monthly basis. Contaminated soil will be replaced with native soil and disposal of contaminated soil through PEPA approved waste contractor.	Monthly Basis On need basis.	Adhi Field Incharge	Record of observations
3	Solid Waste	Along the feeder line Route and Well Sites	Solid waste collection, storage, transportation and disposal.	During routine monitoring	Adhi Field Incharge	Complete record (waste generation record, waste disposal record & disposal certificate)

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 of 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 and rainwater drainage etc.

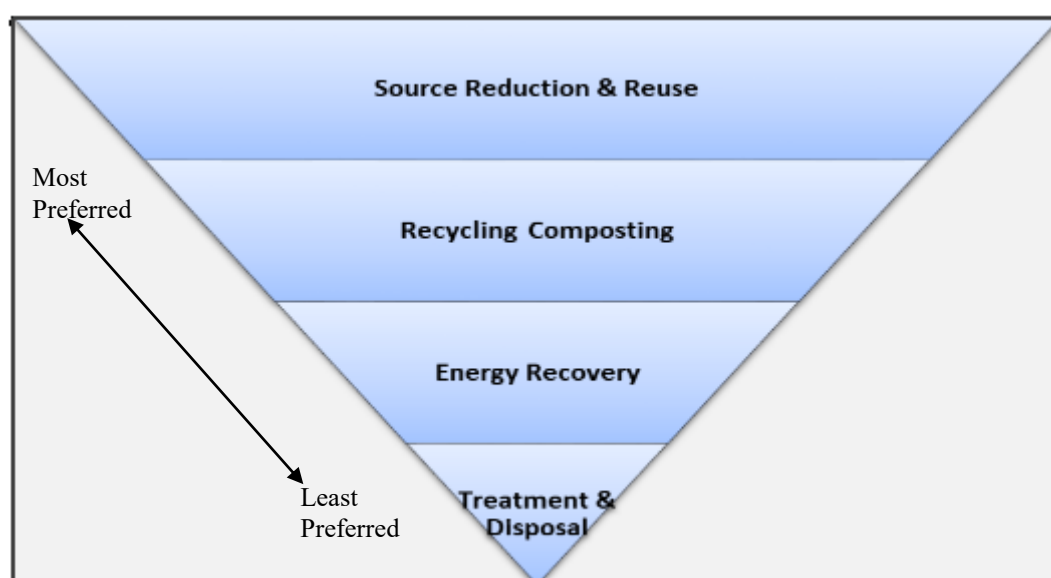


Table 7.7: List of Different Type of Waste and Disposal Options

Type of Waste	Description	Disposal Options
Food Waste (decayable 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

Table 7.7: List of Different Type of Waste and Disposal Options

Type of Waste	Description	Disposal Options
		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 Punjab EPA approved waste contractor. ▪ Expired drugs to be taken by contractor for disposal/incineration through Punjab EPA approved waste contractor.
Workshop Waste	Used oil, ferrous/non-ferrous materials, batteries,	▪ Handover vehicle related waste (excluding hazardous waste) to local contractors for recycling²⁸ ▪ Used lubricating oil shall either be provided to OGRA reclamation license holder lubricant reclamation plant for reclamation or disposed off through PEPA approved waste contractor. ▪ Batteries to be hauled away by contractor for recycling
Demolition Waste	Dirt, concrete, plaster, plumbing, heating and electrical parts	▪ Dirt, concrete and plaster to be buried at site; and ▪ Plumbing, heating and electrical parts to be hauled away by contractor for recycling
Liquid Waste	Wastewater from kitchen and washing areas, sewerage	▪ All liquid wastes from kitchen, washing areas and sewage are collected and disposed of into septic tank system
Drilling waste	Drill cuttings, excess and spent drilling mud, rig wash water	▪ WBM cuttings will be stored in a lined pit on the site. ▪ Water based mud and drill cuttings will be disposed onsite by either allowing the mud / liquid to evaporate (to the extent possible) or wastewater will be treated / disposed off through waste contractor and then burying the dry drill cuttings encapsulated within the HDPE liner and backfilling with at least 1 meter of top soil cover. by allowing the mud / liquid to evaporate and covering the pit by 1 meter of top soil cover. ▪ In case the drilling mud pit is an agricultural land, the drilling mud should be disposed of as per the relevant guidelines of LSO 29 B.

²⁸ PPEPCA Sectoral for Upstream Petroleum Sector – Onshore Volume 2 of 2

Table 7.7: List of Different Type of Waste and Disposal Options

Type of Waste	Description	Disposal Options
Well testing waste, well completion waste, testing fluid / brine solution / acid	Completion fluid (completion brine, crude oil and formation / produced water)	Completion brine is collected in flare pit (made of brick masonry with plastered) for disposal by natural evaporation. Whereas crude oil is collected in storage tanks then transported to nearby operating facility for further processing at Plant. Moreover, formation water, produced during testing, drained into pit provided with impermeable membrane lining for disposal by evaporation.
	Produced Water during hydrocarbon production	Oil & gas reservoirs contain water known as produced water or formation water produced during hydrocarbon production. Options may include: Option-1: Injection into the reservoir to enhance oil recovery, Option -2: Disposal into a dedicated disposal well drilled to a suitable porous subsurface geological formation. Option-3: Produced water is collected in lined evaporation pits, where the water is evaporated (natural or induced) salt cakes (if any) left behind is disposed through PEPA approved waste contractor. Option-4: Produced water treatment and then discharges to surface waters or to land. This option is considered only if there is no other option available. Discharged produced water should be treated to meet the PEQS.
	Hydrotesting water	Hydrostatic testing of equipment and pipelines involves pressure testing with water to detect leaks and verify equipment and pipeline integrity. The wastewater shall be collected in lined pit for natural evaporation or discharged into the nearby nallah after taking approval from relevant authority / TMA and ensuring wastewater meets PEQS limits for effluent.
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 bunded area lined with an impermeable base.

Table 7.7: List of Different Type of Waste and Disposal Options

Type of Waste	Description	Disposal Options
		Finally, the contaminated soil will be disposed of through Punjab EPA certified waste contractor.

Wastewater from Pipeline Hydrotesting

Hydrostatic testing of pipelines involves pressure testing with water to detect leaks and verify equipment and pipeline integrity. Approximately 31,850 US gallons of water (approximately 4,900 US Gallon/km considering 06-inch inner diameter pipeline) would be used for hydrotesting of the feeder line. The wastewater shall be collected in lined pit for natural evaporation or discharged into the nearby nullah, only if wastewater is meeting PEQS limits for effluent and after taking approval from relevant authority / TMA.

7.9 Change Management Plan

7.9.1 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.

7.9.2 Change in Record Register

A record register will be maintained at 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 department, and will be used internally.

7.9.3 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 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:

- Well blowout;
- 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 to product contamination, 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 site specific emergency response plan and submit it to PPL for review.

7.11 Tree Plantation Plan

Objectives:

The objectives of the Tree Plantation are to improve the aesthetics of microenvironment and protect the local flora. Tree plantation will ensure a green cover tolerating pollutant gases and solid particulates present in the atmosphere.

Location:

Keeping in view the environmental importance, trees will be planted in and around the camp site and well site. Suggested locations include well site boundaries, residential campsite, and places where production activities do not affect the growth of the saplings.

Suggested Plant Species:

Suitable tree species need to be selected with adoption of simple techniques which require minimum investment and care. Following list of trees are suggested for tree plantation at project site. They are mostly deciduous and evergreen tree types suitable to be grown in the area. Plants suitable and indigenous to local area will be planted.

Table 7.8: List of Suggested Plants

Sr. No.	Scientific Name	Local Name
1.	<i>Delbergia sissoo</i>	Sheesham or Tahli
2.	<i>Populus</i>	Poplar
3.	<i>Acacia modesta</i>	Phulai
4.	<i>Acacia nilotica</i>	Babul
5.	<i>Acacia Arabica</i>	Kikar
6.	<i>Eucalyptus globulus</i>	Sufeda

Protection of plantation on site

- During plantation a space of 8ft will be maintained between the plants.
- Regular watering will be done
- Maintenance of plants shall be carried out.
- The manure will be added when plantation take up. For this propose cow dung may be used. No other manure is needed for proposed plantation. The cow dung is easily available in the area.

7.12 Decommissioning and Site Restoration

This section discusses generalized site restoration phase activities for the proposed project. Site restoration will be performed either;

1. After the well has been drilled / feeder line has been laid or
2. After the well and pipeline have completed their service life (also known as final decommissioning).

1. Site restoration after the well has been drilled and the feeder line has been laid

1.1 Site Restoration after drilling activities

Restoration of the well site, access track and campsite will depend on whether the drilled well is a success or failure. The restoration measures that will be carried out have been separately listed as follows for the two possibilities;

a. Complete restoration – Dry well

If there are no indications of a commercial quantity of oil and gas, either before or after testing / study, then the well will be declared dry and will be plugged and abandoned in line with the local regulations and good industrial practices. The well site, camp and portion of access track which leads to the well site from the main community track will be restored.

Mitigation measure – Complete restoration

- All equipment and machinery at the well site will be demobilized
- All wastes at the well site will be disposed of according to the requirements of the EIA.
- All the fencing / barriers surrounding the base camp area will be removed, and the area will be levelled.
- The concrete structures if desired by the land owner may be left intact after taking concurrence in the form of NOC from respective land owner and considering that no environmental hazard / issue will occur. Otherwise, the concrete structures will be broken up and disposed or reused for backfilling of pits / septic tanks (below main rooting zone, 1 - 1.5 m) or provided to locals for re-use (backfilling).
- 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. Dispose wastewater in an environmentally friendly manner.

- Restore soak pit after removal of wastewater & cover and backfilling it with at least 1 meter of native soil cover. Dispose wastewater in an environmentally friendly manner.
- Contaminated bricks of black/grey water & others shall not be given to locals for any purpose.
- Water based mud and drill cuttings can be disposed onsite by either allowing the mud / liquid waste to evaporate (to the extent possible) or treated / disposed off through waste contractor and then burying the dry drill cuttings encapsulated within the HDPE liner and backfilling with at least 1 meter of native top soil cover.
- In case the drilling mud pit is an agricultural land, the drilling mud should be disposed of as per the applicable and relevant guidelines of LSO 29 B.
- General restoration of the site area including landscaping and restoration of drainage where required.
- The access roads and other construction works / foundations etc. may be left intact if local people desire to use them. If not, they too will be restored and the land returned to its original use.
- Restore flare pit in an environmentally friendly manner.
- General restoration of the site area and drainage where required.

b. Partial Restoration – Producing Well

An alternative situation is if commercial quantities of oil and gas are discovered after testing then the well may be suspended while testing results of produced hydrocarbon are analyzed and procurement of completion equipment. In this case, the well will be secured by running kill sting and well will be partially restored. After availability of required equipment and installation of wellhead and downhole completion equipment, the well will be produced.

Mitigation measure – Partial restoration

- The well site and access roads will be retained to support well access work for further testing.
- The outer chain link fence may be retained as a safety measure to keep wildlife away from the pit areas.
- All wastes at the well site will be disposed of in environment friendly manner.
- The wellhead will be enclosed by a locked steel cage. This will serve as both a safety and security measure as the site will be down-manned pending further development operations work.
- Either liquid / wastewater and drill cuttings will be removed from the site and disposed off in an environmentally friendly manner or WBM pit(s) will be closed as per PPEPCA sectoral guidelines.
- In partial restoration, wastewater will be removed from septic tank / soak pit and disposed of in an environmentally friendly manner and entrance pipe will be blocked so that the rain water do not enter into the pit or septic tank.
- Contaminated bricks of black/grey water & others shall not be given to locals for any purpose.

1.2 Restoration after Feeder line laying

ROW of the feeder line will be restored to its original condition, as the proposed feeder lines are underground, and excavated soil will be backfilled. For reference purpose a photographic record of the project site prior to the set up and after the restoration will be taken.

Mitigation Measures

- Restore the land after laying the feeder line to its original level
- Compact the surface after backfilling, in the village/town where the feeder line will be laid in the street/pathway, to ensure hassle free movement of the residents.
- Demobilization of all equipment and machinery
- Disposal of any waste material remaining at the time of completion of the operation.
- General restoration of the site area including landscaping and restoration of drainage where required.
- Relieve compacted areas to enable re-vegetation in the open land.

2. Site restoration after completion of well and Feeder Line service life

2.1 Decommissioning and Well Abandoning

A well reaches the end of its producing life when the cost to operate it exceeds the revenue it generates. Decommissioning is the process followed to take a well out of service once it has reached this point.

Decommissioning a well involves 3 main steps:

- Dismantling the producing and transportation facilities,
- Plugging and abandoning the well and
- Restoring the producing area to its original state.

The primary objective of plugging and abandoning a well is to totally contain any remaining hydrocarbons and in particular, protect groundwater reserves. This process also limits fluid movement within the wellbore until nature restores the pressure balance that existed before the well was drilled. Plugging and abandoning is commonly referred to as “P&A”.

Decommissioning a well involves removing all surface equipment, production tubing and uncemented casing. To plug the well, sections of the wellbore are filled with concrete to isolate the flow of reservoir fluids from each other and to the surface. Finally, the surface casing is cut off and a cap is welded in place.

Following general mitigation measures should be adopted to eliminate or reduce the potential impacts and risks.

Mitigation measure

- All equipment and machinery at the well site will be demobilized
- All wastes at the well site will be disposed of according to the requirements of the EIA.

- All the fencing / barriers surrounding the base camp area will be removed, and the area will be levelled.
- The concrete structures if desired by the land owner may be left intact after taking concurrence in the form of NOC from respective land owner and considering that no environmental hazard / issue will occur. Otherwise, the concrete structures will be broken up and disposed or reused for backfilling of pits / septic tanks (below main rooting zone, 1 - 1.5 m) or provided to locals for re-use (backfilling).
- 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. Dispose wastewater in an environmentally friendly manner.
- Restore all the pit in environment friendly manner.
- Contaminated bricks of black/grey water & others shall not be given to locals for any purpose.
- The access roads and other construction works / foundations etc. may be left intact if local people desire to use them. If not, they too will be restored and the land returned to its original use.

Feeder Line

Feeder line decommissioning is the termination of all oil and gas transport through a pipeline at the end of well life. Decommissioning of pipelines requires adequate planning, manpower, and resources in line with local land use and environmental regulations.

Decommissioning options for Feeder Lines include leaving them in place, or removing them for reuse, recycling or disposal, especially if they are above ground and interfere with human activities. Environmental impacts related with the decommissioning of feeder line are

- Oil spillage from pipelines.
- Generation of dust,
- Noise due to the movement/operation of heavy machinery involved in decommissioning activities.
- Vehicular emissions,
- Occupational health and safety risks
- Waste management

Mitigation measure

- The exposure of construction workers to dust should be minimized by ensuring dust mask use among the workers.
- Truckloads of loose soil will be covered with tarpaulin.
- Soil and material piles at the site will be barricaded to avoid material escape / generation of dust.
- Construction machinery, vehicles should be properly tuned and kept in good working condition, minimizing exhaust and vehicular emissions. It should be ensured that exhausts from these equipment and vehicles comply with relevant PEQS.

- Pipelines left in place should be disconnected and isolated from all potential sources of hydrocarbons; cleaned and purged of free hydrocarbons; and sealed at their ends.
- Repair any damaged property
- Demobilize all materials and equipment from the camp site
- Dispose all left over wastes
- Backfill excavation and trench with topsoil
- Ensure use of appropriate PPE by the workers

A preliminary decommissioning and restoration plan should be developed that identifies disposal options for all equipment and materials, including products used and wastes generated on site. The plan should consider the removal of oil from pipe lines, pipeline decommissioning and site restoration.

7.13 Implementation of Environmental Management Plan and Environmental Budget

The expected unit cost of major component of EMP is given below. Expected cost for the implementation of Environmental Management Plan has been calculated and presented in tables below.

Table 7.10: Cost Estimates for EMP Implementation – Well Site Construction, Well Drilling and Feeder line Installation Activities

Activity	Cost (Rupees PKR)			Remarks
	During Well Construction	Well Drilling	During Feeder-lines Installation	
Training / awareness Program	In house	In house	In house	Dedicated HSEA is deputed by PPL for in-house trainings and awareness programs.
Provision of PPEs (per person x total workforce)	20,000 per PPL staff	20,000 per PPL staff	20,000 per PPL staff	PPEs are provided on yearly basis.
Damage to natural drainage system (tentative cost)	N/A	N/A	N/A	No such damage is envisaged
Water sprinkling	Rs 5 per liter	Rs 6.73 / bbl. / km	Rs 5 per liter	For dust suppression
Ambient air monitoring	N/A	Rs 60,000 per location	N/A	Carried out through PEPA approved Lab to ensure the parameters meet the PEQS limits.
Noise and Emissions from equipment and vehicles	30,000 / engine 2,000 / vehicle	Rs 30,000 / engine Rs 2,000 / vehicle	30,000 / engine 2,000 / vehicle	Carried out through PEPA approved Lab to ensure the parameters meet the PEQS limits.
Testing of drinking water (chemical + biological)	Rs 40,000 per sample	Rs 40,000 per sample	Rs 40,000 per sample	Carried out through PEPA approved Lab to ensure the parameters meet the PEQS limits for Drinking Water.
Disposal, handling and treatment of WBM mud	N/A	Rs 95 / bbl	N/A	WBM is disposed in waste pits as per PPEPCA guidelines.
Provisions for firefighting and emergency response	N/A	Nil	N/A	Firefighting and ER arrangements are included in the drilling rig rental and well construction & feeder-lines installation work contracts respectively.

Table 7.10: Cost Estimates for EMP Implementation – Well Site Construction, Well Drilling and Feeder line Installation Activities

Activity	Cost (Rupees PKR)			Remarks
	During Well Construction	Well Drilling	During Feeder-lines Installation	
Provision for detection of H ₂ S	N/A	Nil	N/A	Not applicable as no H ₂ S is envisaged.
Third Party Trainings (Defensive Driving, First Aid etc.)	N/A	10,000 / person	N/A	External third-party trainings are provided depending upon the job role.
Construction of septic tank / Soak pits	8Lac / 5lac	8lac / 5lac	8Lac / 5lac	Estimated cost for construction of septic tank / soak pits along
Construction of pits (2 nos.) for handling WBM.	Rs 2.84 M without Pit liner	-	N/A	Pit liner cost is approximately 27 PKR / sq. ft.
Flare pit construction cost	Rs 1 M	-	N/A	
Spill containment measures (secondary containment for oil and fuel storage area, spill kit, drip trays etc.)	Rs 5 lac	Rs 5 lac	N/A	
Color coded bins for waste segregation	Rs 7000/piece of 200liter waste bin	Rs 9500 / day	Rs 7000/piece of 200liter waste bin	The waste pits located at existing wells serve as reservoirs for collection of hydro-testing water used in the process of testing feeder lines.
Management / Disposal of hazardous and non-hazardous waste	Rs 500/Kg		Rs 500/Kg	PEPA approved third party contractor is hired for solid waste management services including color coded bins during drilling phase.
Construction of pit for Hydrotesting water (for feeder line)	N/A	N/A	N/A	The waste pits located at existing wells serve as reservoirs for collection of

Table 7.10: Cost Estimates for EMP Implementation – Well Site Construction, Well Drilling and Feeder line Installation Activities

Activity	Cost (Rupees PKR)			Remarks
	During Well Construction	Well Drilling	During Feeder-lines Installation	
				hydro-testing water used in the process of testing feeder lines.
Testing of wastewater (before sprinkling / disposal in Nallah)	Rs 15,000 per sample	Rs 15,000 per sample	Rs 15,000 per sample	Carried out through PEPA approved Environmental Laboratory.
Disposal, handling and treatment of OBM mud	N/A	N/A	N/A	Not applicable on these wells.
Environmental Liabilities including WBM disposal	Rs. 4 million			
Treatment of WBM liquid cuttings	N/A	Rs 95 / bbl	N/A	
Restoration Cost – Civil Structures & Others	Rs 4 M			
Commissioning of feeder lines				
Training / awareness Program	N/A	N/A	In house	
PPEs (per person x total workforce)	N/A	N/A	Rs 20000/person	
Provisions for firefighting and emergency response	N/A	N/A	N/A	The Plant is entrusted with the duty if firefighting and emergency response during commissioning of feeder lines.

Table 7.10: Cost Estimates for EMP Implementation – Well Site Construction, Well Drilling and Feeder line Installation Activities

Activity	Cost (Rupees PKR)			Remarks
	During Well Construction	Well Drilling	During Feeder-lines Installation	
Water for hydrotesting	N/A	N/A	Rs 1000 per 3000 gallon bowser	Water to be brought in from outside the block due to water scarcity

Table 7.11: Cost Estimates for EMP Implementation – Operational Phase

Activity	Cost (Rupees PKR) Gross	Remarks
Training / awareness Program	-	In-house
PPEs (per person x total workforce)	-	No additional budget required. Routine PPEs and QHSE Plant budget shall be consumed.
Provisions for firefighting and emergency response	-	
Vehicular emission monitoring once a year	-	No additional budget required. Routine emissions testing as per approved EMP shall be carried out.
Feeder line testing / inspection	-	No additional budget required. Routine testing & inspection budget shall be used.
Land clean up and restoration in case of leak from FL	-	No additional budget required. Routine testing & inspection budget shall be used.

8.0 CONCLUSION

The project proposed by Pakistan Petroleum Limited includes following components;

- Drilling of development wells to increase the production of oil and gas and
- Laying of associated feeder lines (in case well is successful) in Adhi Mining Lease;

In order to assess the environmental and socioeconomic impacts of the proposed project and associated activity the EIA study has been conducted to evaluate the impacts and propose mitigation measures. The findings from the study conducted have been categorically recorded and presented in this report.

Pakistan is striving through a severe energy crisis that has directly and indirectly affected all sectors of the economy over the past decade. Pakistan generates its power from an energy mix that includes oil, gas (natural gas and liquefied natural gas, LNG), coal, renewable sources (solar, wind and hydro energy), nuclear, and biomass. Pakistan's energy sector is heavily dependent on imported fuel (oil and LNG). In 2019, the country produced 4.3 million metric tons of crude oil, enough to meet only 20 percent of the country's total petroleum requirements. The remaining 80 percent was met through imports of crude oil and refined petroleum products worth \$15-16 billion annually.²⁹

In order to assist the economic development and reduce the import bills, there is a dire need to explore and increase the production of oil and gas. The proposed development wells would help achieve this goal besides having a positive impact on socioeconomic conditions as it would provide more job opportunities to the local people and generate opportunities for more business.

A baseline survey of the project area conducted by the EIA study team provides the basis of establishing profiles of natural, socioeconomic and cultural environments which might be impacted by project activities. The proposed exploration activities does not lie within any protected area.

All the requirements have been addressed in this EIA, which has covered the following:

- The proposed project activities;
- Alternatives considered in finalizing the project location, design and other aspects;
- Environmental conditions of the project area;
- Legislative requirements related to the project;
- Potential environmental impacts of the proposed project activities on the physical, natural and socio-economic receptors;
- Mitigation and monitoring measures in form of EMP that will help in avoiding or minimizing these impacts.

All activities associated with the proposed project have been reviewed and their possible impacts methodically analyzed and mitigation measures have been provided.

²⁹ Energy Resource Guide - Pakistan - Oil and Gas, International Trade Administration USA, 2021

Major impacts from project activities include changes in landscape, 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, preferred use of existing tracks, minimize vegetation clearance, disposal of sewage water through septic tank and soak pit, reuse of greywater for water sprinkling, provision of secondary containment around all fuel storage tanks and chemical storage area of suitable size, disposal of produced water/formation water in lined evaporation pond and disposal and restoration of water-based drilling mud pit in accordance with applicable and relevant guidelines of PPEPCA / LSO 29 B.

A comprehensive Environmental Management Plan has been put together and provided in the report for adherence which will ensure the evasion of environmental degradation or contamination.

EIA study concludes that the potential environmental impacts, arising from well construction, well drilling and feeder line laying activities can reasonably be mitigated through Environmental Management Plan, Environmental Monitoring Plan and good industry practices.

It is thus recommended that the EIA for the proposed project be approved with the condition that all corrective and mitigation measures proposed in this report will be implemented with diligence.

APPENDICES

List of Stakeholders Consulted				
S. No	Stakeholders			Date
1	List of staff members involved in the project			01-03-2023
	S#	Name	Designation	
	1.	Mr. Abdul Malik Kakar	Head of Adhi, Dhok Sultan and Partner Operated Asset (ADS & PO)	
	2.	Mr. Syed Dost Ali	Senior Manager Production Technology (Drilling and Completions Engineering)	
	3.	Mr. Tariq Hussain	Senior Manager (Construction)	
	4.	Mr. Abdul Waheed	Senior Manager Subsurface – ADS&PO	
	5.	Mr. Zahid Mahmood	Manager (Construction)	
	6.	Mr. Kamran Sher	Chief Community Development	
	7.	Mr. M Mohsin Usmani	Chief Engineer (Drilling)	
	8.	Mr. Mazhar Azim	Chief Engineer (Mechanical) – ADS&PO	
	9.	Mr. Sohail Ahmed Mallah	Deputy Chief Engineer (Drilling & Completions Engineering)	
	10.	Mr. Farrukh Daud	Deputy Chief Geologist - ADS&PO	
	11.	Mr. Sana Ullah Khan	Deputy Chief Engineer (Construction)	
	12.	Mr. Salman Haider	Senior Community Development Officer	
	13.	Mr. Jamil Akhtar	Senior Manager (Quality, Health, Safety & Environment)	
	14.	Mr. Zeeshan Raza	Senior Engineer (Health, Safety & Environment)	
	15.	Mr. Abid Hussain	Deputy Chief Engineer (Health, Safety & Environment)	
	16.	Mr. Fawad Ahmed	Senior Engineer (QHSE) - Drilling & Completions Engineering.	
2	Sr.	EPA Offices	Officer Consulted	17-03-2023
	1.	District Office Rawalpindi, Punjab EPA	Mr. M. Rafique (Deputy Director)	
3	Forest Department		Officer Consulted	17-03-2023
	Forest Department, District Rawalpindi		Mr. Imran (Assistant Forest Officer)	
4	Wildlife Department		Officer Consulted	17-03-2023
	Wildlife Department, District Rawalpindi		Mr. Ahsan Ahmed Raja (Deputy Director Wildlife)	

List of Stakeholders Consulted				
S. No	Stakeholders			Date
5	TMA Gujar Khan	Officer Consulted		17-03-2023
	Municipal office, Gujar Khan	Mr. Chand Muneeb (Municipal Officer)		
6	Agriculture Department	Officer Consulted		17-03-2023
	Agriculture office, Chakwal District	Mr. Arif (Agriculture Officer)		
4	Environmental Expert Dr. Hamid, Research Associate, Quaid-e-Azam University, Islamabad			16-03-2023
5	Consultation with Communities			16 and 17-03-2023
	Rawalpindi District			
	Mudasir Hussain	Farmer		
	Mobeen Basharat	Shopkeeper		
	Rauf Ali	Retired govt employee		
	Zahoor Ali	Farmer		
	Abdullah	Student		
	Sareer	Driver		
	Niaz Hassan	Politician		
	Abdul Saboor	Carpenter		
	Waqas	Social worker		
	Illyas raheem	Teacher		
	Sumair Ali	Student		
	Sheraz	Shopkeeper		
	Zain	Govt employee		
	Syed Ghulam Rasool	Cattle farm owner		
	Shakir rehman	Farmer		
	Moneeb	Local resident		

Stakeholders' Feedback

Consultation with Proponent

PPL (the proponent) has a comprehensive QHSE Management System to continuously improve its performance in the areas of Quality, Health, Safety & Environment. Starting from the project award to site visits, project understanding, data acquisition, report preparation, review and finalization and report submission, PPL was in contact with consultant and data and information sharing was done through meeting, telecons and emails. Consultant shared the draft report with PPL for its review and comments. Draft EIA report was reviewed by all PPL internal stakeholders and consolidated comments were shared with EMC for incorporation in the report.

Key Findings of Primary Consultation

- The major concern of settlement was contamination and degradation of water source at the area from drilling activities.

- Road should be constructed where required. Truck and heavy vehicle mobilize in the area. therefore, in CSR they should construct road.
- No proper Drainage System in the project area
- Local persons should be considered for job during project execution.
- The project area does not have any permanent surface water source. The locals store rain water in ponds and lake for use in agriculture and domestic purposes. Some oil and gas facilities in the area are discharging their wastewater directly into surface water. Contamination of these sources of water has further aggravated the water shortage situation for the locals. This problem should be resolved on priority.
- Due to oil and gas exploration projects, agriculture land got affected, care should be taken while planning and executing the project.
- The proposed project is good for the local economy and opportunity of employment for the local people.
- Local businessmen have no objection to the project as long as their business isn't affected.
- Proponent and their contractor should not disturb the privacy of residents during the project activities.
- During the movement of vehicles, drivers should drive carefully to avoid any accident.
- If in case any damage is done to standing crops, compensation should be done on site.

Key Findings of Secondary Consultation

Feedback by EPA District Offices:

Deputy Director EPA Rawalpindi;

- Settlement of the proposed project area have concerns of water contamination from project activities. it is recommended that no waste will be dumped in open environment. Produced water, oil and water base mud should be treated prior to disposal.
- The project should be constructed at safe distance from the settlement.
- Public hearing will be conducted on the project site.

Feedback by Forest department:

According to him there is no forest in the surrounding of proposed project. The project lies in Agriculture land use pattern. It is responsibility of project developer to consider different environmental parameters of the area and to treat the waste generation from the proposed project. Open dumping will not be allowed.

Feedback by Wildlife department

The location and activities of the Project were explained to the officer. As per him the proposed project area is agriculture land and settlement are also present. therefore, no major concern on wildlife anticipated. Furthermore, he requested to write letter to the DG of wildlife Punjab then he will be able to give any official remark on the project.

Feedback by TMA Gujar Khan

The location and activities of the Project were explained to Mr. Chand Muneeb. The officer said that it was old practice of waste approval from TMA prior to its disposal. Now the approval will be taken from district council office. The PPL has to consult District council for waste disposal activities.

Feedback by Agriculture Department

Appendix II: Source of data and list of reference material used

The meeting was held at agriculture office of Chakwal. The waste should not be dumped in agriculture field. The contaminated water and pollutant can be moved up to the food web if it will not be properly disposed of. Therefore, used chemicals and waste should be environmental treated and disposed away from settlement and agriculture field. International standard should be followed for disposal.

Feedback by Environmental Expert

- Strict waste management practices should be implemented. Contamination of land and water resources should be avoided,
- Resource conservation, recycling and reuse policy should be implemented.
- Vegetation clearance should be minimized,
- Social issues that may arise due to project activities should be amicably resolved,
- Special attention should be given to site restoration to restore land to original condition.



Consultation with locals



Consultation with locals



Consultation with locals



Consultation with locals

Appendix II: Source of data and list of reference material used

	
Consultation with locals	Consultation with locals
	
Consultation with locals	Consultation with locals
	
Consultation with locals	Consultation with locals
	
Consultation with Mr. Rafique (Deputy Director EPA) Rawalpindi	

Appendix II: Source of data and list of reference material used



Consultation with Mr. Imran (Assistant Forest Officer) Rawalpindi



Consultation with Mr. Ahsan Ahmed Raja (Deputy Director Wildlife) Rawalpindi



Consultation with Mr. Chand Muneeb (Municipal Officer Gujar Khan)



Consultation with Mr. Arif (Agriculture Officer) Chakwal

Source of data and list of reference material used

- Project data received from client (Pakistan Petroleum Limited)
- Pakistan Petroleum Limited Website
- www.fao.org
- Field surveys conducted in project area
- Environmental monitoring conducted in project area
- The Urban Unit
- rawalpindi.punjab.gov.pk
- chakwal.punjab.gov.pk
- Geological survey of Pakistan
- Punjab EPD Reports
- worldweatheronline.com
- weatherspark.com
- Punjab Bureau of Statistics
- Pakistan Livestock Census
- schoolportal.punjab.gov.pk

Terms of Reference

Project Title: Drilling Activities in Adhi Mining Lease

Project Location: District Rawalpindi.

The Environmental Consultant firm, “EMC Pakistan Pvt. Ltd.” to carry out environmental assessment of proposed Drilling and feeder line/pipeline laying activity in accordance with the guidelines of Punjab Environmental Protection Agency (PEPA). The Environmental Assessment Study will be done for proposed Drilling and feeder line/pipeline laying activities in Adhi Block. The block has total area of 212.86 sq. km.

The proposed project includes drilling of 03 development wells which are in tehsil Gujar Khan, district Rawalpindi. In case of discovery of oil / gas, feeder lines will be laid from the well to the oil / gas gathering point (for onward supply to the production facility i.e. Adhi Plant).

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 Punjab EPA.

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. Stakeholder Consultation

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 Punjab EPA.

XII. Conclusions

The Environmental consultant shall prepare Initial Environmental Report and subsequently submit to relevant authority after obtaining review / approval from Pakistan Petroleum Limited. Furthermore, consultant shall also be responsible for obtaining approval from Punjab EPA.

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.

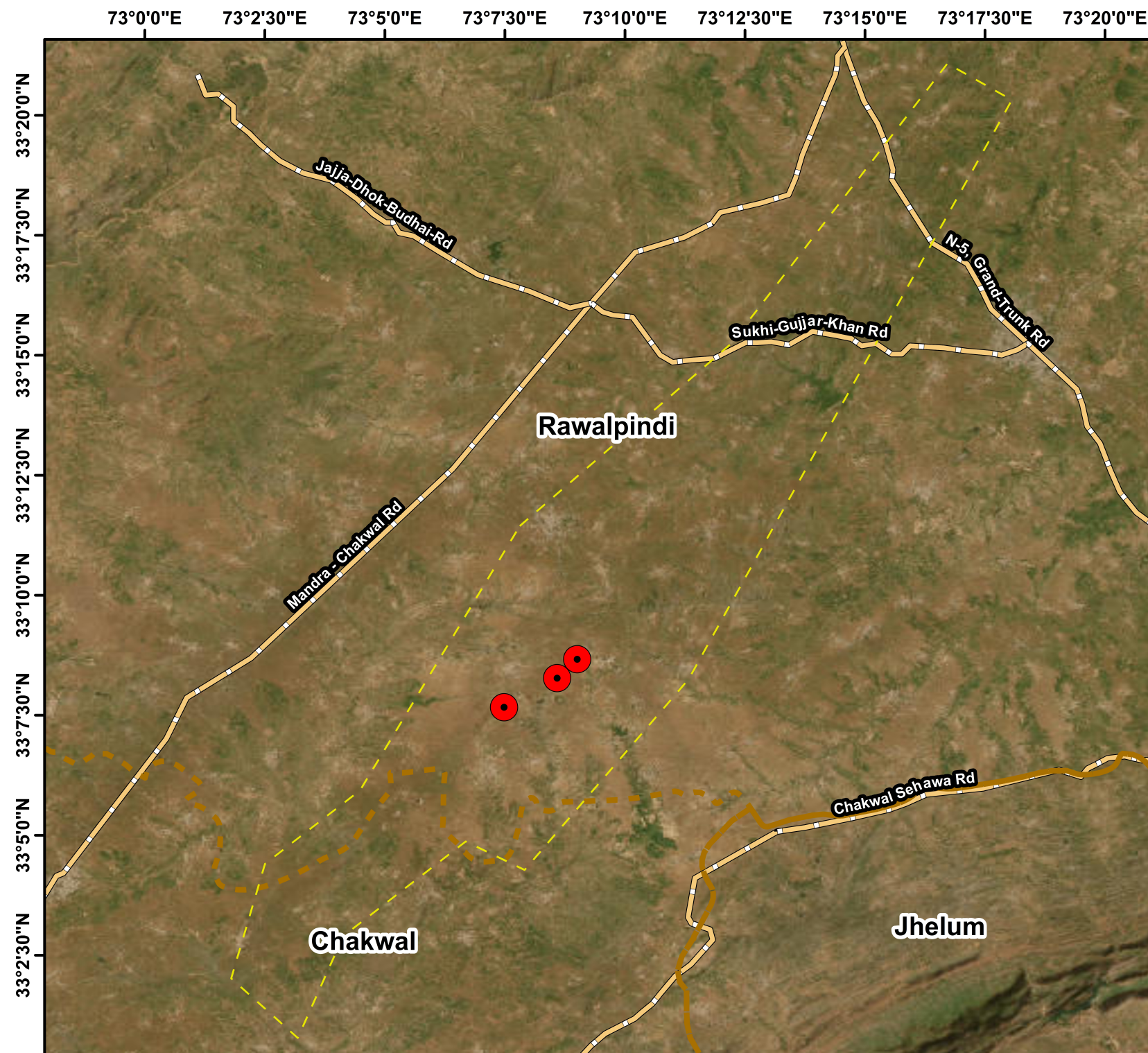
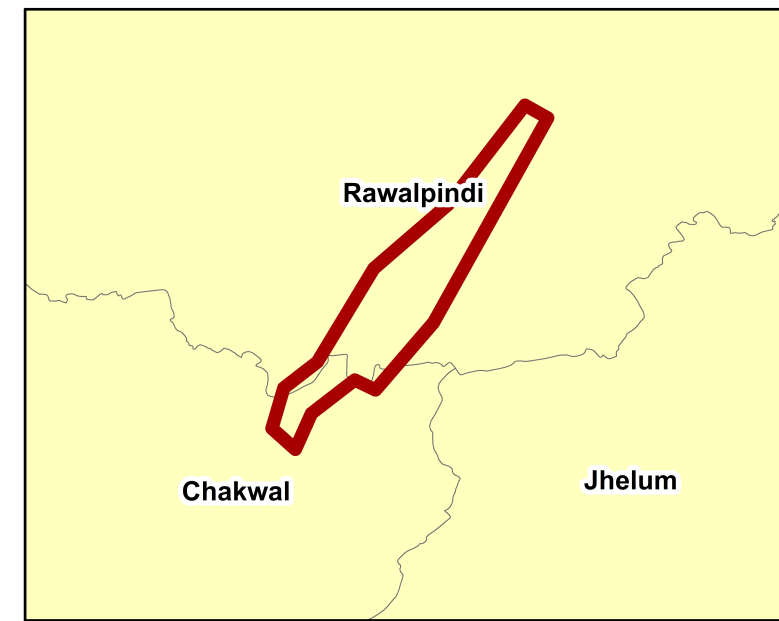
EIA Study Team

List of EIA Study Team members		
S. No	Names	Positions
1.	Mr. Syed Nadeem Arif	Project Manager
2.	Mr. Ahmed Zohair Siddiqui	Environmental Engineer/ Team Leader
3.	Mr. Sohaib Tariq	Environmental Engineer
4.	Mr. Syed M. Omer Arif	Environmental Engineer
5.	Dr. Muhammad Mohiuddin	Senior Environmentalist
6.	Mr. Adil Khan	Environmentalist
7.	Mr. Nisar Ali Khan	Environmentalist and Field Officer

ANNEXURES

Annex – I

Location Map of Project Sites and Adhi Mining Lease



Legend

- Adhi ML, Punjab
- District Boundary
- Roads
- Feeder Line Route
- Proposed Development Well Sites

Location Map

Environmental Impact Assessment
EIA

Drilling Activities in Adhi Mining Lease



0 1 2 4 6 8 Kilometers



Prepared by Hamyadah Raees

Annex – II

Adhi Mining Lease Agreement

No.DGP(1)-5(36)/84-Vol-III-Pt
Government of Pakistan
Ministry of Energy (Petroleum Division)
Directorate General of Petroleum Concessions
03rd Floor, Petroleum House, G-5/2

Islamabad 22nd November, 2019

✓
Managing Director,
Pakistan Petroleum Ltd,
PIDC House, Dr. Ziauddin Ahmed Road,
P.O Box 3942,
Karachi.

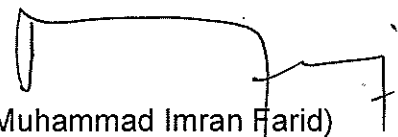
Subject: **APPROVAL FOR RENEWAL OF ADHI MINING LEASE**

Dear Sir,

I am directed to refer to your letter No.Adhi/AdhiML-4thRenewal dated 26th July, 2019 and previous correspondence resting on above subject and to say that Government has been pleased to grant five (05) years renewal w.e.f. 13th November, 2019 over Adhi Mining Lease covering an area of 82.19Sq Miles, located in districts Rawalpindi & Chakwal, Punjab in accordance with rule-34 of Pakistan Petroleum (Production) Rules, 1949 and Article 51(1) of Adhi Mining Lease Deed subject to the condition that M/s PPL shall fulfill all the existing statutory obligations as per applicable Rules/PCA/lease Deed etc and will clear all outstanding obligation(s), if any, within thirty (30) days from issuance of this letter.

2. All other terms and conditions of the original Mining Lease shall remain applicable.

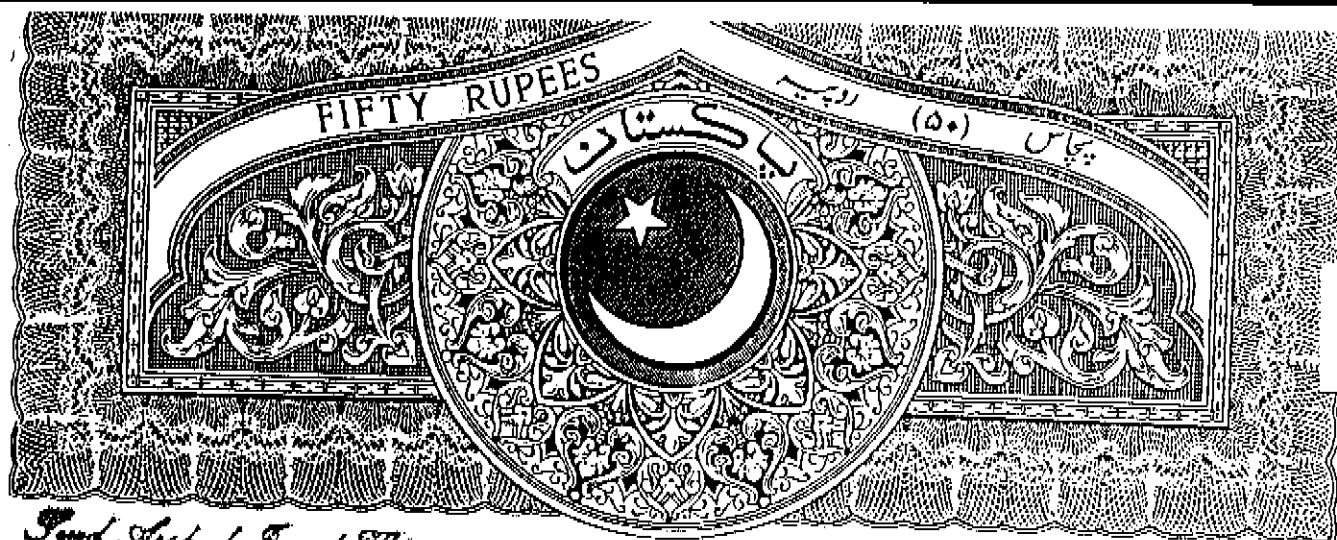
Yours truly,


(Muhammad Imran Farid)
Deputy Director (Exploration)

For Director General Petroleum Concessions

Copy to:

1. The Chief Secretary, Government of Punjab, Lahore
2. The Secretary Energy Department, Government of Punjab, Lahore
3. The Secretary, Mines & Minerals Development Department
Government of Punjab, Lahore
4. The Secretary, Home Department, Government of Punjab, Lahore
5. The Deputy Commissioner, District Rawalpindi, Punjab.
6. The Deputy Commissioner, District Chakwal, Punjab.
7. The Chairman PAEC Post Box No. 1114, Nilore, Islamabad.
8. Director General (Gas), Petroleum House, Islamabad.
9. The Chairperson, OGRA, 54-B, Fazal-e- Haq Road, Blue Are, Islamabad.
10. The Chief Inspector of Mines 2ndFloor, Petroleum House, G-5/2, Islamabad.
11. Director (Database), DGPC, Islamabad.
12. Director (Production), DGPC, Islamabad.



Syed Ashraf Jawed Hussain
Memos No. 140, Sent No. 48 City Court Karachi.
S. No. DATE
ISSUED BY ADDRESS
THROUGH WITH ADDRESS
PURPOSE
VALUE ATTACHED
STAMP SIGNATURE

07 MAY 1999

SUPPLEMENTAL TO ADHI MINING LEASE NO.

THIS SUPPLEMENTAL TO ADHI MINING LEASE IS made this 20th July,
day of 1999 among :

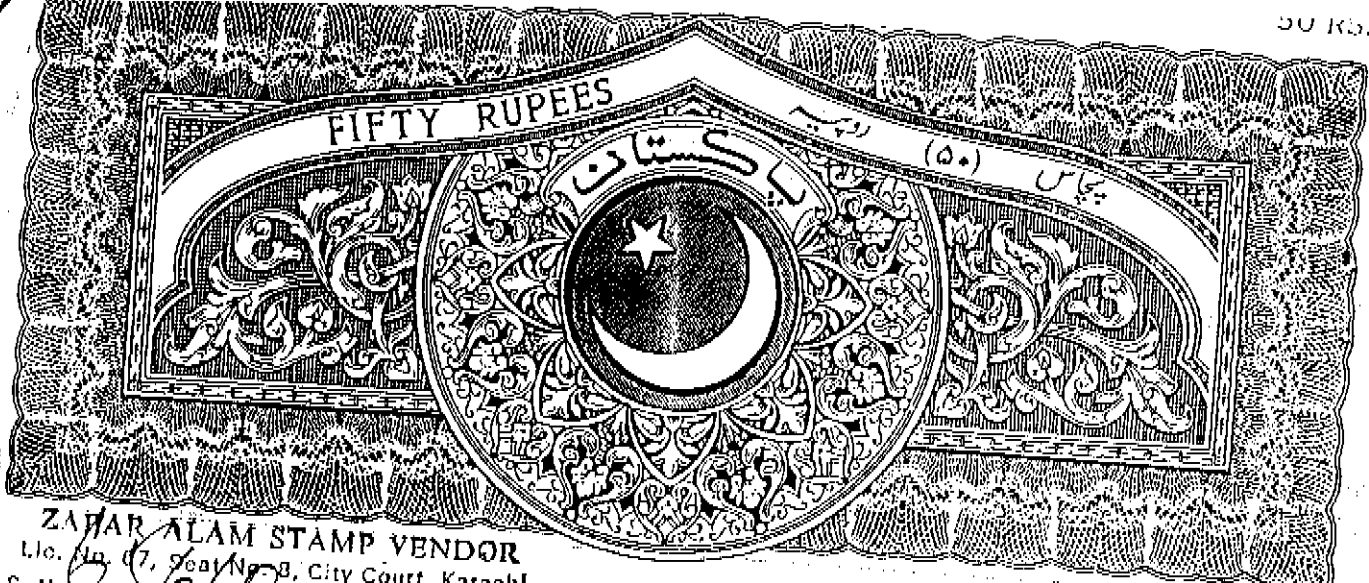
1. The President of Islamic Republic of Pakistan ("President");
2. Pakistan Petroleum Limited, a company incorporated in Pakistan and having its registered office at P.I.D.C. House, Dr. Ziauddin Ahmed Road, Karachi (herein called "PPL" which expression shall include the successors and assigns of PPL) ; and
3. Oil and Gas Development Company Limited, a company incorporated in Pakistan and having its registered office at OGDC House, Jinnah Avenue, Blue Area, Islamabad (herein called "OGDCL" which expression shall include the successors and assigns of OGDCL).

WHEREAS the President, PPL and OGDCL currently hold Adhi Mining Lease and desire to amend Clause 34 thereof as hereunder provided.

NOW, THEREFORE, IT IS AGREED as follow :

1. Clause 34 of Adhi Mining Lease is hereby amended by adding, at the end thereof, the words "without the previous consent in writing of the President",

Continued on page (2)



ZAHAR ALAM STAMP VENDOR
Lic. No. 17, Seat No. 8, City Court, Karachi
S. No. 610 DATE.....
ISSUED TO WITH ADDRESS.....
THROUGH WITH ADDRESS.....
PURPOSE.....
VALUE RS..... (ATTACHED)
STAMP VENDOR'S SIGNATURE.....

01 APR 1996

PAKISTAN PETROLEUM LTD.

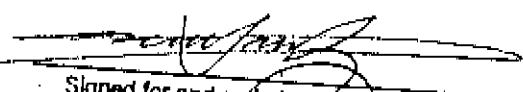
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2. Except as amended above, Adhi Mining Lease shall remain in full force and effect.

IN WITNESS WHEREOF, this Supplemental is executed by the parties as of the date first written above.

Witness :

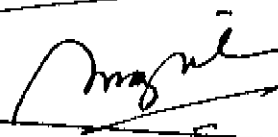
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Signed for and on behalf of The President of
Islamic Republic of Pakistan in the presence of :

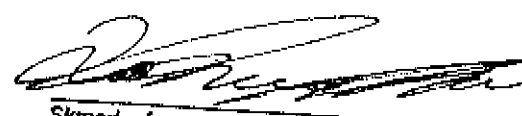
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1. 


Signed for and on behalf of Pakistan Petroleum
Limited in the presence of : (Under Common Seal)

2. 

1. 


Signed for and on behalf of Oil and Gas
Development Company Limited in the presence of :

2. 

SUPPLEMENTAL AGREEMENT

IN RESPECT OF

ADHI MINING LEASE

NO. 72 / PAKISTAN



PAKISTAN PETROLEUM LIMITED

SUPPLEMENTAL AGREEMENT IN RESPECT OF ADHI MINING LEASE
NO. 72 / PAKISTAN

This Supplemental Agreement is made and entered into between the President of the Islamic Republic of Pakistan (hereinafter referred to as the "President" which term shall include his successors and assigns) of the First Part and Pakistan Petroleum Limited, a company incorporated/registered under the Laws of Pakistan and having its registered office at PIDC House, Dr. Ziauddin Ahmed Road, Karachi (hereinafter referred to as "PPL" which term shall include its successors and assigns) of the Second Part.

WHEREAS :

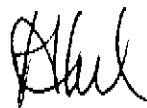
- (1) The President of Pakistan has granted to PPL, pursuant to Pakistan Petroleum (Production) Rules, 1949 ("Rules"), the Adhi Mining Lease No. 72/Pakistan dated 29th November 1988 effective 13th November 1984 for the Adhi Field covering an area of 70 sq. miles in District Rawalpindi and Jhelum.
- (2) PPL, as Operator of the Lease, is importing machinery and equipment etc. in accordance with the said Oil Mining Lease for Petroleum operations.
- (3) The Government of Pakistan has, in the Petroleum Policy 1994 as notified in various notifications and instructions, provided certain incentives and concessions in respect of import duties, licence fees and import of commissary items to Petroleum Sector Exploration and Production Companies, its contractors and their subcontractors and their foreign employees and consultants for Petroleum operations.
- (4) PPL is entitled to such incentives upon execution of a Supplemental Agreement in accordance with the Petroleum Policy 1994.



NOW THEREFORE, the President and PPL agree as follows :

1. (a) With effect from the date of execution of this Supplemental Agreement, PPL, a Petroleum Sector Exploration and Production Company, as Operator, its contractors and subcontractors are hereby permitted to import, export, transfer and dispose the machinery, equipments, materials, specialized vehicles, accessories, spares, chemicals and consumables etc. in accordance with the duty and other concessions as set out in SRO 367 (I) / 94 dated 9th May, 1994 (Annex-I) as amended vide SRO 1091(1)94 dated 8th November, 1994 and subsequent amendments from time to time, provisions of CGO-2/93 dated 20th May, 1993 wherever applicable (Annex-II), and other provisions of this Supplemental Agreement. No license or import-cum-export authorization fee shall be levied on such imports/exports in accordance with import Fee Order 1993 as amended by SRO 336(I)/94 dated 26th April, 1994 (Annex-III).

- (b) The initial list of machinery, equipment, materials, specialized vehicles, accessories, spares, chemicals and consumables etc. required for Joint Operations approved by the relevant Regulatory Authority under Article 1(a) above is attached as Annex-IV hereto. PPL shall, however, give preference to goods which are produced or available in Pakistan and services which are rendered by Pakistani nationals and companies, provided such goods and services are offered on competitive terms. National firms which appear capable of supplying goods and services of the type demanded shall always be included in invitations to bid. For classification of items imported by PPL, its contractors or subcontractors, the harmonized system of classification will be followed. The local manufacturers and producers of the Petroleum Sector machinery and equipments etc. will be entitled to concessions contained in SRO 366(I)/94 dated 9th May, 1994 (Annex-V).



- (c) Foreign employees and consultants of PPL and its contractors and subcontractors will be entitled to import/export of used and bonafide personal and household effects, excluding passenger vehicles, in accordance with instructions contained in Central Board of Revenue's letter C. No. 10(14)/93-ICM&CON dated 13th June, 1994 (Annex-VI).
2. PPL, its contractors and subcontractors shall be entitled to export such of their items as have been imported into Pakistan and are not required for the Petroleum operations, without restriction and without the payment of any fee, tax or export duty. PPL shall ensure that the aforesaid equipments/materials imported by itself, its contractors and subcontractors under this Supplemental Agreement against the import-cum-export authorization are exported, if all the Petroleum operations are terminated, unless otherwise permitted in accordance with this Supplemental Agreement.
3. Import of items permitted under this Supplemental Agreement shall be allowed subject to the following conditions :
- (a) A condition shall be stamped on the import authorizations that the items imported under this Supplemental Agreement shall not be sold in Pakistan, except with prior permission of the Government.
- The permission required under this Supplemental Agreement shall not be necessary with respect to the transfer of title to any property made pursuant to or incidental to any assignment by PPL of all or any part of its Working Interest with the approval of the Government under relevant Rules.
- (b) PPL and its contractors and subcontractors shall maintain proper accounts, statements and records of all consumable stores received and expended and send copies thereof (in duplicate) through regulatory authority to the Ministry of Commerce by the 15th of January each year and finally within fifteen (15) days of the closing of operations in Pakistan.



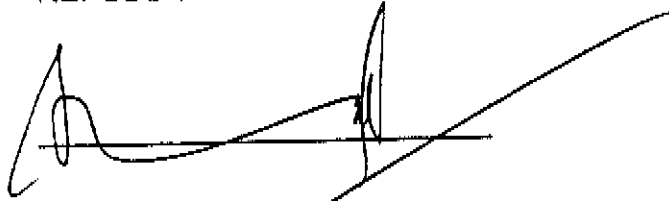
- (c) (i) Commissary stores can be imported after the first arrival of an expatriate employee of PPL, its contractors and subcontractors in accordance with instructions contained in the Central Board of Revenue's letter C.No. 10(14)/93-ICM&CON dated 13th June, 1994 (Annex-VI). Such imports shall be confined to the items shown in Annexure VII excepting such items as are locally available of proper standard. Such items shall be specified by the Ministry of Commerce once each year in the month of January.
- (ii) As soon as an expatriate employee arrives in Pakistan, an application will be made for grant of Import permit / CBR Booklet for the commissary stores required for him indicating the duration of his programmed stay in Pakistan.
- (iii) Account for the sale of tobacco and liquor (if imported) and drugs will be maintained for each individual while those of the other items will be maintained on an over-all basis.
- (iv) Items of food and other commissary goods will be stamped clearly to avoid resale in the market.
- (v) CBR booklets will be maintained by individuals.
- (d) Any other items of personal use, e.g., arms and ammunition, pets etc., will not be permitted unless the conditions for their import such as arms licences from district authorities, quarantine requirements etc., are fulfilled.

4. Subject to the rights granted under the provisions of the Mining Leases and particularly those granted under this Supplemental Agreement, any items banned for import into Pakistan under the Import Policy in force from time to time shall not be permitted without specific permission to be obtained before shipment of goods from abroad.
5. PPL and its contractors and subcontractors shall not be liable to pay any tax, assessment, levy, octroi or charge imposed or levied on the transportation or movement of the aforesaid machinery and equipment to and from the Area or on any item imported under this Supplemental Agreement.
6. Imports/Exports under this Supplemental Agreement shall be effected in accordance with the Import/Export Policy in force on the date of execution of this Agreement.
7. At least ten percent (10%) of the value of computer software contracts shall be utilized by the Operator for using local software capabilities, available in Pakistan at competitive prices.
8. For duty drawbacks the relevant rules shall apply.
9. This Supplemental Agreement shall supersede all previous notifications, undertakings (oral or written), agreements, correspondence and contracts on the subject between the parties.

Shil

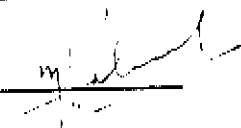
IN WITNESS WHEREOF this Agreement has been duly signed by the respective parties hereto as of the 28th day of May 1995.

For and on behalf of
THE PRESIDENT OF THE ISLAMIC
REPUBLIC OF PAKISTAN

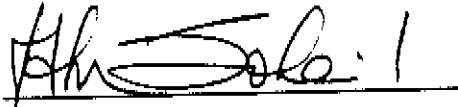


WITNESSES:

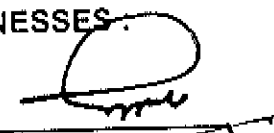
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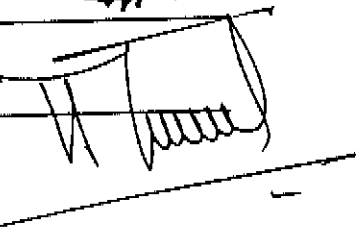
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For and on behalf of
PAKISTAN PETROLEUM LIMITED



WITNESSES:

1. 

2. 

b:spagaml

ANNEXURES

- ANNEX-I - S.R.O. 367(1)/94, DATED 9TH MAY, 1994 &
S.R.O. 1091(1)/94, DATED 8TH NOVEMBER, 1994.
- ANNEX-II - CGO-2/93, DATED 20TH MAY, 1993.
- ANNEX-III - S.R.O. 336(1)/94, DATED 26TH APRIL, 1994.
- ANNEX-IV - LIST OF MACHINERY & EQUIPMENT ETC. FOR
JOINT OPERATIONS.
- ANNEX-V - S.R.O. 366(1)/94, DATED 9TH MAY, 1994.
- ANNEX-VI - C.NO. 10(14)/93-ICM & CON, DATED 13TH JUNE,
1994.
- ANNEX-VII - LIST OF COMMISSARY STORES.

✓

ANNEX - I

GOVERNMENT OF PAKISTAN
MINISTRY OF FINANCE, REVENUE & ECONOMIC AFFAIRS
(REVENUE DIVISION)

Islamabad, the 9th May, 1994

NOTIFICATION
(CUSTOMS)

S.R.O. 367(1)/94- In exercise of the powers conferred by section 19 of the Customs Act, 1969 (IV of 1969), sub-section (1) of section 13 of the Sales Tax Act, 1990, and sub-section (2) of section 5 of the Finance Act, 1985 (I of 1985), the Federal Government is pleased to exempt the machinery, equipment, materials, specialized vehicles, accessories, spares, chemicals and consumables, as are not manufactured locally, if imported for the projects mentioned in column (2) of the table below for the phases and by the importers mentioned in columns (3) and (4) respectively of that table from custom-duties including regulatory duties, sales tax and Iqra surcharge to the extent specified in column (5) thereof, subject to the following conditions, namely:-

- (1) Only such machinery, equipment, materials, specialized vehicles, accessories, spares, chemicals and consumables shall be entitled to the exemption under this notification, as are certified through Central Board of Revenue by the relevant Regulatory Authority from time to time in terms of Annexure VI to the Petroleum Policy, 1994. The relevant Regulatory Authority shall take such measures as it deems necessary to ensure that the concerned companies, corporations and organizations entitled to avail exemption under this notification import only so much quantity of machinery, equipment, materials, specialized vehicles, accessories, spares, chemicals and consumables as is approved by the said Regulatory Authority in view of their actual project requirements;
- (2) exemption available to E&P companies sector, S. No. 1 of the table, shall be admissible only to such E&P companies who hold permits, licences, leases and who enter into supplemental agreements with Government of Pakistan in terms of the said Petroleum Policy or those who sign new petroleum concession agreements on or after 1st January, 1994. Exemption under rest of the S. NOs. of the table shall be available to E&P companies without any such conditions;

- (3) in respect of goods imported under S.No. 1(i) of the table, after the first Commercial Discovery has been made in the concession area, the respective Operator shall pay to the Collector of Customs on an annual deferred basis a consolidated fee equal to 3% of the total invoice value of the equipment, materials, specialized vehicles, accessories, spares, chemicals and consumables imported by it, its contractors and sub-contractors after the first Commercial Discovery of all activities in the area including but not limited to exploration activities in that particular concession area during the year. Goods imported under S.no. 2 to S.no. 8 of the said table shall not be subjected to such consolidated fee. Items imported free of import duties under S.no. 1 (ii) of the table if sold to E&P companies as part of their services will be included in the total invoice value for calculation of the fee payable by the Operator. The value to be taken for the service company items for inclusion in the total invoice value shall be their invoice value at the time of import. The Operator shall submit an account of all import invoices to the Regulatory Authority and the Collector of Customs for confirmation with their record at the time of annual payment. This provision will also apply to OGDC and other local E&P companies who hold mining, development and production leases and have not been required to enter into any agreement with the Government of Pakistan;
- (4) at the time of importation, the importer shall furnish to the Collector of Customs an indemnity bond in the form set out in the Annexure below to the extent of customs-duties including regulatory duties, sales tax and igra surcharge exempted under this notification. This bond shall be discharged within such period as approved by the relevant Regulatory Authority on production of a certificate by the Assistant Collector of Customs and Central Excise in whose jurisdiction the project is located to the effect that goods imported for the purposes specified in the bill of entry have been duly installed or consumed or used or have been scrapped in the prescribed manner, continue to be held on the project inventory of the company or have been transferred to another petroleum sector company with the approval of the relevant Regulatory Authority in terms of the said Petroleum Policy provided the transferee company furnishes a fresh indemnity bond in the manner approved by the Collector of Customs as specified in the annexure to this notification;
- (5) in the event of non-production of such certification as aforesaid by the importer, the Collector of Customs shall enforce the indemnity bond and proceed to recover Government dues under section 202 of the Customs Act, 1969 (IV of 1969), and the rules made thereunder;
- (6) in the event a dispute arises whether any item is entitled to the exemption under this notification, the item will be immediately released by the Customs Department against a corporate guarantee. A subsequent certificate from the relevant Regulatory Authority that the item is covered under this notification shall be given due consideration by the Customs Department towards finally resolving the dispute;

- (7) in the event that an emergency condition occurs in connection with operations by a petroleum sector company which seriously endangers life or property or the operations of the projects, the relevant Regulatory Authority shall declare an emergency and the operating company shall be allowed to import any item or items considered necessary by the said company to deal with the emergency under intimation to the Regulatory Authority without fulfilling such formalities as are likely to cause delay and such formalities will be attended to thereafter as soon as practicable; and
- (8) items imported free of import duties or at concessionary rates which become scrap, junk or obsolete shall be disposed of in the following manner, namely:-
- (i) in the event an item other than vehicles, is sold to another company in the petroleum sector no import duties shall be levied or charged. If the item is not sold to another petroleum sector company it shall be sold through a public tender and duties shall be recovered at the rate of 5-1/4% of the sale proceeds;
 - (ii) for vehicles, there would be a minimum retention period of five years after which the vehicles may be disposed of in the manner provide in (i) above except that the full rate of import duties and taxes, net of any import duties and taxes already paid, shall be charged subject to an adjustment of depreciation @ 2% per month up to a maximum of twenty-four months. Vehicles can be surrendered at any time to the Government of Pakistan without payment of any import duties and taxes under intimation to the Central Board of Revenue; and
 - (iii) any item imported free from import duties and taxes or on concessionary rate under this notification may be exported for replacement, repair, modification or renovation and may be re-imported without the payment of additional import duties subject to the production of certificate from the Regulatory Authority that the item needs to be exported for replacement, repair, modification, or renovation and a corporate guarantee for re-import by the exporting company.

Explanation : In this notification,

- (i) "exploration and production (E&P) companies" includes the Oil and Gas Development Corporation;
- (ii) "invoice value" means value as ascertained by the Collector of Customs; and
- (iii) "Regulatory Authority" means the relevant Regulatory Authority specified in Annexure VI to the Petroleum Policy, 1994.

TABLE

S.NO. (1)	PROJECT DESCRIPTION (2)	PROJECT PHASE (3)	CATEGORY OF IMPORT (4)	EXTENT OF EXEMPTION (5)
1.	Petroleum projects covered under petroleum concession agreements, permits, licences and leases.	Exploration, development, production, compression and enhanced recovery.	(i) Exploration and production (E&P) companies, their contractors and sub-contractors. (ii) Companies providing services covering seismic, drilling, cementation, testing or similar type of services to E&P companies.	Whole Whole
2.(a)	Refinery projects.	Replacement	Existing refineries.	In excess of consolidated rate of 5.1/4% <u>ad valorem</u> .
(b)	Refinery projects.	Establishment (initial installation), expansion, modernization, and upgradation.	E&P companies where they establish a refinery as a part of their field development.	Whole
(c)	Refinery projects.	Establishment (initial installation), expansion, modernization, and upgradation.	Refining companies, corporations, or organizations.	Whole

3.	Oil and Gas pipeline projects.	Oil transportation and gas transmission and distribution (as determined by the relevant Regulatory Authority).	(i) E&P companies where they establish a pipeline. (ii) Petroleum marketing companies. (iii) Petroleum refining companies. (iv) Gas transmission, distribution companies, corporations and organizations.	Whole Whole Whole Whole
4.	Liquefied petroleum gas projects.	Establishment (initial installation), and expansion of LPG processing and extraction plants, LPG bottling and handling facilities.	E&P companies, corporations and organizations, where they establish LPG facilities or market LPG.	Whole
5.	Compressed natural gas projects.	Establishment of natural gas compression, re-filling and outlet facilities, the conversion of vehicles to CNG and transportation of CNG through specialized vehicle mounted systems.	(i) E&P companies where they establish CNG facilities and/or market CNG. (ii) CNG Companies. (iii) Petroleum marketing companies, corporations and organizations.	Whole Whole Whole

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6.	Petroleum terminal projects.	Establishment of port terminals mainly used to handle petroleum items including crude and fuel oil, petroleum products, LPG and CNG whether for import or export.	(i) E&P companies where they establish petroleum terminal facilities. (ii) Terminal companies, corporations and organizations.	Whole Whole
7.	Energy conservation, environment and safety control projects.	Energy conservation, efficiency enhancement, pollution, environmental and safety control.	E&P companies and other corporations/organizations where they import conservation, efficiency enhancement, pollution control, environmental and safety equipment.	Whole

8.	Construction and erection of petroleum projects listed at S.No. 1 to S.No. 7 above.	During all phases listed at S.No.1 to S.No. 7 above.	All petroleum sector companies, corporations and organizations including their contractors and sub-contractors for the purpose of construction and erection of petroleum projects on an import-cum-export basis against a corporate guarantee equal to the value of import duties and taxes that would have otherwise been payable on import. Should the goods, etc., not be exported on the conclusion of the project or transferred with the approval of the relevant Regulatory Authority to another duty free petroleum project then the company, corporation and organization concerned will be liable to pay duty and taxes chargeable on importation.	Whole
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INDEMNITY BOND

THIS DEED OF INDEMNITY is made on the _____ day of _____
BETWEEN Messrs _____ having registered office at _____
_____ (hereinafter called "the importer" which
means and includes their successors, administrators, executors and assignees), of the one
part, AND the President of Pakistan through the Collector of Customs (hereinafter
called "the Collector of Customs") of the other part;

WHEREAS the Government of Pakistan has, by its decision contained in Notification
S.R.O. 367(1)/94 dated the 9th May, 1994 and subject to the conditions given in the said
Notification, been pleased to direct that machinery, equipment, materials, specialized
vehicles, accessories, spares, chemicals and consumables as are not manufactured locally
shall be exempt from whole of the customs-duty, regulatory duties, sales tax and iqra
surcharge leviable thereon from so much of these duties and taxes as exceed the
consolidated rate of 5-1/4% ad val. as the case may be, if imported for the projects
specified in the table of the said Notification.

AND WHEREAS M/s. _____ having registered office at _____
_____ have imported the goods
mentioned in the Schedule (please specify in the Schedule the description and quantity
of goods imported) to this Bond for the purpose of (please specify the particulars of the
project and phase of the project).

NOW, THEREFORE, in consideration of the release of the goods without payment of
customs-duty, regulatory duties, sales tax and iqra surcharge or at the concessionary
consolidated rate of 5 1/4% ad val., as the case may be, the importers bind themselves
to pay on demand to the Government of Pakistan the sum of Rs. _____ being the
customs-duty, regulatory duties, sales tax and iqra surcharge leviable on the goods, if the
importers fail-

- (i) to produce a certificate of verification from the concerned Assistant
Collector of Customs and Central Excise, within the period as approved
by the relevant Regulatory Authority as required under the said
Notification; and
- (ii) to produce such other evidence as the Collector of Customs may require
to satisfy himself that the goods have been installed, used, consumed,
scrapped, retained in the project inventory or transferred, as the case may
be, in accordance with the conditions of the said Notification.

The importers further agree and bind themselves that the amount covered by this Bond
may be recovered as arrears of customs-duties under section 202 of the Customs Act,
1969 (IV of 1969) and the rules made thereunder.

This Bond shall be rendered void when the aforesaid certificate has been produced and the Collector of Customs is satisfied that the importers have fulfilled all the conditions of this Bond and the aforesaid Notification.

Signed by importers on this _____ day of _____, 19

(Authorised Officer)
Name and permanent address

Collector of Customs
(on behalf of the President)

Witness _____
(Signature, name, designation and full
address)

Witness _____
(Signature, name, designation and full
address)

Note : The amount of indemnity bond may be reduced by the Collector of Customs, if any company, corporation or organization produces a certificate from the concerned Assistant Collector of Customs and Central Excise to the effect that part of the goods covered under the indemnity bond has been installed, used or consumed, as the case may be, in terms of the said Notification during the validity period of the indemnity bond.

SCHEDULE

(F. No. 1(7)Mach./94)-49/94

(RIAZ HUSSAIN NAQVI)
ADDITIONAL SECRETARY

GOVERNMENT OF PAKISTAN
MINISTRY OF FINANCE, REVENUE AND ECONOMIC AFFAIRS
(REVENUE DIVISION)

Islamabad, the 8th November, 1994

NOTIFICATION
(CUSTOMS)

S.R.O. 1091(1)/94- In exercise of the powers conferred by section 19 of the Customs Act, 1969 (IV of 1969) and sub-section (1) of section 13 of the Sales Tax Act, 1990, the Federal Government is pleased to direct that the following further amendments shall be made in this Ministry's Notification No. S.R.O. 367(I)/94, dated the 9th May, 1994, namely:-

In the aforesaid Notification,

- (a) In condition (1),-
 - (i) the words "through Central Board of Revenue" shall be omitted; and
 - (ii) the words "so much quantity of" shall be omitted;
- (b) for condition (4) the following shall be substituted, namely:-

"(4) The Petroleum Sector companies or importers shall furnish to the Collector of Customs an Indemnity Bond in the form set out in the Annexure below to the extent of customs-duties and sales tax exempted under this Notification on the import of items of the value specified in the import authorization issued by the Ministry of Commerce. The Indemnity Bond shall be valid for a period of five years for the amount of customs-duties and sales tax payable and exempted on import of items covered under the above referred import authorization. The Bond shall be discharged on production of a certificate set out in the Annexure-I duly countersigned by the Regulatory Authority or its authorized representative to the effect that items imported under the specified import authorization have been duly installed or consumed or used or have been scrapped in the prescribed manner. The Bond shall be extended for a further period of one year if the relevant Regulatory Authority recommends such extension for any reasons or shall direct for substitution of such Bond for outstanding amount of customs-duty and sales tax on any items transferred to another Petroleum sector company entitled to import of such items under this Notification;

Provided that the transferee company furnishes a similar Indemnity Bond in the form set out in the Annexure below;"

- (c) in the Annexure, in the fourth paragraph, after the word "fail", for the hyphen and clause (i) and (ii) the following shall be substituted, namely:-
"to produce a certificate of verification from the Regulatory Authority within such period as it may approve in accordance with condition (4) of this Notification"; and
- (d) after the Annexure, the following new Annexure-I shall be added, namely:-

ANNEXURE-I

CERTIFICATE

I Mr. _____ M/s. _____
_____ certify that all the (name with designation and name of company) items or
the items indicated in the enclosed list imported vide Index No. _____ of
an IGM No. _____ dated _____ under Indemnity Bond No. _____
_____ dated _____ have been duly installed or consumed or used,
or have been scrapped in the prescribed manner or transferred to M/s _____
_____ dated _____ (copy enclosed) issued by the
Ministry of Commerce and indemnity bond furnished by that company is enclosed. It is,
therefore, requested that the indemnity bond No. _____ dated _____
for the amount of Rs. _____ may be allowed release or a certificate may
be issued for the release of the Indemnity Bond, if misplaced.

Name _____
Designation _____

Countersigned by Regulatory Authority

Name _____

Designation _____

Officer's Seal _____

(C.No. 1/7/Mach./94-270/94)

(MUMTAZ ALI)

ADDITIONAL SECRETARY

ANNEX - II

GOVERNMENT OF PAKISTAN
CENTRAL BOARD OF REVENUE

C.No.5(26)/92-Cus.Ex.

Islamabad, the 20th May, 1993

C.G.O. No. 2/93

**SUBJECT: DECISIONS TO RESOLVE THE DIFFICULTIES BEING FACED BY
THE OIL DRILLING COMPANIES**

1. It has been brought to the notice of the Board that the Oil Drilling Companies engaged in drilling work in Pakistan are facing various problems in connection with their imports e.g., classification/appraisal of goods, admissibility of concessions provided in the agreements on the import of oil and gas drilling machinery and equipment, issues regarding local manufacture of certain items and disposal of scrapped equipment etc.
2. These issues were examined in detail in consultation with the representatives of oil drilling companies and the Ministry of Petroleum and Natural Resources. In order to remove difficulties faced by the oil drilling companies in clearance of the machinery/equipment a "one window" facility has to be provided by Custom Department including Houses. The following decisions have also been taken for strict compliance by all concerned:-
 - (i) Clearance of vehicles under the agreements already signed will be strictly in accordance with the terms of the agreement, and type of vehicles specified therein shall only be allowed release on concessional duty. While seeking clearance from the Customs of various vehicles the Oil Companies will specifically attach the terms and conditions of the agreement under which the said vehicle/vehicles are being claimed for release.
 - (ii) Where jeeps and trucks are specifically mentioned in the agreements, single or double cabin pick-ups will be eligible for benefit as substitutes for trucks and jeeps wherever necessary. Saloon cars are not covered under the agreements and will not be allowed.
 - (iii) For classification of equipment/vehicles imported by the oil companies the harmonized system of classification will be followed. Future agreements with Oil drilling Companies shall be specifically provided for this.
 - (iv) Clearance and appraisal of material imported under the terms of the Concessions Agreements will be done by a centralized appraisal group instead of current system of dealing in respective group where the item is specifically dealt.

- (v) Transfer of equipment/materials from one company to another company shall be allowed as per concession available to the buying company. If buying company is liable to pay taxes the same shall be charged and where the selling company has already paid any taxes but the buying company is entitled to import free or at reduced duty rates no refund shall be allowed to the selling company. Ministry of Commerce will in future give clearance for transfer of equipment/materials from one company to another on receipt of their request.
- (vi) The service companies shall not be entitled to any concession and shall be charged the duty under CGO 16 and 17.
- (vii) Export of Crude Oil and machinery by the Oil Companies as per agreements are free of export taxes. The Export Development Surcharge being levied on the companies on these items will not be charged in future and the amount charged previously shall be refunded.
- (viii) A new list of equipment being manufactured locally shall be prepared by the Ministry of Industries and circulated first to the Oil Companies and after receipt of their response it shall be finalized and made applicable. Till such time as the list of locally manufactured items is finalized, the disputed goods will continue to be released on DG(PC)'s recommendations.
- (ix) The issue of undertakings submitted by the Oil Companies to the Collector (Customs) in the past for getting release of their equipment shall be submitted by the Oil Companies to DG(PC). On the recommendations of DG(PC) to this effect the Collectorate of Customs shall release all the undertakings.
- (x) On inter-agency disputes a committee was formed consisting of Chief (Customs) as a representative of the CBR and Director General (PC) as representative of the Ministry of Petroleum and Natural Resources. In case of the non-agreement amongst the committee members, the matter shall be referred to the appellant authority which shall comprise Member (Customs) and Secretary, Petroleum and Natural Resources.
- (xi) The matter pertaining to the disposal of scrap and levy of duty thereon shall be resolved by the committee.

(SAIF ULLAH KHAN)
Second Secretary (Cus.Ex)

ANNEX - III

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THE GAZETTE OF PAKISTAN

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABAD, TUESDAY, APRIL 26, 1994

PART II
Statutory Notification (S.R.O)
GOVERNMENT OF PAKISTAN
MINISTRY OF COMMERCE
ORDER

Islamabad, the 26th April, 1994

S. R. O. 336 (I) / 94 - In exercise of the powers conferred by sub-section (1) of section 3 of the Imports and Exports (Control) Act, 1950 (XXXIX of 1950), the Federal Government is pleased to direct that the following further amendment shall be made in the Import Fee Order, 1993, namely:-

In the aforesaid Order, in clause 6 for entry (vii) the following shall be substituted namely:-

- "(vii) to all petroleum sector companies, corporations and organizations in respect of machinery, equipment, materials, specialized vehicles, accessories, spare parts, chemicals and commodities imported in accordance with the list approved by the regulatory authority, as specified in the Petroleum Policy, 1994".

Explanation - For the purpose of this entry, the question whether a company, corporation or organization falls within the Petroleum Sector shall be determined by the concerned regulatory authority.

(F. No. 13 (14) / 91.Imp. II)

MUHAMMAD MALIK
Joint Secretary

ANNEX - IV

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ANNEX IV

LIST OF MACHINERY AND EQUIPMENT REQUIRED FOR JOINT OPERATIONS

The following items will be required for Joint Operations, and not for the personal use of employees :

1. Drilling rigs, vessels and machinery, including prefabricated derricks, draw-works, rotary tables, high pressure hoses, kelly stems, tongs, swivels, hooks, elevators, slips, boilers, bales, travelling blocks, crown blocks, wire lines, wellhead equipment, blow out preventers, control heads, drilling bits, reamers, thread dope, rope (wire and hemp) and well cementing equipment.
2. Machinery, including such items as steam, diesel, petrol and gas engines, electric motors and generators including electric arc welding and gas welding generators and welding torches, electrical power switch-gear, pumps of all types and sizes for drilling and producing Petroleum, machine tools as required in connection with exploration, drilling or production of Petroleum, including lathes, grinders, planners, power saws, presses, drills and hammers, power driven winches, air compressors, pneumatic tools, special cables including steel, electric and hemp, mechanical power transmitters.
3. Scientific and engineering instruments including surveyors transits, levels, Alidades, Brunton and prismatic compasses, seismic instruments, gravity meters, magnetometers, instruments and equipment required for well logging and surveying (including photographic recording), mud-treating and control, core analysis, and gas testing (in particular gaschromatograph, microscopes, ultra violet lamps, rock-saw), special photographic and such special instruments as will be required to establish geophysical, geological, engineering and chemical laboratories, radio telemetering, radio facilities and other electronic equipment and seismic energy sources (dynamite, etc.) and consumables.
4. Tools including drilling tools, oil well fishing and specialty tools, drill stem test, wire line test, well surveying and logging, well cementing tools and equipment, also oil well cement, drilling mud and admixtures, drilling equipment and all types of support equipment.
5. All forms of vessels, heavy hauling and oilfield service vehicles, four wheel, drive single and double cabin pick-ups, jeeps, station wagons, trucks and general purpose vehicles built primarily for off-road/rough terrain transportation of staff and equipment (excluding saloon cars and luxury five door jeeps) and aircraft required to support the marine drilling units and onshore support operations, specialized transportation and earth moving equipment; trailers for field use, aircraft, boats, barges, swamp buggies,

- including tires, tubes valves and valve stems for the above equipment. All equipment and working material necessary for construction of exploration and exploitation facilities.
6. Steel pipe of all sizes, including drill pipe, drill collars, oil well casing, tubing and line pipe and all necessary control valves and fittings.
 7. Special prefabricated steel structures, including but not limited to, marine production facilities fully outfitted all forms of sub-sea equipment for exploration, drilling and production, tanks and pressure vessels and all semifinished goods (steel plates etc. for their construction on location and all related instruments, regulating and measuring equipment, controllers, gauges, indicators, etc.)
 8. Specialized fire fighting equipment for oil field use both, mounted and portable, fire and smoke detectors and all forms of precautionary devices to protect life and property.
 9. Special Petroleum field designed electric communication and cooling equipment, computing hardware/software. [For software subject to Article 13.11].
 10. Safety equipment of all kinds including items such as boots, coveralls, safety helmet, gloves, protection eyeglasses, H2S equipment, life rafts, life boats, safety jackets, first aid kits, medical supplies, transport equipment, emergency lighting, radioactive monitoring tools, fresh water making equipment, gas detection systems, blow out preventers etc.
 11. Replacement parts for the foregoing.

NOTE :

- i) The foregoing enumeration of items is not exhaustive and each category shall be deemed to include articles of similar nature required for the specific purpose of operations on land, sea, and air for on-shore and off-shore petroleum exploration, production and development projects.
- ii) The foregoing list shall not include articles which are produced and available in Pakistan at the same delivery date, of the same quality, at comparable prices as certified by the Director General of Petroleum Concessions and which are banned for import under Import Policy by the Government from time to time notwithstanding the fact that such items may be among those described above.
- iii) No customs concessions will be allowed on spare parts, office equipment, stationery articles and other goods/items etc. which are locally manufactured and so certified by the Director General Petroleum Concessions.

- iv) It is clarified that the Operator, its contractors or sub-contractors can import on an import cum export basis the used equipment and machinery (such as seismic acquisition equipment, drilling rigs and equipment, production testing equipment etc.) for the purposes of temporary Operations on the recommendations of the Director General of Petroleum Concessions but the same will have to be either exported after the operations have been completed or the transfer of the said equipment to another company has been authorized by the appropriate Regulatory Authority in accordance with the Petroleum Policy and the notifications issued by the Central Board of Revenue.

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ANNEX - V

ANNEX-V

GOVERNMENT OF PAKISTAN
MINISTRY OF FINANCE, REVENUE AND ECONOMIC AFFAIRS
(REVENUE DIVISION)

Islamabad, the 9th May, 1994

NOTIFICATION
(CUSTOMS)

SRO 366(1)/94 - In exercise of the powers conferred by section 19 of the Customs Act, 1969 (IV of 1969), sub-section (1) of section 13 of the Sales Tax Act, 1990, and sub-section (2) of section 5 of the Finance Act, 1985 (I of 1985), the Federal Government is pleased to exempt from the whole of customs-duty specified in the First Schedule to the Customs Act, 1969 (IV of 1969), regulatory duties leviable under sub-section (2) of section 18 of the Customs Act, 1969, sales tax and iqra surcharge on such raw materials and components as are not produced or manufactured locally and are imported for use in the manufacture of machinery, equipment, materials, specialized vehicles, accessories, spares, chemicals and consumables to be supplied to the petroleum sector companies for the projects mentioned in the table of the Notification No. SRO 367 (I)/94, dated 9th May, 1994, subjected to the following conditions, namely:-

- (i) The importer-cum-manufacturer has suitable in-house facility to manufacture the articles or he has access to such manufacturing facility elsewhere (name and address to be specified,) in respect of which he claims exemptions under this notification;
- (ii) at the time of import, the importer makes a declaration on the bill of entry to the effect that the raw materials and components have been imported in accordance with his entitlement for manufacturing of machinery, equipment, materials, specialized vehicles, accessories, spares, chemicals and consumables to be supplied to the petroleum sector companies for the projects mentioned in the table of the Notification No. SRO 367(I)/94, dated 9th May, 1994, duly supported by a certificate of entitlement from Chief, Survey and Rebate, Central Board of Revenue;
- (iii) furnishes an indemnity bond in the form set out herein below to the Collector of Customs at the time of importation of the raw materials and components equal to the amount of customs-duty, regulatory duties, sales tax and iqra surcharge and an undertaking to abide by the conditions laid

down in this notification failing which he shall pay the customs duty, regulatory duties, sales tax, and iqra surcharge exempted under this notification and shall make payment of any penalties that may be imposed by the Collector of Customs in this behalf; and

- (iv) the manufacturer shall, during the validity period of the indemnity bond, apply to the Collector of Customs for discharging the indemnity bond, the application being supported by a certificate in the Form set out below issued by the Assistant Collector, Customs and Central Excise within whose jurisdiction the manufacturing unit is located and a certificate from the incharge of the concerned project that the articles pertaining to the petroleum sector project have been supplied to it and duly installed, consumed or used as the case may be.

(See condition (iii))

(On appropriately stamped non-judicial paper)

INDEMNITY BOND

THIS DEED OF INDEMNITY is made on the _____ day of _____ BETWEEN Messrs _____ having registered office at _____ (hereinafter called "the importer" which means and includes their successors, administrators, executors and assignees) of the one part AND the President of Pakistan through the Collector of Customs _____ (hereinafter called "the Collector of Customs") of the other part;

WHEREAS the Government of Pakistan, by its decision contained in Notification No. S.R.O. 366(I)/94 dated the 9th May, 1994 and subject to the conditions given in the said Notification, has been pleased to direct that such raw materials and components which are not produced locally shall be exempted from whole of the customs duty, regulatory duty, sales tax and igra surcharge leviable thereon, if imported for the local manufacture of machinery, equipment, materials, specialized vehicles, accessories, spares, chemicals and consumables to be supplied to the petroleum sector companies for the projects mentioned in the table of Notification No. S.R.O. 367(I)/94 dated 9th May, 1994.

AND WHEREAS M/S _____ having registered office at _____ have imported the raw materials and components in accordance with the entitlement duly approved by Chief, Survey and Rebates, Central Board of Revenue for the purpose of local manufacture of the above referred machinery, equipment, materials, specialized vehicles, accessories, spares, chemicals and consumables.

NOW, THEREFORE, in consideration of the release of the raw materials and components without recovery of customs duty, regulatory duties, sales tax and igra surcharge, the importers bind themselves to pay on demand to the Government of Pakistan the sum of Rs. _____ being the customs duty, regulatory duties, sales tax and igra surcharge leviable on the raw materials and components, if the importers fail:-

- (i) to produce a certificate from the Assistant Collector of Customs and Central Excise within one year after the import of the goods or within such extended period as approved or prescribed by the Collector of Customs as required under the said Notification; and
- (ii) to produce such other evidence as the Collector of Customs may require to satisfy himself that the raw materials and components have been utilized in accordance with the conditions of the said Notification.

The importers further agree and bind themselves that the amount covered by this Bond may be recovered as arrears of customs duty under Section 202 of the Customs Act, 1969 (IV of 1969) and the rules made thereunder.

The Bond shall be rendered void when the aforesaid certificate has been produced and the Collector of Customs is satisfied that the importers have fulfilled all the conditions of this Bond and the aforesaid notification.

Signed by importers on this _____ day of _____ 1994.

(Authorized Officer)
Name and permanent address
Collector of Customs
(on behalf of the President)

Witness _____
(Signature, name, designation and full address)

Witness _____
(Signature, name, designation and full address)

Note: The bond shall be witnessed by a Government servant in BPS-17 or above or an officer of a Schedule Bank.

FORM

Certificate No. _____ dated _____, I Assistant Collector, Customs and Central Excise, _____, am satisfied that the raw materials and components imported by Messrs _____ under the provisions of Notification No. S.R.O. _____ dated the _____ against the indemnity bond No. _____ dated the _____ Bill of Entry No. _____ dated the _____ have been used for the manufacture of _____ in accordance with the scale laid down by the Chief, Survey and Rebate, vide certificate No. _____ dated the _____ and the articles have been supplied against the order of the petroleum sector company M/s _____ and duly installed, consumed or used, as the case may be, in their project (give particulars of the project).

Stamp and Signature
(of Assistant Collector)

(C. No. 1(7)Mach./94)-48/94

(RIAZ HUSSAIN NAQVI)
ADDITIONAL SECRETARY

ANNEX - VI

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GOVERNMENT OF PAKISTAN
CENTRAL BOARD OF REVENUE

C.No.10(14)/93-ICM&CON

Islamabad, the 13th June, 1994

From: Ghulam Ahmad
Secretary (ICM&CON)

To: The Collector of Customs
(Appraisalment)/Preventive)
Custom House
Karachi

The Collector of Customs &
Central Excise
Peshawar/Rawalpindi/Faisalabad/Gujranwala/
Multan/Hyderabad/Quetta/Lahore

**SUBJECT: EXEMPTION OF CUSTOMS DUTY, SALES TAX AND IORA
SURCHARGE ON FOODSTUFF/LIQUOR AND HOUSEHOLD
EFFECTS OF EXPATRIATE EMPLOYEES OF THE OIL DRILLING
COMPANIES AND THEIR CONTRACTORS/SUB-CONTRACTORS**

The Central Board of Revenue has been pleased to order that henceforth foreign expatriate employees of the Oil Companies and the contractors/sub-contractors of the oil companies coming to work on petroleum projects covered under Petroleum Concessions Agreements will be entitled of following concessions:-

- (a) Foreign employees and consultants of petroleum sector companies and foreign employees of such companies contractors and sub-contractors will be entitled to import free of import duties including customs duties, sales tax, Iqra surcharge and any other surcharges and licence/authorization fees used and bonafide personal and household effects excluding passenger vehicles provided that the effects were acquired or were in such person's possession before his arrival in Pakistan or were imported within 6 months of such arrival such personal and household effects may thereafter be freely exported free of export duties and fees. Such articles shall not be sold or disposed of or transferred in Pakistan except with the prior permission of Regulatory Authority and on payment of import duties at the rate and value operating on the date the goods at the time of import less depreciation @ 10% per annum.
- (b) Foreign employees and consultants of petroleum sector companies and foreign employees of such companies contractors and sub-contractors shall be allowed to import commissary goods free of import duties including

customs duty, sales tax, Iqra surcharge and any other surcharges to the extent of US\$ 1,200 each (excluding family members) per annum or such greater amount notified from time to time subject to the condition that the said goods shall not be sold or disposed off in Pakistan and no foreign exchange shall be involved.

The previous instructions issued on the subject vide Board's letter C.No. 5(26)92/Cus.Ex. dated 29.12.1992 are hereby withdrawn.

(GHULAM AHMAD)
SECRETARY (ICM&CON)

Copy to Mr. Akhlaque Mahmud, Deputy Director (Imp), Directorate General Petroleum Concessions, 1019 Pak Plaza, Fazal-e-Haq Road, Blue Area, Islamabad, with reference to Board's letter No. 5(26)/92-Cus.Ex. dated 29.12.1992.

(GHULAM AHMAD)
SECRETARY (ICM&CON)

ANNEX - VII

LIST OF COMMISSARY STORES

The following food stuff and commissary stores can be imported:

Food

- (i) Meat:
Beef, Pork, Ham, Bacon, Miscellaneous meat including tinned meat.
- (ii) Vegetables tinned and glassed including juices.
- (iii) Fruits tinned including juices.
- (iv) Liquor, Tobacco and cigarettes of all kinds.
- (v) Sea Food: Tinned tuna, salmon, sardines etc.

Note: Import of Liquor by the non-Muslim foreigners shall be subject to the regulations and orders of the Government of Pakistan.

7610
11/4/88



11/4

11/4

Stamp: 4200/-
7610
11-4-88
Pakistan Petroleum Ltd.
11/4/88

PETROLEUM MINING LEASE NO. 72/PAKISTAN

THIS DEED made the 29th day of November 1988 between the President of the Islamic Republic of Pakistan (hereinafter referred to as the "President" which term shall where the context so admits include his successors in office and assigns) of the One Part A N D

(1) The President of the Islamic Republic of Pakistan of Islamabad, Pakistan ("Government"),

(2) Oil & Gas Development Corporation, a statutory corporation established under the Oil & Gas Development Corporation Ordinance 1981 (XXXVII of 1981) having its head office at Islamabad Pakistan ("OGDC"),

(3) Pakistan Petroleum Limited a company incorporated under the Companies Act 1913 and having its registered office at PIDC House, Dr. Ziauddin Ahmed Road, Karachi, Pakistan ("PPL")

Government, OGDC and PPL are hereinafter jointly referred to as "the Lessee" which term shall where the context so admits include their respective successors and assigns) of the Other Part.

Whereas Lessee in accordance with the conditions laid down in the Pakistan Petroleum(Production)Rules, 1949 ("Rules") for the granting of oil mining leases have applied jointly to the President for an oil mining lease to the Lessee in respect of the lands specified in Part I of the Schedule marked "A" hereunder written (hereinafter referred to as "the said lands") and Lessee has entered into a bond in the form set out in the Schedule marked "B" hereunder written with the President in the sum of Rs. 350,000/- (Rupees threehundred fifty thousand only) conditioned for the due and faithful carrying out of the provisions contained in this Deed and in the Rules as in force at the time of the grant of Oil Prospecting Licence.

And whereas the President has found that there is no objection to granting the said lease.

NOW THIS DEED WITNESSETH AS FOLLOWS:-

In consideration of the rents royalties covenants and agreements hereinafter reserved and contained on the part of the lessee to be paid and observed the President hereby demises unto the lessee all or any petroleum lying or being within under or throughout the said lands and hereby grants the liberties, powers, and privileges to be exercised in connection with the said petroleum mentioned in Part II of the said Schedule marked "A" subject to the restrictions and conditions which are specified in Part III of the said Schedule marked "A" and to the provisions contained in Part IV of the said Schedule marked "A" and in the Pakistan Petroleum (Production)Rules, 1949.

To hold exercise and enjoy all and singular the premises, liberties, powers and privileges hereby granted and demised unto the lessee from the 13th day of November, 1984 for the term of twenty years then next ensuing yielding and paying free and clear from all rates taxes charges and deductions the several rents royalties and sums of money mentioned and specified in Part V of the said Schedule marked "A" subject to the provisions relating to rents and royalties contained in Part VI of the said Schedule marked "A". And the lessee hereby covenants with the President as in Part VII of the said Schedule marked "A" is expressed and the President hereby covenants with the lessee as in Part VIII of the said Schedule marked "A" is expressed and it is hereby mutually agreed and declared by and between the parties hereto as in Part IX of the said Schedule marked "A" is expressed and it is hereby declared that the Schedule marked "A" hereunder written shall be deemed part of these presents and be read and construed accordingly.

(In witness whereof the President and Lessee have hereunto set their hands and seals the day and year first above written).

(In witness whereof the President has hereunto set his hand and seal and the lessee has caused its Common Seal to be hereunto affixed the day and year first hereinabove written).

The Schedule marked "A" above referred to herein.

Part I - The Lands referred to in this lease.

All those lands lying and being within Rawalpindi District and Jhelum Districts delineated in the plan hereunto annexed and therein coloured pink and containing an area of 70 Sq.Miles (Seventy Square Miles) or thereabouts.

SCHEDULE

ADHI OIL MINING LEASE AREA
RAWALPINDI AND JHELUM DISTRICTS
PUNJAB PROVINCE

Description of the Area over which an Oil Mining Lease for natural petroleum including natural gas, granted to

PAKISTAN PETROLEUM LIMITED

Reference Maps:- Survey of Pakistan 1:50,000 Topographical
 Sheets Nos. 43 G/3, 43 G/4, 43 G/7 and 43 G/8.

The applied for Mining Lease Area comprises of 70.0 square miles (181.34 sq.km) covering 68.0 square miles (176.16 sq.km) in Rawalpindi District and 2.0 square miles (5.18 sq.km) in Jhelum District. This area arises out of the Prospecting Licence of 496 square miles (1284.97 sq.km) already held jointly by PPL/OGDC.

The limits of the M.L. Area, applied for, is bounded by the straight lines joining the following tracing points in succession which are described by Greenwich Coordinates as under:

- | | |
|----------------|---|
| <u>Point A</u> | at 33° 11' 26.5" North Latitude and 73° 07' 48.5" East Longitude, thence in a South South-westerly direction to |
| <u>Point B</u> | at 33° 05' 56.0" North Latitude and 73° 04' 29.0" East Longitude thence in a East East-southerly direction to |
| <u>Point C</u> | at 33° 04' 16.5" North Latitude and 73° 07' 54.5" East Longitude thence in a North-easterly direction to |
| <u>Point D</u> | at 33° 08' 15.0" North Latitude and 73° 00' 50" East Longitude thence in a North North-direction to |
| <u>Point E</u> | at 33° 20' 19.0" North Latitude and 73° 04' 19.0" East Longitude thence in a North-west direction to |
| <u>Point F</u> | at 33° 21' 04.5" North Latitude and 73° 04' 19.0" East Longitude thence in a South So direction to |
| <u>Point G</u> | at 33° 15' 14.0" North Latitude and 73° 04' 19.0" East Longitude thence in a South-back to Point A. |

For the purpose of transferring the proposed M.L. on the ground a Trig. Station Δ 1914 located at 33° North Latitude and 73° 10' 27" East Longitude (Easting 26270, Northing 07280) has been taken as Reference Point.

Thus Point A of the M.L. Area lies at the distance of 11711 yards on the Grid-bearing of 199° 55' 13.46" from the Reference Point Δ 1914.

Part II - Liberties, Powers, and Privileges to be exercised or enjoyed by the Lessee, but subject to the Restrictions and Conditions in Part III.

1. To bore etc.

To enter upon the said lands and to search bore for win and work all or any petroleum lying or being within under or throughout the said lands.

2. To appropriate water, etc.

Subject to the approval of the President to appropriate and use for any purpose connected with the borings or works or refining operations connected therewith, the water upon or within any of the said lands, and to collect, impound and bore for the same for the purpose of working the said borings or works or carrying out refining operations, but so that in the exercise of this privilege the Lessee shall not deprive any lands, villages, houses or watering places for cattle of a reasonable supply of water as heretofore accustomed.

3. To appropriate surface of land for work, etc.

To enter upon, use and occupy a sufficient part of the said lands adjoining any borings for depositing thereon the products of the said borings and all the earth soil and other substances brought to the surface and for otherwise carrying on the works of the said borings and operations hereunder.

4. To refine.

To refine or otherwise treat the aforesaid petroleum in and upon the said lands whether for purposes of sale or otherwise save as hereinafter provided.

5. To store, load and carry away oil, etc.

To store, take, load, pipe, and carry away, on under or over the said lands the aforesaid petroleum and the products thereof and to dispose of the same at his own will and pleasure, save as hereinafter provided.

6. To erect houses, etc.

To erect set up and make in upon and over the said lands workmens' houses, sheds, engines, machinery, furnaces, buildings, erections, pipelines, telephone lines, railroads, tram-roads, and other roads and works necessary or convenient for the effectual working of the said borings, works or refining operations connected therewith, and the exercise of the several liberties and powers hereby granted.

Q. Now, what is the difference between the two?

Provided that (a) the grazing in any single pasture shall not exceed ten acres and (b) the licensee shall pay a reasonable price for all timber and undergrowth cut down or felled by him for the purpose of making pastures or taken or used by him, such price to be ascertained in default of agreement by the Secretary to Government or Collector in the appropriate Ministry. This proviso shall not apply in any land that may have been proclaimed to be a forest reserve without the consent of the President in writing first and obtained.

9. The experience with a horse

To enclose with a copy of the schedule of any of the said lands in respect of which the rights reserved in Clause 19 (Schedule 2) of this Memorandum are being paid provision that the libelation and patent shall not be the President in Part 19 of this Schedule and all copies of it shall not thereby be affected.

Part III - Restrictions and Conditions as to the exercise of the above Liberties, Powers and Privileges

10. Notice to be given before entering on lands for surface purposes.

(1) Before occupying any land for surface operations, or clearing any land for the purpose of making pastures under Clause 8 (To cut timber, etc.) of this Schedule the Lessee shall give to the Director General Petroleum Concessions fourteen days' previous notice in writing specifying by name or other sufficient designation and by quantity the land proposed to be occupied and the purpose for which the same is required.

(2) The Director General Petroleum Concessions shall at any time within one month from the receipt of such notice state his objections, if any, on grounds of public interest to the proposed site and the Lessee shall not proceed with any of the operations mentioned in sub-clause (1) of this Clause till the objections are removed.

11. Compensation to occupiers.

The Lessee shall before occupying any land for surface operation pay or tender reasonable compensation to the occupiers thereof and shall thereupon be entitled to occupy the lands, but shall nevertheless be bound to pay the amount of compensation which, in case of dispute, shall be assessed in terms of Clause 66 of this Schedule.

12. Sale or lease of surface to third parties.

(1) Director General Petroleum Concessions may at any time or times give notice in writing to the Lessee that application has been made to the President to purchase or lease the surface of such portion of the lands referred to in this lease as is mentioned in such notice.

(2) If the Lessee shall not within ninety days after service of such notice on him give to the President notice in writing that he objects to the President acceding to such application on the ground that the proposed sale or lease will prejudicially affect his rights under this lease it shall be lawful for the President at any time or times after the expiration of that period to sell or lease all or any part of the surface specified in such first mentioned notice freed and discharged from all rights of the Lessee hereunder and the Lessee shall thereupon be relieved of all liabilities and obligations hereunder in respect of the area specified in such first mentioned notice excepting such liabilities and obligations as may have accrued before the date of service of such notice.

(3) If any such objection as aforesaid shall be made by the Lessee within the period aforesaid and the President shall notwithstanding such objection desire to make the sale or lease the question whether the proposed sale or lease should or should not be made shall be determined in terms of Clause 66 of this Schedule.

(4) Where a sale or lease of the surface of a portion of the lands has been made by the President under this Clause the Lessee shall have a prior right to have the land again included in the lands subject to this lease if it shall subsequently become available for this purpose.

13. Distance of bore-holes or wells from boundaries of the said lands.

No bore-hole or well shall except with the consent in writing of the Director General Petroleum Concessions be drilled or made within a distance of 150 feet from the boundaries of the said lands, provided that the restriction shall not apply to the common boundary of the said land and of any contiguous areas leased to the Lessee.

14. No mining operations to be carried on near railway, etc.

No boring operations or working shall be carried on or allowed by the Lessee in the said lands at any point within 100 yards of any railway, reservoir, canal or other public works or any building or inhabited site on or near the said lands except with the previous permission in writing of the President or of any officer authorized by him in this behalf and subject to any instructions, restrictions and conditions which may be attached in such permission by the officer granting the same.

15. Cutting of timber.

Save as provided in Clause 8 (To cut timber, etc.) of this Schedule the Lessee shall not without the express sanction of the President cut down or injure any trees or timber in the said lands.

Part IV - Liberties and Powers of the President and others

16. These presents or anything herein contained shall not prejudice or affect the exercise from time to time of all or any of the following liberties and powers, that is to say:-

- (1) President may work other minerals, etc.

Liberty and power for the President or any other person authorised by him in that behalf to enter into and upon the

said lands and to search for, dig, work and get any minerals or substances other than petroleum upon or under the said lands and for the purposes aforesaid to sink, make, erect and use such pits, shafts, levels, drains, watercourses, tunnels, buildings, engines or machinery, railways, wagonways and other ways, works and conveniences upon, through or under the said lands as he shall deem necessary or expedient: provided always that the said reserved liberties and powers to work for minerals or substances other than petroleum shall be exercised and enjoyed in such a manner as not to hinder or interfere with the rights and privileges of the Lessee under these presents, and provided also that fair and proper compensation shall be paid by the President for all loss, damage or injury which the Lessee may sustain or be put to by reason or in consequence of the exercise of the said reserved liberties and powers to work for minerals or substances other than petroleum.

(2) President may enter lands, etc.

Liberty and power for the President or any other person authorized by him in that behalf to enter into and upon the said lands and to make and maintain upon, over or through the said lands such reservoirs, pumping stations, generating stations, waterways, roads, tramways, railways, telegraph and telephone lines and pipe-lines or other works as he shall deem necessary or expedient for any purpose and to obtain from and out of the said lands such stone, earth and other materials as may be necessary or requisite for making, repairing or maintaining the same or any of them and at all times to draw water from the said lands and to have free access thereto, and to pass and repass at all times over and along the said lands for all such purposes as occasion shall require: provided always that the said reserved liberties and powers shall be exercised and enjoyed in such a manner as not to hinder or interfere with the rights and privileges of the Lessee under these presents: And provided also that fair and proper compensation shall be paid by the President for all loss damage or injury (not however including the value of any water stone earth or other materials taken) which the Lessee may sustain or be put to by reason or in consequence of the exercise of the said reserved liberties and powers.

(3) President may grant or demise said lands to third parties subject to Lessee's rights.

Liberty and power for the President to grant or demise to any person all or any part of the said lands for any purpose so that such grant or demise be made subject to the rights of the Lessee hereunder.

Part V - Rents and Royalties Reserved by this Lease.

17. Certain yearly rent.

(1) The Lessee shall pay annually in advance to the President during the term hereby granted certain yearly rent at the rate of Rs. 2,000 per sq. mile or part thereof.

(2) Payment of the certain yearly rent reserved by this lease shall be made annually in advance and the first payment of the sum of Rs. 140,000/- (Rupees one hundred and forty thousand only) in respect of the first year of the term hereby granted (the receipt whereof is hereby acknowledged) shall be made on the execution of this lease.

18. Royalties.

The Lessee shall pay to the President within two months after the end of each year of the term hereby granted, the royalties hereunder specified:-

(1) On all crude oil sold by the Lessee or if utilized by him for any other purpose than the production of petroleum-12-1/2 per cent on the well-head value (convertible at the option of the Government to an equivalent charge per 40 gallons to be fixed annually) subject to a minimum of 8 annas per 40 gallons.

(2) Natural Gas - If sold by the Lessee or if utilized by him for any other purpose than the production of petroleum-12-1/2 per cent on the well-head value.

On gas converted into gasoline the well-head value shall be calculated on the volume of gasoline manufactured: it shall be deemed to be equivalent to the selling value of the gasoline less the cost of manufacture and the royalty shall be subject to a minimum of 8 annas per 40 gallons of gasoline manufactured:

Provided that the 12-1/2 per cent royalty rate shall be convertible at the option of the Government to an equivalent charge per 40 gallons of gasoline (not being less than eight annas) or per 1,000 cubic feet of gas, as the case may be, to be fixed annually.

(3) From the amount of royalties payable under the foregoing provisions of this Clause in respect of any such year there shall be deducted the amount of the certain yearly rent actually paid in respect of that year under the provisions of Clause 17 (certain yearly rent) of this Schedule.

(4) Notwithstanding anything contained in sub-clauses (1) to (3) the President may in his discretion require the Lessee to pay the 12-1/2 per cent royalty of part thereof in kind, that is to say, in the form of crude oil or natural gas. If the President requires payment of royalty in kind, he shall give the Lessee three months' prior notice to this effect. The Lessee shall provide transportation facilities to transport such crude oil or natural gas for which the President shall pay the transportation charges to the Lessee.

19. Surface rents.

(1) The Lessee shall pay to the President in respect of Government owned land the further yearly rent at the rate assessable under the revenue and rent law in the district in which the land is situated, the surface whereof shall be actually used or occupied by the Lessee superficially for any of the purposes of this demise and water rates, if any, ordinarily assessable under any irrigation rules, if the land had been occupied for the winning of petroleum. If no such rent is assessable under the laws of the district, the rate may be fixed by the President subject to a maximum of Rs. 2,000/- per square mile. The said rent and water rates shall be paid by the Lessee in equal half yearly instalments on the 1st day of January and the 1st day of July in every year. The first of such payments to be made on whichever of the said days shall happen next after such occupation or use shall commence and the last half yearly payment thereof to be made on whichever of the said days shall happen next after such occupation or use shall have ceased.

(2) If the land belongs to a private person or the Forest Department, the Lessee shall pay surface rent to the land owner or the Forest Department, as the case may be, for the area of land the surface whereof be actually used or occupied superficially by the Lessee for any of the purposes of this demise, at such rate or rates and in such manner as may be mutually agreed upon between the Lessee and the land owner or the Forest Department and in case of disagreement between the aforesaid parties, at such rate or rates and in such manner as may be determined by the Director General Petroleum Concessions.

Part VI - Provisions relating to Rents and Royalties.

20. Refund of certain yearly rent on determination or surrender.

(1) Upon the determination by the Lessee of the term hereby granted or any renewal thereof or upon the surrender by him of the rights granted by this lease in respect of any part or parts of the said lands the President will refund to the Lessee an apportioned part of yearly rent paid by the

Lessee in advance in respect of the said lands or any such part or parts thereof provided that such reduction in rent shall not take effect during the year in which he surrenders and for which rent has either been paid or has accrued.

(2) Upon the release by the Lessee of any lands or area under the provisions of Clause 28 (Release of lands included by inadvertence in the said lands) of this Schedule, the President will refund to the Lessee an apportioned part of any certain yearly rent paid by the Lessee during the term hereby granted in respect of the said lands: provided that in respect of any year the amount remaining of the certain yearly rent after the said refund shall not be less than the amount of royalties payable in respect of any such year under the provisions of sub-clauses (1) and (2) of Clause 18 (Royalties) of this Schedule.

(3) The Lessee shall pay the rents and royalty reserved by this lease at the times and in the manner provided in Parts V and VI and shall also pay and discharge all taxes, rates, assessments and impositions whatsoever being in the nature of public demands which shall from time to time be charged, assessed or imposed upon or in respect of the mines or works of the Lessee or any part thereof by authority of Government or otherwise except demands for land revenue and shall also pay simple interest at the rate of three per cent per annum above the State Bank of Pakistan rate on all arrears of such rents or royalty from the date whereon the same ought to be paid under these presents.

Part VII - The Lessee's Covenants.

21. Payments of Rents and Royalties.

The Lessee shall pay the several rents and royalties hereby reserved at the times and in the manner above appointed in that behalf.

22. Measurement of Petroleum obtained from the said Lands.

(1) The Lessee shall measure or weigh by a method or methods customarily used in good oilfield practice and from time to time approved by the Director General Petroleum Concessions-

(a) all crude oil won and saved and casing-head petroleum spirit recovered from the said lands; and

(b) all natural gas sold from the said lands.

(2) The Director General Petroleum Concessions or any officer authorised by him shall, at all times during the said term or any renewal thereof, be entitled to be present whenever such measurement or weighing takes place.

(3) If any measuring or weighing appliance shall at any time be found to be false or unjust, the same shall, if the Director General Petroleum Concessions so determines after considering any representations in writing made by the Lessee, be deemed to have existed in that condition during the period of three months prior to the discovery thereof or the period elapsed since the last occasion upon which the same was examined or tested, whichever shall be the less, and accordingly the royalties payable in respect of such period shall be adjusted.

(4) The Lessee shall not make any alteration in the method or methods of measurement or weighing used by him or any appliances used for that purpose without first informing the Director General Petroleum Concessions and the Director General Petroleum Concessions may in any case require that no alteration shall be made save in the presence of an officer authorised by the Director General Petroleum Concessions.

23. Keeping of Accounts.

(1) The Lessee shall at all times during the term hereby granted or any renewal thereof keep full and correct accounts in a form from time to time approved by the Director General Petroleum Concessions which shall contain accurate entries of:-

(a) the quantity of crude oil won and saved from the said lands; and

(b) the method and results of tests made on the crude oil; and

(c) the quantity of crude oil refined and the products recovered therefrom; and

(d) the quantity of crude oil otherwise disposed of and the manner of its disposal; and

(e) the quantity of natural gas sold and the price at which it has been sold; and

(f) the quantity in cubic feet of natural gas treated and the quantity in Imperial gallons of casing-head petroleum spirit recovered; and

(g) the quantity of crude oil and the products thereof or casing-head petroleum spirit used for drilling or production operations or pumping to field storage and refineries; and

(h) such further particulars and statistics as Director General Petroleum Concessions may from time to time reasonably require.

(2) The Lessee shall within two months after the end of each year of the term hereby granted or any renewal thereof deliver to the Director General Petroleum Concessions an abstract in a form from time to time approved by the Director General Petroleum Concessions of the said accounts for each such year together with a statement in the like form of all royalties payable in respect of each such year.

24. Establishment of boundary marks.

The Lessee shall unless the Director General Petroleum Concessions otherwise determines at his own expense forthwith erect and at all times maintain and keep in repair substantial boundary marks of brick, stone or concrete not less than one foot high at every angle or corner on the boundary line of the said lands. Such boundary marks shall be referenced by survey to at least two readily identifiable points in such a manner that the boundaries of the said lands can be accurately traced on the ground. The Lessee shall ensure that the area demarcated on the ground, shall conform as closely as possible to the area delineated on the plan hereto annexed.

25. Local Resident Manager.

The Lessee shall before commencing any operations in the said lands furnish to the Director General Petroleum Concessions the name and address of the Manager resident in the locality of the said lands under whose supervision such operations are to be carried on. Any notice which the President or any person authorised by him is in accordance with the terms of this lease required or entitled to serve upon the Lessee shall be sufficiently served if the same shall be delivered or sent by registered post to such Manager at such address.

26. Compensation.

The Lessee shall make and pay reasonable satisfaction and compensation for all damage or injury to the property and rights of other parties which may be done by him, his agents and servants in the exercise of the liberties and powers conferred by this lease.

27. Indemnity against third party claims.

The Lessee shall at all time indemnify and keep harmless the President and every officer of the Government of Pakistan against all actions, costs, charges, claims and

demands whatsoever which may be made or brought by any third party in relation to or in connection with this lease or any matter or thing done or purported to be done in pursuance thereof.

28. Release of lands included by inadvertence in the said lands.

In the event of the inclusion by inadvertence in Part I of this Schedule of lands or areas over which it may subsequently be proved that the Government are not entitled to the oil rights or of lands or areas in respect of which the oil rights have already been granted to other individuals or companies the Lessee shall immediately release to the President any such lands or areas when required to do so by the Director General Petroleum Concessions.

29. Lessee not to cultivate, etc.

The Lessee shall not except with the consent of the President cultivate or use the said lands in any manner save for the purpose of this demise and the rights hereby granted.

30. Exclusion of lands for public purposes, etc.

(1) Notwithstanding the rights conferred on the Lessee under this lease, the President shall have power at any time to require the exclusion from the lands included in Part I of this Schedule of any area or areas which may from time to time be required for villages, new villages, village extensions, water reserves, or any other public purposes whatsoever provided that during the subsistence of this lease the area or areas so excluded shall not exceed in all twenty percent of the area of the said lands and provided further that the exclusion of any area or areas upon which any active operations such as well drilling, road construction, waterworks, or other works relating to the winning of petroleum have previously been commenced or be in progress shall not be required but in lieu thereof an equal area or areas upon which active operations as aforementioned have not already been commenced or are not at the time being in progress shall be excluded, provided that such alternative area or areas are in the opinion of the President suitable for the public purposes aforementioned, and the Lessee shall thereupon be relieved of all liabilities and obligations hereunder in respect of any such area or areas excluded under the provisions of this Clause excepting such liabilities and obligations as may have accrued before such exclusion.

(2) Where any area or areas have been excluded under this clause the Lessee shall have a prior right to have such

lands or areas included in the lands subject to this lease if they shall subsequently become available for this purpose.

31. Advertisements, Prospectuses, etc.

No statement shall be made either in any notice, advertisement, prospectus or other document issued by or to the knowledge of the Lessee or in any other manner claiming or suggesting whether expressly or by implication that the President or any other Government Department or any person or body acting on behalf of the President has or have formed or expressed any opinion that the said lands are from their geological formation or otherwise likely to contain petroleum.

32. Notice of fresh issues of capital.

The Lessee shall report to the President particulars of any fresh issues of capital which may from time to time be made by him and any alteration which may be made in the Memorandum or Articles of Association or in the constitution of the Lessee.

33. Consent to assignment.

The Lessee shall not grant or assign any interest under this lease nor part with the possession of any of the rights hereby granted to any person or persons whomsoever without the previous consent in writing of the President or of an officer authorised by him in this behalf who may (without prejudice to his right to make such consent subject to any conditions he may think fit) require as a condition of giving such consent the assigned or assignees at his or their expense to execute a deed of covenant to observe and perform the covenants and conditions on the part of the Lessee in these presents contained.

34. Assignment of Lease.

The Lessee shall not assign or attempt to assign the rights granted by this lease to any person other than a subject of Pakistan or a company incorporated in Pakistan.

35. Lessee ceasing to be a Pakistan subject.

If the Lessee shall cease to be Pakistan national or a company incorporated in Pakistan the Lessee shall forthwith inform the President and apply to him for his consent to an assignment of the rights granted by this lease in accordance with Clause 33 (Consent to assignment) of this Schedule and in the event of the Lessee failing to obtain such consent within such time as the President may in his discretion appoint, the President may revoke this lease. The

with the President

*Consent to be given
(Amended)*

revocation of this lease is pursuant to the foregoing provisions of this Clause shall be subject and without prejudice to any obligation or liability imposed by or incurred under the terms and conditions hereof.

36. Reasonableness.

This lease shall be determined if the Lessee shall be or become controlled directly or indirectly by a national of or by a company incorporated in any country the laws and customs of which do not permit nationals of Pakistan or companies incorporated in Pakistan or companies incorporated in that country controlled directly or indirectly by nationals of Pakistan or companies incorporated in Pakistan to acquire, hold and operate petroleum concessions on conditions which in the opinion of the President are reasonably comparable with the conditions upon which such rights are granted to nationals of that country with the addition of conditions corresponding to those imposed by this Clause and those included in the Pakistan Petroleum (Production) Rules, 1949, as applicable in respect of this lease.

37. Lessee not to obstruct working of other minerals.

The Lessee shall exercise the liberties and powers hereby granted in such a manner as to offer no unnecessary or reasonably avoidable obstruction or interruption to the development and working within the said lands or lands adjacent thereto of any minerals not included in this lease and shall at all times afford to the President or his representative and to the holders of prospecting licences or mining leases in respect of any such minerals or any minerals within any lands adjacent to the said lands reasonable means of access and safe and convenient passage upon and across the said lands to such minerals for the purpose of getting, working, developing and carrying away the same.

38. Notice of the site and commencement of boreholes and wells.

(1) As soon as the site of any borehole or well has been decided the Lessee shall notify the Director General Petroleum Concessions in writing of the situation thereof and the same shall be described by a certain number in the plans and records which the Lessee is required to keep under the provisions of this lease. The Lessee shall notify the Director General Petroleum Concessions of any change of the number of any such borehole or well which may be made.

(2) No borehole or well shall be commenced and no borehole or well shall be recommenced after work has been discontinued thereat for more than six months unless seven clear days' notice in writing shall first have been given to

the Director General Petroleum Concessions provided that the provisions of this sub-clause shall not apply to cleaning out operations in a producing well.

39. Abandonment and plugging of boreholes.

(1) No boreholes or wells shall be abandoned and no cemented string or other permanent form of casing shall be withdrawn from any borehole or well which it is proposed to abandon without the prior consent in writing of the Director General Petroleum Concessions such consent not to be unreasonably withheld in the case of boreholes or wells which have become or are unproductive.

(2) Every borehole or well which the Lessee intends to abandon shall, unless the Director General Petroleum Concessions otherwise determines, be so securely plugged by the Lessee as to prevent ingress and egress of water in and from any portion of the strata bored through.

(3) The Director General Petroleum Concessions may in any case require that no borehole or well shall be plugged or any works be executed for that purpose save in the presence of an officer authorized by him.

40. Delivering up of productive boreholes and wells, etc., in good order.

Within two months after the expiration or sooner determination of this lease the Lessee shall deliver up to the President in good order repair and condition and fit for further working all productive boreholes or wells (unless ordered by the Director General Petroleum Concessions to plug them as provided in the next succeeding clause hereof) and except such boreholes and wells as shall have been previously abandoned with the consent of the Director General Petroleum Concessions which shall have been made by the Lessee under the liberty or power in that behalf hereinbefore contained, together with all casings and other appurtenances to such boreholes or wells below surface level and which cannot be moved without causing injury to the said boreholes and wells.

41. Plugging of boreholes on determination of lease, etc.

Within two months after the expiration or sooner determination of this lease the lessee shall if required so to do by the Director General Petroleum Concessions plug all boreholes and wells as provided in Clause 39 (Abandonment and plugging of boreholes) of this Schedule.

42. Health and safety of workers and employees.

The Lessee shall comply with any instructions from time to time given by the Chief Inspector of Mines in writing for securing the health and safety of persons employed in or about the said lands.

43. Avoidance of harmful methods of working.

(1) The Lessee shall maintain all apparatus and appliances and all boreholes and wells capable of producing petroleum in good repair and condition and shall execute all operations in or in connection with the said lands in a proper and workmanlike manner in accordance with methods and practice customarily used in good oilfield practice and without prejudice to the generality of the foregoing provision the Lessee shall take all steps practicable in order:-

(a) to control the flow and to prevent the escape or waste of petroleum discovered in or obtained from the said lands; and

(b) to conserve the said lands for productive operations; and

(c) to prevent damage to adjoining petroleum bearing strata; and

(d) to prevent the entrance of water through boreholes and wells to petroleum bearing strata; and

(e) to prevent the escape of petroleum into any water wells, spring, stream, river, lake, reservoir, estuary or harbour; and

(f) to cause as little damage as possible to the surface of the said lands and to the trees, crops, buildings, structures and other property thereon.

(2) The Lessee shall comply with any instructions from time to time given by the Director General Petroleum Concessions in writing relating to any of the matters set out in sub-clause (1) hereof.

44. Provision of storage tanks, pipes, pipelines or other receptacles.

The Lessee shall use methods and practice, customarily used in good oilfield practice for confining the petroleum obtained from the said lands in tanks, gasholders, pipes, pipelines or other receptacles constructed for that purpose. No petroleum shall save as a temporary measure, during an emergency, be placed or kept in an earthen reservoir.

45. Disposal of waste oil, salt water and refuse.

The Lessee shall drain all waste oil, salt water and refuse from tanks, gasholders, boreholes and wells into proper receptacles constructed and maintained by him for that purpose at a safe distance from such tanks, gasholders, boreholes and wells and from any buildings or structures whether situate within the said lands or not and shall dispose of such waste oil, salt water and refuse in manner from time to time approved by the Director General Petroleum Concessions.

46. Lessee to keep records of boreholes

The Lessee shall keep accurate records in a form from time to time approved by the Director General Petroleum Concessions of the drilling, deepening, plugging or abandonment of all boreholes and wells and of any alterations to the casing thereof. A log of all boreholes and wells shall be kept in a form from time to time approved by the Director General Petroleum Concessions containing particulars of the following matters:-

(a) the strata and subsoil through which the boreholes or well was drilled; and

(b) the casing inserted in any boreholes or well and any alteration to such casing; and

(c) any petroleum, water, workable minerals or mine workings encountered; and

(d) such other matters as the Director General Petroleum Concessions may from time to time require.

The Lessee shall deliver copies of the said records and log to the Director General Petroleum Concessions as and when required.

47. Lessee to keep samples of strata, petroleum and water.

The Lessee shall as far as reasonably practicable correctly label and preserve for reference for a period of twelve months characteristic samples of the strata or water encountered in any boreholes or well and samples of any petroleum discovered in the said lands. And the Director General Petroleum Concessions or his representative shall have access to such samples at all reasonable times and shall be entitled to require that representative specimens not exceeding one-half of any such sample be delivered to him and to retain any specimen so delivered.

48. Plans and records.

(1) The Lessee shall furnish to the Director General Petroleum Concessions (quarterly) (at such times as the Director General Petroleum Concessions may appoint) during the term hereby granted or any renewal thereof a record in a form from time to time approved by the Director General Petroleum Concessions of the progress of his operations in the said lands. Such record shall contain:

(a) a statement of the depth drilled in each borehole or well; and

(b) a statement of any petroleum, water, workable mineral or mine workings encountered in the course of the said operations; and

(c) a statement of all petroleum produced and casing-head petroleum spirit recovered; and

(d) a statement of the areas in which any geological or geophysical work has been carried out.

(2) Within two months after the end of each year comprised in the term hereby granted or any renewal thereof the lessee shall furnish to the Director General Petroleum Concessions a record in a form from time to time approved by the Director General Petroleum Concessions of the operations conducted in the said lands during each such year, together with a plan upon a scale approved by the Director General Petroleum Concessions showing the situation of all boreholes or wells and indicating all development and other works executed by him in connection with searching, boring for and getting petroleum.

(3) The Lessee shall also keep accurate geological plans, maps and records relating to the said lands.

(4) The Lessee shall furnish to the Director General Petroleum Concessions such plans and information as to the progress of operations in the said lands as the Director General Petroleum Concessions may from time to time reasonably require.

49. Reports to be treated as confidential.

All logs, records, plans, maps, accounts and information which the Lessee is or may be from time to time required to furnish under the provisions of this lease shall be supplied at the expense of the Lessee and shall (except with the consent in writing of the Lessee which shall not be unreasonably withheld) be treated as confidential by the Director General Petroleum Concessions and shall nevertheless be entitled at any

time to make use of any information received from the Lessee for the purpose of preparing and publishing aggregated returns and general reports on the extent of oil prospecting or oil mining operations in Pakistan and for the purposes of any arbitration or litigation between the President and the Lessee.

Part VIII - The President's covenants.

50. For quiet enjoyment.

The Lessee paying the rents and royalties hereby reserved and observing and performing the covenants and provisions herein contained and on his part to be observed and performed, shall and may peaceably and quietly hold and enjoy the rights and privileges hereby devised for and during the term hereby granted without any lawful interruption from or by the President or any person rightfully claiming from or under him.

51. Renewal.

(1) The Lessee having paid the several rents and royalties due and having observed and performed the terms and conditions herein contained may be granted, on giving to the President not less than twelve months previous notice in writing in that behalf, not more than two years nor less than one year before the termination of the term hereby granted, at the discretion of the President, a renewal of this lease which complies with the rules for the time being in force, for a period of five years in respect of the whole of the said lands or any part thereof from the expiration of the said term upon the terms and conditions contained in the rules today in force subject to such modifications or exclusions and enhancement of rates for royalties and rents as the President may in his discretion determine. Further renewals each for a period of five years at the discretion of the President may also be granted but the total period of the renewals shall not exceed twenty years. In case of any dispute about the grant of such a renewal, the matter shall be referred to arbitration in accordance with Clause 66 hereof.

(2) In this Clause the expression "rates of royalty" includes yearly rents.

52. Right of Lessee to determine Lease.

Without prejudice to any obligation or liability imposed by or incurred under the terms and conditions hereof the Lessee may at any time during the term hereby granted or any renewal thereof determine this lease by giving to the President not less than twelve months previous notice in writing to that effect.

53. Rights of Lessee to abandon portions of the said Lands.

Without prejudice to any obligation or liability imposed by or incurred under the terms and conditions hereof the Lessee shall be entitled to any time during the term hereby granted or any renewal thereof by giving three months' notice in writing to the President to surrender the rights granted by this lease in respect of any part or parts of the said lands. Provided that the part of the said lands in respect of which the said rights are retained shall comply with the Rules as applicable as to the shape and size of areas in respect of which an oil mining lease may be granted.

Part IX - General Provisions.

54. Power to inspect plant, records, accounts, etc.

Any person or persons authorised by the Director General Petroleum Concessions shall be entitled at all reasonable times to enter into and upon any land for the time being possessed or occupied by the Lessee in the said lands for the purposes hereinafter mentioned:-

(a) to examine the boreholes, wells, plant, appliances, buildings and works made or executed by the lessee in pursuance of this lease and the state of repair and condition thereof; and

(b) to inspect and check the accuracy of the weighing or measuring appliances, weight, measurements, logs, records, plans and maps which the Lessee is required to keep or make in accordance with the provisions of this lease; and

(c) to inspect and make abstracts or copies of any logs, records, plans, maps or accounts which the Lessee is required to keep or make in accordance with the provisions of this lease; and

(d) to inspect the samples of strata petroleum or water which the Lessee is required to keep in accordance with the provisions of this lease; and

(e) to execute any works which the Director General Petroleum Concessions may be entitled to execute in accordance with the provisions of this lease.

55. Unit development.

If at any time during the term hereby granted or any renewal thereof the President shall be satisfied that the said lands or any part thereof form part of a single

geological petroleum structure or petroleum field (hereinafter referred to as "an oil field") in respect of other parts of which other oil mining lease are then in force and the President shall consider that it is in the interest of Pakistan in order to secure the maximum ultimate recovery of petroleum and to avoid unnecessary competitive drilling that the oil field should be worked and developed as a unit in co-operation by all the persons, including the Lessee, whose leases extend to or include any part thereof, the following provisions shall apply:

(1) (a) The Lessee shall upon being so required by notice in writing by the President co-operate with such other persons, being persons holding oil mining leases in respect of any part or parts of the oil field (hereinafter referred to as "the other Lessees") as may be specified in the said notice in the preparation of a scheme (hereinafter referred to as "a development scheme") for the working and development of the oil field as a unit by the Lessee and the other Lessees in co-operation and shall, jointly with the other Lessees, submit such scheme for the approval of the President.

(b) The said notice shall also contain a description by reference to a map of the area or areas in respect of which the President requires a development scheme to be submitted and shall state the period within which such scheme is required to be submitted for approval by the President.

(2) If a development scheme shall not be submitted to the President within the period limited in that behalf by the said notice or if a development scheme submitted in pursuance of the foregoing provisions of this Clause shall not be approved by the President the President shall himself prepare a development scheme which shall be fair and equitable to the Lessee and the other Lessees shall perform and observe all the terms and conditions thereof.

58. In the event of state of emergency or war President to have right of pre-emption.

In the event of a state of national emergency or war (of the existence of which the President shall be the sole Judge).

(1) The President shall have the right of pre-emption of all crude oil gotten under the lease and shall have the right to require the lessee to the extent of any refinery capacity he may have in Pakistan to produce oil fuels that shall comply with the specifications at the time prescribed by the Director General Petroleum Concessions provided that the said crude oil be of a suitable kind and quality for this purpose.

(2) The Lessee shall use his utmost endeavours to increase so far as reasonably possible with existing facilities the supply of oil and/or products thereof for the Government to the extent, required by the President.

(3) The Lessee shall with every reasonable expedition and so as to avoid demurrage on the vessel or vessels engaged to convey the same, do his utmost to deliver all oil or products of oil purchased by the President under his said right of pre-emption in the quantities at the time and in the manner required by the President at a convenient place of shipment or at a place of storage in Pakistan to be determined by the President whether belonging to the Government or otherwise. In the event of a vessel employed to carry any such oil or products thereof on behalf of the President being detained on demurrage at the port of loading the Lessee shall pay the amount due for demurrage according to the terms of the charter party and/or the rates of loading previously agreed with the Lessee unless the delay is due to causes beyond the control of the Lessee.

(4) The price to be paid for all oil or products of the refining or treatment of oil taken in pre-emption by the President shall be either-

(a) as specified in a separate agreement, or

(b) if no such agreement shall have been entered into prior to the exercise of the right of pre-emption a fair price for the time being at the point of delivery as the same shall be settled by agreement between the President and the Lessee or in default of such agreement by arbitration in manner provided by Clause 66.

To assist in arriving at a fair price at the point of delivery the Lessee shall furnish for the confidential information of the President, if so required particulars of the quantities, descriptions and prices of oil or products sold to other customers and of charters or contracts entered into for carriage and shall exhibit to the President original or authenticated copies of contracts or charter parties entered into for the sale or carriage of such oil or products.

(5) The President shall be at liberty to take control of the works plant and premises of the Lessee in Pakistan and in such event the Lessee shall conform to and obey all directions issued by the President or on his behalf. Compensation shall be paid to the Lessee for any loss or damage that may be proved to have been sustained by the Lessee by reason of the exercise by the President of the

powers conferred by this sub-clause. Any such compensation shall be settled by agreement between the President and the Lessee or in default of agreement by arbitration in the manner provided by Clause 26.

57. Additional requirements for Subvention

The President may at any time require the Lessee to meet the internal requirements of Pakistan to the satisfaction of the Government of Pakistan in matters respecting crude oil or any of its products for other countries and the Lessee shall comply with the instructions issued by the President in this behalf.

58. Association of Pakistan Capital

The President may subject to any law for the time being in force at his discretion require the Lessee to associate Pakistan capital to the extent of 25 per cent of all classes of capital and debentures issued by him from time to time and the Lessee shall comply with the instructions issued by the President in this behalf.

59. Employment of nationals of Pakistan and their training

The Lessee shall be required to employ Pakistan nationals in his organisation at all levels as follows:

for the first 5 years of the lease: 1/8th of the total number of employees.

for the next 5 years of lease: 1/4th of the total number of employees.

for the next 5 years and thereafter: at least 1/2 of the total number of employees.

The number of Pakistan personnel to be trained by the Lessee will be determined in consultation with the Director General Petroleum Concessions.

60. Power to execute works

If the Lessee shall at any time fail to perform the obligations arising under the terms and conditions of any of the undermentioned Clauses of this Schedule:

(a) Clause 22 (Measurement of Petroleum obtained from the said lands);

(b) Clause 37 (Abandonment and plugging of boreholes);

(c) Clause 46 (Delivering up of productive boreholes and wells, etc. in good order);

(d) Clause 41 (Plugging of boreholes on determination of lease etc.);

(e) Clause 42 (Health and safety of workers and employees);

(f) Clause 43 (Avoidance of harmful methods of working);

(g) Clause 44 (Provision of storage, tanks, pipes, pipe-lines or other receptacles);

(h) Clause 45 (Disposal of waste oil, salt water and refuse).

then and in any such case the Director General Petroleum Concessions shall be entitled after giving to the Lessee reasonable notice in writing of such his intention to execute any works which in the opinion of the Director General Petroleum Concessions or his agents may be necessary to secure the performance of the said obligations or any of them and to recover the costs and expenses of so doing from the Lessee.

61. Rights of distress.

If and whenever any of the rents or royalties reserved by this lease or any part thereof respectively shall be in arrear or unpaid for the space of two calendar months next, after any of the days whereon the same ought to be paid (whether the same shall have been legally demanded or not) then and so often as the same may happen the Director General Petroleum Concessions may (as an additional remedy and without prejudice to the power of distress and other the rights and remedies to which he would be entitled) enter into and upon any land which shall be for the time being be possessed or occupied by the Lessee for purposes of this lease of the exercise of any of the rights thereby granted and may seize and distrain and sell as landlords may do for rent in arrear all or any of the stocks of petroleum and products hereof, live and dead stock, engines, machinery, tools, implements, chattels and effects belonging to the Lessee which shall be found in or upon the land so entered upon and out of the moneys arising from the sale of such distress may retain and pay all the arrears of the said rents and royalties and also the costs and expenses incident to any such distress and sale rendering the surplus (if any) to the Lessee.

62. Power of revocation.

If and whenever the rents and royalties reserved by this lease or any part thereof shall be in arrear for the

space of six calendar months next after any of the days whereon the same ought to have been paid or if there shall be any violation of the undertaking given in accordance with Rule 4(6) of Pakistan Petroleum (Production) Rules, 1949, or any breach or non-observance by the Lessee of any of the terms and conditions of this lease or if the Lessee shall become bankrupt or make or enter into any arrangement or composition with his creditors or, if where the Lessee is a company, a Receiver shall be appointed or the company shall enter into liquidation whether compulsory or voluntary (except a voluntary liquidation of a solvent company for the purpose of reconstruction) or if the Lessee shall fail to perform and observe the terms and conditions or any development scheme prepared in accordance with the provisions of Clause 55 (Unit development) of this Schedule then and in any such case the President may revoke this lease and thereupon the same and all the rights hereby granted shall cease and determine but subject nevertheless and without prejudice to any obligation or liability imposed by or incurred under the terms and conditions of this lease. Provided always that save as to the nonpayment of rents or royalties the aforesaid power shall not be exercisable unless and until notice has been given to the Lessee specifying the particular breach complained of and if the breach is capable of remedy requiring the Lessee to remedy the breach and in any case, requiring the Lessee to make compensation in money for the breach, and the Lessee fails, within a period of three months thereafter to remedy the breach if it is capable of remedy, and to make reasonable compensation in money, to the satisfaction of the President for the breach.

63. Power of Lessee to remove plant, etc.

Subject to the provisions of Clause 40 (Delivering up of productive boreholes and wells, etc. in good order) of this Schedule the Lessee may provided that all rents, royalties and other impositions payable by him by virtue of these present have been paid and that all the covenants and conditions herein contained have been observed and performed, at any time or times within six calendar months after the determination of this lease whether by effluxion of time or otherwise enter into and upon the said lands or any part thereof for the purpose of taking down, removing and disposing of for his own use and benefit all or any of the buildings, works, railways, pipelines, machinery, utensils, implements, articles and things set up and used or employed by him in or about the said lands which the President shall not have elected to purchase under the provisions of Clause 64 (Power of President to purchase plant, etc.) of this Schedule (except buildings and erections of brick, stone or concrete) making reasonable compensation for all damage done to the said lands by such removal.

64. Power of President to purchase plant, etc.

If at the expiration or sooner determination of this lease the President shall be desirous of purchasing all or any of the buildings, works, railways, pipe-lines, machinery, utensils, implements, articles or things constructed set up or used or employed by the Lessee in or about the said lands and shall signify such his desire by notice in writing to the Lessee six calendar months at least before the expiration of this lease (or if this lease shall be determined under the power of revocation hereinbefore contained at any time within three calendar months after the determination of this lease) the Lessee shall sell to the President the articles and things specified in such notice at a price which failing agreement shall be fixed by arbitration as provided in Clause 66 (Arbitration) of this Schedule.

65. Force Majeure.

(1) Failure on the part of the Lessee to fulfil any of the terms and conditions of this lease shall not give the President any claim against the Lessee or be deemed a breach of this lease in so far as such failure arises from force majeure.

(2) In this Clause the expression "Force Majeure" includes the act of God, war, insurrection, riot, civil commotion, tide, storm, tidal wave, flood, lightning, explosion, fire, earthquake and any other happening which the Lessee could not reasonably prevent or control.

66. Arbitration.

If at any time during the continuance of this lease or after the determination thereof any question or dispute shall arise regarding this lease or any matter or thing connected therewith or the several duties or liabilities of the Lessee hereunder or the amount or payment of any rent or royalty then and in all such cases the matter in difference shall be referred to the Government of Pakistan in the appropriate Ministry whose decision will be final provided that any dispute as regards the right of the Lessee to an oil mining lease or cancellation of this deed for any violation of the undertaking given in accordance with Rule 4(6) of Pakistan Petroleum (Production) Rules, 1949 or any breach of its provisions or any dispute connected with the price of crude oil prescribed by Government or price of plant purchased by President at the expiration or sooner determination of this lease or compensation payable to the Lessee in terms of annuities (5) of Clause 56 or compensation payable to the Lessee on Government taking over all the rights of the Lessee under the mining lease or the

renewal of this mining lease shall be determined by two arbitrators one to be nominated by the President and the other by the Lessee or in case of disagreement between the arbitrators by a Judge of the Supreme Court of Pakistan to be appointed as an umpire by the arbitrators in writing and the decision of such arbitrators or the Judge of the Supreme Court as umpire, as the case may be, shall be final.

67. Marginal notes.

The marginal notes are for convenience only and do not form part of this Lease.

IN WITNESS WHEREOF the President and the Lessee have hereunto set their hands and seals the day and year first herein above written.

SIGNED by [Signature] For and on behalf of the President of Pakistan
(LESSOR) in the presence of:
(SHAHID AHMAD)
Director General
Petroleum Concessions
Ministry of Petroleum & NR
ISLAMABAD.

WITNESSES:

[Signature]

STATED by _____ and
on _____ at _____
Punjab _____
000

(SHAHID AHMAD)
Director General
Petroleum Concessions
Ministry of Petroleum & NR
ISLAMABAD.

UNPROCESSED

1.

STATED in the above mentioned letter
Punjab _____
STATED, by _____
on the above mentioned _____
proceedings.

UNPROCESSED

1.

2.

STATED in the above mentioned letter
GIL _____
of the _____
_____ _____
_____ _____
_____ _____

UNPROCESSED

1.

2.

NOTE

Notes: The party mentioned above is
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

The Schedule marked 'B' above referred to
Bond in respect of Oil Mining Lease.

KNOWN ALL MEN BY THESE PRESENTS THAT WE,
PRESIDENT OF THE ISLAMIC REPUBLIC OF PAKISTAN (PRESIDENT))
PAKISTAN PETROLEUM LIMITED (PPL))
OIL & GAS DEVELOPMENT CORPORATION. (OGDC)) LESSEE.

and BANK LIMITED (or other agency for President) (First Surety).
and BANK LIMITED (or other agency for President) (Second Surety)

and;

and BANK LIMITED (for Pakistan Petroleum Limited) (First Surety).
and BANK LIMITED (for Pakistan Petroleum Limited) (Second Surety)

and;

and BANK LIMITED (for Oil & Gas Development Corporation). (First Surety).
and BANK LIMITED (for Oil & Gas Development Corporation). (Second Surety)

are held and firmly bound to the President (Lessor) and his Successors in the office in the sum of Rs. 350,000/- (Rupees three hundred fifty thousand only) to be paid to the said President for which payment to be well and truly made we bind ourselves and each of us our heirs executors and administrators jointly and severally by these presents.

Dated this 29th day of November 1988.

WHEREAS by Deed of even date herewith and made between President of Pakistan of the One Part and the PRESIDENT, PPL AND OGDC of the Other Part all or any petroleum lying or being within under or throughout these lands lying and being within Rawalpindi District and Jhelum District and containing an area of (70) seventy square miles or thereabouts and delineated in the plan attached to the said Deed was demised unto the said PRESIDENT, PPL AND OGDC subject to the terms conditions and covenants therein contained.

AND WHEREAS, the said;

- (1) BANK LIMITED and BANK LIMITED (or other agencies for President).
- (2) BANK LIMITED and BANK LIMITED (for PPL).
- (3) PAKISTAN LIMITED and BANK LIMITED (for OGDC).



SPECIAL
ADHESIVE

PAKISTAN PETROLEUM LIMITED
A-10.3
Val. 30/2
Date 11-4-88
Continued....
Pakistan Petroleum Ltd.
11/4/88

and have agreed to become surety for the due performance by the said President, PPL and OGDC of all and several the covenants matters and things under the said Deed to be by them performed and done.

Now the condition of the above-written bond or obligation is such that if the said PRESIDENT, PPL/OGDC shall well and truly observe and perform all and every the covenants undertakings and agreements by them to be observed and performed as hereinbefore mentioned and shall in a proper and workmanlike manner do all and every the acts, matters and things by them to be done under the said Deed to the satisfaction of the President THEN the above written bond or obligation shall be void otherwise the same shall remain in full force and effect.

FOR PRESIDENT

Signed by _____ (Name & Designation)
the First Surety in the presence of:

Witness:

[(1) _____]
[(2) _____]

Signed by _____ (Name & Designation)
the Second Surety in the presence of:

Witness:

[(1) _____]
[(2) _____]

FOR PAKISTAN PETROLEUM LIMITED

Signed by [Signature] (Name & Designation)
the First Surety in the presence of:

Witness:

[(1) P. C. Wazir]
[(2) [Signature]]

Signed by [Signature] (Name & Designation)
the Second Surety in the presence of:

Witness:

[(1) P. C. Wazir]
[(2) [Signature]]

Continued.....

FOR OIL & GAS DEVELOPMENT CORPORATION

Signed ZAFAR IQBAL (Name & Designation)
the First Surety in the presence of:



Witness:

[(1) _____]
[_____]
[(2) _____]

Signed _____ (Name & Designation)
the Second Surety in the presence of:

Witness:

[(1) _____]
[_____]
[(2) _____]

Signed in the name and
on behalf of the President
(Lessee)

by (SHAHID AHMAD)
(Name and Designation) Director General

Petroleum Concessions
Ministry of Petroleum & NR
ISLAMABAD, Witness:

[(1) Shahid Ahmad]
[_____]
[(2) _____]

Signed in the name and
on behalf of
Pakistan Petroleum Limited (Lessee)
by _____
Attorney of the above named Company
in the presence of:

Witness:

[(1) P. G. Iqbal]
[_____]
[(2) Shahid Ahmad]

Signed in the name and
on behalf of
Oil & Gas Development Corporation (Lessee)
by _____
Attorney of the above named Corporation
in the presence of:

Witness:

[(1) Shahid Ahmad]
[_____]
[(2) P. G. Iqbal]

Annex – III
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	EMC Pakistan	No of Stacks / Sampling Point	
	Abd. oil Field, Gujjar Khan	AA-2	N-5
Phone			
Industry Category	Environmental Study of oil well Flow		
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):-

Valid Subject to Calibration
EPA test date 30-3-23
1-4-23

Signature

Research Officer
Environmental Protection Agency
Punjab Lahore

Signature





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	FMC Pakistan		Sampling Point				
			low-2				
	Adhi oil Field, Gujranwala						
Waste Water (WW) Treatment facility Primary Secondary Tertiary NA				Drinking Water (W) Treatment Facility			
Total WW collected Sample				Total Collected Drinking water samples...0.2...			
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 W/W	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	HNO ₃ to pH < 2	✓		
Nitrogen, Nitrate + Nitrite, Phenolic Compounds, Oil & Grease, COD, NH ₃	✓	P.G	2000 mL	H ₂ SO ₄ to pH < 2, Cool 6C	✓		
Metals, General	✓	P.G Rinsed 1:1 HNO ₃	500 mL	HNO ₃ 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	Yes	NO	Measured value
pH							
Temp							
Cl							

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

Remarks for Sample Quality (if Any):-

Signature

(Signature)
Punjab
Research Officer
Environment Agency

Dated

30-3-23
1-4-23

Signature





Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003541

Monitoring & Test Report

- Ground Water
- Surface Water
- Ambient Air
- Meteorological Data
- Noise Monitoring

EMC
PAKISTAN

11th April. 2023

Job Reference No.: GCEC-PK-PU-73/2023

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.
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1 of 18





Green Crescent

Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003542

Client Detail:

Name of Contact Person:	Mr. Nisar Ali Khan
Designation:	Environmentalism
Contact Number:	+92 51 8744155 (Ext. 8014)
Telephone:	-
Fax:	-
Email:	nisar.khan@emc.com.pk
Address:	403, Green Trust Tower, Jinnah Avenue, Blue Area, F6, Islamabad

GCEC Details:

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

Signatories:





Green Crescent

Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003543

CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Sample Details			
Job Ref. No:	GCEC-PK-PU-73/2023	Client Name:	EMC Pakistan
Telephone No.	+92 51 8744155	Sample Matrix:	Ground Water Sample
Sample Date:	30-03-2023	Sampled By:	GCEC
Sample Receipt Date:	31-03-2023	Date of Completion of Analysis:	10-04-2023
Grab/Composite:	Grab Sampling	Monitoring Validated By:	Muhammad Nadeem
Sample Identification			
01	Ahdi Javed Mour	Sample Coordinates:	33°07'48"N 73°07'19"E

Parameters	Analysis Method	Unit	LOR	Result	PEQS
				01	
PHYSICAL & CHEMICAL ANALYSIS					
pH**	APHA-4500H* B	-	0.01	7.38	6.5-8.5
Odor	In-house	-	-	Odorless	Non-Objectionable
Taste	In-house	-	-	Salty	Non-Objectionable
Color	APHA-2120 B/C	Pt/Co	1.0	<1.0	≤15 TCU
Turbidity**	APHA-2130 B	NTU	0.1	<0.1	<5 NTU
Total Hardness**	APHA-2340 B & C	mg/l	0.1	852.0	< 500 mg/l
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1.0	3528.0	< 1000
Chloride**	APHA-4500Cl* B	mg/l	0.24	1013.64	< 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	10.01	≤ 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-3111Cd B	mg/l	0.0028	<0.0028	0.01
Copper**	APHA-3111Cu B	mg/l	0.0045	<0.0045	2
Chromium**	APHA-3111Cr 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-3111Sb B	mg/l	-	ND	≤ 0.005 (P)
Nickel**	APHA-3111Ni C	mg/l	0.008	<0.008	≤ 0.02
Zinc**	APHA-3111Zn 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-3111Mn B	mg/l	0.0016	<0.0016	≤ 0.5
Pesticides	APHA-6630 B	mg/l	-	ND	-
Boron	APHA-4500-B (C)	mg/l	0.1	<0.1	0.3
Lead**	APHA-3111Pb B	mg/l	0.013	<0.013	≤ 0.05
Selenium	APHA-3111Se B	mg/l	-	ND	0.01 (P)
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±5°C and humidity at 50±20%. **Disclaimer:** The results are solely of the sample provided. **All the starred parameters are PNCAC accredited.

Sample Analyzed By:

Analyst
Mr. Idrees Zaman

Name of Chief Analyst with Seal:

Mr. Usman Raza Jaswal





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Sr. No# 23A/ 003544

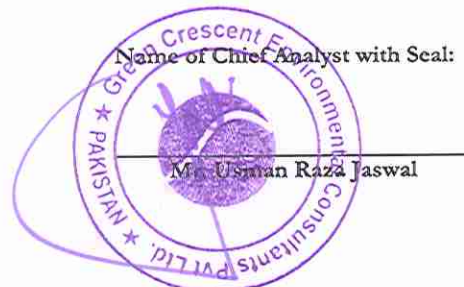
CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Sample Details					
Job Ref. No:	GCEC-PK-PU-73/2023	Client Name:	EMC Pakistan		
Telephone No.	+92 51 8744155	Sample Matrix:	Ground Water Sample		
Sample Date:	31-03-2023	Sampled By:	GCEC		
Sample Receipt Date:	01-04-2023	Date of Completion of Analysis:	10-04-2023		
Grab/Composite:	Grab Sampling	Monitoring Validated By:	Muhammad Nadeem		
Sample Identification					
02	Mastala	Sample Coordinates:	33°08'45"N 73°09'07"E		
Parameters	Analysis Method	Unit	LOR	Result	PEQS
				02	
PHYSICAL & CHEMICAL ANALYSIS					
pH**	APHA-4500H ⁺ B	-	0.01	7.47	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	0.1	<0.1	<5 NTU
Total Hardness**	APHA-2340 B & C	mg/l	0.1	340.0	< 500 mg/l
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1.0	778.0	< 1000
Chloride**	APHA-4500Cl ⁻ B	mg/l	0.24	60.66	< 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-4500NO ₂ B	mg/l	0.01	<0.01	≤ 3 (P)
Nitrate**	APHA-4500NO ₃ C	mg/l	0.1	8.9	≤ 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-3111Cd B	mg/l	0.0028	<0.0028	0.01
Copper**	APHA-3111Cu B	mg/l	0.0045	<0.0045	2
Chromium**	APHA-3111Cr 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-3111Sb B	mg/l	-	ND	≤ 0.005 (P)
Nickel**	APHA-3111Ni C	mg/l	0.008	<0.008	≤ 0.02
Zinc**	APHA-3111Zn 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-3111Mn B	mg/l	0.0016	<0.0016	≤ 0.5
Pesticides	APHA-6630 B	mg/l	-	ND	-
Boron	APHA-4500-B (C)	mg/l	0.1	<0.1	0.3
Lead**	APHA-3111Pb B	mg/l	0.013	<0.013	≤ 0.05
Selenium	APHA-3111Se B	mg/l	-	ND	0.01 (P)
MICROBIOLOGICAL ANALYSIS					
Total Coliforms	APHA:9222 B	CFU/100ml		04	0/100ml
Faecal Coliforms (Ecoli)	APHA:9222 D	CFU/100ml		02	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 the starred parameters are PNAC accredited.					

Sample Analyzed By:

Analyst
Mr. Idrees Zaman

Name of Chief Analyst with Seal:





Green Crescent

Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003545

CHEMICAL ANALYSIS TEST REPORT (SURFACE WATER)

Sample Details			
Job Ref. No:	GCEC-PK-PU-73/2023	Client Name:	EMC Pakistan
Telephone No.:	+92 51 8744155	Sample Matrix:	Surface Water Sample
Sample Date:	31-03-2023	Sampling By:	GCEC
Sample Receipt Date:	01-04-2023	Date of Completion of Analysis:	10-04-2023
Grab/Composite:	Grab Sampling	Monitoring Validated By:	Muhammad Nadeem

Sample Identification			
01	Narali Dam	Sampling Coordinates:	33°07'09"N 73°09'49"E

Parameters	Analysis Method	Unit	LOR	Result
PHYSICAL & CHEMICAL ANALYSIS				
pH**	APHA-4500-H ⁺ B	-	0.01	7.74
Temperature	APHA-2550 B	°C	-	25.2
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1.0	1904.0
Total Suspended Solid**	APHA-2540 C	mg/l	1.0	53.0
Biological Oxygen Demand	APHA-5210 B	mg/l	1.0	17.0
Chemical Oxygen Demand**	APHA-5220 D	mg/l	1.0	49.0
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 Cl ⁻ B	mg/l	0.24	849.26
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 C	mg/l	-	ND
Sulphate**	APHA-4500-SO ₄ ²⁻ C	mg/l	0.41	499.27
Sulphide	APHA-4500-S ₂ F	mg/l	0.4	<0.4
Ammonia	APHA-4500-NH ₃ B,C	mg/l	0.002	<0.002
Zinc**	APHA-3111 B	mg/l	0.0033	0.834
Manganese**	APHA-3111 B	mg/l	0.0016	0.014
Silver	APHA-3500Ag-B	mg/l	0.0032	<0.0032
Chlorine	APHA-4500Cl-B	mg/l	0.1	<0.1
Iron**	APHA-3111 B	mg/l	0.1	0.902
Cadmium**	APHA-3111 B	mg/l	0.0028	<0.0028
Chromium**	APHA-3111 B	mg/l	0.0054	<0.0054
Copper**	APHA-3111 B	mg/l	0.0045	0.021
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	0.017
Arsenic	APHA-3111As B	mg/l	0.01	<0.01
Barium	APHA-3500 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
Pesticides	APHA-6630 B	mg/l	-	ND
Total Toxic Metals	By Calculation	mg/l	-	0.038

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±5°C and humidity at 50±20%.

** PEQS Limits are not available for surface water inspection. ** All starred parameters are PNAC accredited.

Sample Analyzed By:

Name of Chief Analyst With Seal:

Analyst
Mr. Idrees Zaman

Mr. Usman Raza Taswal



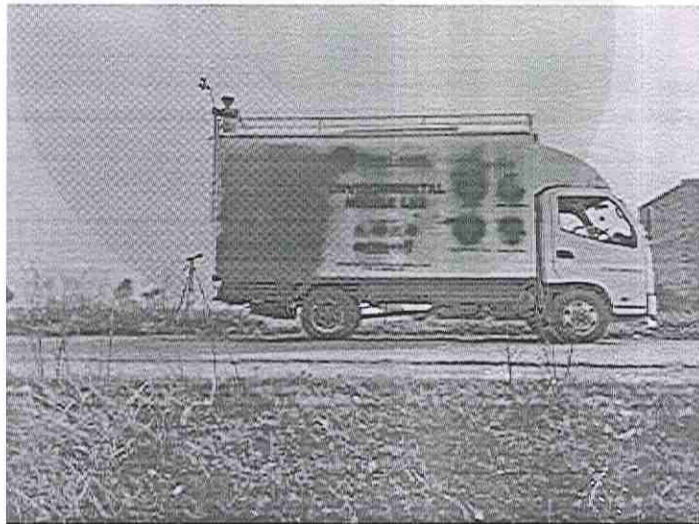


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Sr. No# 23A/ 003648

Ambient Air Monitoring Location # 1

Ahdi Javed Mour
(Gujar Khan)





Ambient Air Quality Monitoring

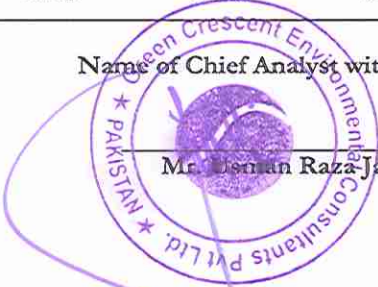
Job Reference Number	GCEC-PK-PU-73/2023
Monitoring Point	Ahdi Javed Mour
Date of Intervention	30-03-2023 to 31-03-2023
Monitoring Coordinates	33°07'48.8"N 73°07'24.4"E
Monitoring Validated By	Mr. Muhammad Nadeem

Sr. #	Time	CO (mg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	NO _x (µg/m ³)	SO ₂ (µg/m ³)
1.	9:00	1.19	14.02	19.77	33.79	14.36
2.	10:00	1.16	13.72	20.12	33.84	13.45
3.	11:00	1.14	14.29	20.53	34.82	14.89
4.	12:00	1.17	15.01	18.49	33.5	16.36
5.	13:00	1.14	14.97	19.34	34.31	15.36
6.	14:00	1.16	15.27	20.82	36.09	16.32
7.	15:00	1.12	13.24	21.23	34.47	15.56
8.	16:00	1.07	14.02	20.23	34.25	14.05
9.	17:00	1.08	12.25	19.23	31.48	11.43
10.	18:00	1.02	14.23	19.34	33.57	12.43
11.	19:00	1.09	12.06	17.23	29.29	13.01
12.	20:00	1.02	13.65	16.34	29.99	12.25
13.	21:00	1.12	14.02	19.56	33.58	11.24
14.	22:00	1.01	12.65	21.24	33.89	10.23
15.	23:00	1.03	13.02	17.54	30.56	13.02
16.	00:00	1.09	14.05	18.45	32.5	10.43
17.	01:00	1.07	12.91	19.23	32.14	11.13
18.	02:00	1.31	14.23	20.34	34.57	15.12
19.	03:00	1.11	13.24	19.76	33.0	14.35
20.	04:00	1.18	14.05	20.53	34.58	16.23
21.	05:00	1.19	15.04	21.65	36.69	15.43
22.	06:00	1.18	15.56	21.65	37.21	14.75
23.	07:00	1.19	13.25	20.73	33.98	15.88
24.	08:00	1.15	15.23	21.98	37.21	16.02
Average Concentration		1.12	13.92	19.81	33.72	13.89

Monitoring Performed By:


Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:


Mr. Noman Raza Jaswal





Green Crescent

Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003548

Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-PU-73/2023
Monitoring Point	Ahdi Javed Mour
Date of Intervention	30-03-2023 to 31-03-2023
Monitoring Coordinates	33°07'48.8"N 73°07'24.4"E
Monitoring Validated By	Mr. Muhammad Nadeem

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	PEQS
Nitrogen Dioxide (NO ₂)	µg/m ³	24 Hours	1.00	19.81	80.0
Nitrogen Oxide (NO)	µg/m ³	24 Hours	1.00	13.92	40.0
NO _x	µg/m ³	24 Hours	1.00	33.72	120.0
Sulphur Dioxide (SO ₂)	µg/m ³	24 Hours	1.00	13.89	120.0
Carbon Monoxide (CO)	mg/m ³	24 Hours	0.01	1.12	5.0*
Ozone (O ₃)	µg/m ³	24 Hours	-	14.08	130.0**
Particulate Matter (PM _{2.5})	µg/m ³	24 Hours	1.00	19.46	35.0
Particulate Matter (PM ₁₀)	µg/m ³	24 Hours	1.00	100.67	150.0
Suspended Particulate Matter (SPM)	µg/m ³	24 Hours	1.00	153.13	500.0
Lead Airborne Particles	µg/m ³	24 Hours	-	0.26	1.5

Abbreviations:

µg/m³= Micrograms per Cubic Meter

mg/m³= Milligrams per Cubic Meter

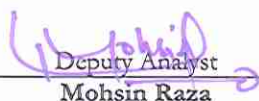
LDL= Lowest Detection Limit

PEQS= Punjab Environmental Quality Standards

*08 hour standard for CO

**01 hour standard for O₃

Monitoring Performed By:


Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:


Mr. Usman Raza Jaswal



Meteorological Data

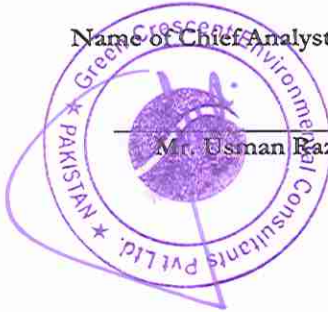
Job Reference Number	GCEC-PK-PU-73/2023
Monitoring Point	Ahdi Javed Mour
Date of Intervention	30-03-2023 to 31-03-2023
Monitoring Coordinates	33°07'48.8"N 73°07'24.4"E
Monitoring Validated By	Mr. Muhammad Nadeem

Time	Ambient Temperature °C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
09:00	23	SE	1.2	66	747.4
10:00	23	SE	1.4	64	748.3
11:00	24	SE	1.2	60	748.1
12:00	24	SE	1.6	59	747.4
13:00	25	SE	1.8	58	751.2
14:00	25	SE	1.4	58	758.3
15:00	25	E	1.9	57	753.2
16:00	24	E	1.2	55	751.4
17:00	25	E	2.1	51	751.4
18:00	26	E	2.1	49	758.3
19:00	24	E	2.8	47	758.8
20:00	22	E	2.7	52	755.4
21:00	21	S	2.8	53	755.4
22:00	21	S	2.3	54	753.2
23:00	20	S	1.3	55	752.3
00:00	18	S	1.5	58	754.3
01:00	17	S	2.2	62	753.2
02:00	16	S	2.5	63	758.4
03:00	16	S	2.8	66	756.4
04:00	17	S	2.1	67	759.2
05:00	18	SE	2.1	67	756.2
06:00	19	SE	1.8	69	756.4
07:00	21	SE	2.4	66	756.3
08:00	22	SE	1.4	62	751.2

Monitoring Performed By:


Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:


Mr. Usman Raza Jaswal





Noise Level Monitoring Report

Job Reference Number	GCEC-PK-PU-73/2023
Monitoring Point	Ahdi Javed Mour
Date of Intervention	30-03-2023 to 31-03-2023
Monitoring Coordinates	33°07'48.8"N 73°07'24.4"E
Monitoring Validated By	Mr. Muhammad Nadeem

Sr. #	Time	Method/Technique	Unit	Results LAavg	PEQS (Residential)
Night Time					
1.	23:00	Noise Meter	dB	43.5	45.0
2.	00:00	Noise Meter	dB	44.6	
3.	01:00	Noise Meter	dB	42.6	
4.	02:00	Noise Meter	dB	43.6	
5.	03:00	Noise Meter	dB	44.7	
6.	04:00	Noise Meter	dB	43.6	
7.	05:00	Noise Meter	dB	44.6	
8.	06:00	Noise Meter	dB	42.5	
Night Time Average			dB	43.71	45.0
Day Time					
9.	07:00	Noise Meter	dB	43.6	55.0
10.	08:00	Noise Meter	dB	53.5	
11.	09:00	Noise Meter	dB	54.3	
12.	10:00	Noise Meter	dB	53.6	
13.	11:00	Noise Meter	dB	52.4	
14.	12:00	Noise Meter	dB	53.6	
15.	13:00	Noise Meter	dB	50.4	
16.	14:00	Noise Meter	dB	53.1	
17.	15:00	Noise Meter	dB	54.3	
18.	16:00	Noise Meter	dB	53.4	
19.	17:00	Noise Meter	dB	52.5	
20.	18:00	Noise Meter	dB	54.5	
21.	19:00	Noise Meter	dB	53.5	
22.	20:00	Noise Meter	dB	51.5	
23.	21:00	Noise Meter	dB	52.5	
24.	22:00	Noise Meter	dB	53.4	
Day Time Average			dB	52.51	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.

Sr. No# 23A/ 003649

Ambient Air Monitoring Location # 2
Mastala
(Gujar Khan)





Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-PU-73/2023
Monitoring Point	Mastala
Date of Intervention	31-03-2023 to 01-04-2023
Monitoring Coordinates	33°08'43.2"N 73°09'07.7"E
Monitoring Validated By	Mr. Muhammad Nadeem

Sr. #	Time	CO (mg/m³)	NO (µg/m³)	NO ₂ (µg/m³)	NO _x (µg/m³)	SO ₂ (µg/m³)
1.	09:00	1.76	14.33	22.68	37.01	16.33
2.	10:00	1.12	15.33	23.98	39.31	15.98
3.	11:00	2.65	13.87	19.87	33.74	16.68
4.	12:00	1.21	16.54	21.97	38.51	17.35
5.	13:00	1.45	14.88	19.97	34.85	14.98
6.	14:00	2.54	15.33	20.87	36.2	18.93
7.	15:00	1.37	16.87	19.67	36.54	16.98
8.	16:00	2.12	15.98	21.74	37.72	17.79
9.	17:00	1.87	12.99	19.87	32.86	15.98
10.	18:00	2.02	16.05	20.97	37.02	16.35
11.	19:00	1.45	15.87	21.87	37.74	18.34
12.	20:00	2.45	14.87	19.64	34.51	16.68
13.	21:00	2.04	13.87	18.94	32.81	15.98
14.	22:00	2.22	13.46	19.97	33.43	17.04
15.	23:00	1.98	12.98	18.83	31.81	15.79
16.	00:00	1.78	13.07	20.65	33.72	14.98
17.	01:00	2.76	12.87	18.53	31.4	16.98
18.	02:00	1.27	13.88	19.63	33.51	17.45
19.	03:00	1.27	14.07	21.64	35.71	15.55
20.	04:00	1.89	12.33	18.96	31.29	15.98
21.	05:00	2.05	13.44	21.78	35.22	17.68
22.	06:00	1.96	15.08	19.25	34.33	19.34
23.	07:00	2.05	14.33	22.96	37.29	15.98
24.	08:00	2.01	13.98	20.53	34.51	18.14
Average Concentration		1.89	14.43	20.62	35.04	16.80

Monitoring Performed By:

Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:

Mr. Usman Raza Jaswal



Meteorological Data

Job Reference Number	GCEC-PK-PU-73/2023
Monitoring Point	Mastala
Date of Intervention	31-03-2023 to 01-04-2023
Monitoring Coordinates	33°08'43.2"N 73°09'07.7"E
Monitoring Validated By	Mr. Muhammad Nadeem

Time	Ambient Temperature °C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
09:00	23	SE	3.2	65	753.4
10:00	23	SE	3.2	63	754.5
11:00	24	SE	3.4	62	752.5
12:00	24	SE	3.2	58	755.6
13:00	25	SE	1.4	54	754.3
14:00	26	SE	1.5	52	758.6
15:00	25	SE	1.5	47	758.4
16:00	24	S	1.6	44	751.7
17:00	24	S	2.3	44	757.3
18:00	23	S	2.4	43	756.8
19:00	23	S	2.5	39	753.5
20:00	22	S	2.6	44	753.7
21:00	21	NE	1.2	46	756.3
22:00	20	NE	1.6	47	756.3
23:00	19	NE	1.8	48	756.4
00:00	18	NE	1.9	53	756.3
01:00	18	E	2.1	54	754.6
02:00	17	E	2.4	56	754.6
03:00	17	E	2.1	64	756.3
04:00	16	E	2.5	66	754.3
05:00	16	E	1.2	67	754.3
06:00	17	SE	1.4	66	758.3
07:00	18	SE	1.6	64	756.2
08:00	21	SE	1.7	58	753.4

Monitoring Performed By:

Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:

Mr. Usman Raza Jaswal



Green Crescent

Environmental Consultants Pvt. Ltd.

Sr. No# 23A/ 003555

Noise Level Monitoring Report

Job Reference Number	GCEC-PK-PU-73/2023
Monitoring Point	Mastala
Date of Intervention	31-03-2023 to 01-04-2023
Monitoring Coordinates	33°08'43.2"N 73°09'07.7"E
Monitoring Validated By	Mr. Muhammad Nadeem

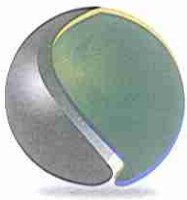
Sr. #	Time	Method/Technique	Unit	Results LAavg	PEQS (Residential)
Night Time					
1.	23:00	Noise Meter	dB	44.3	45.0
2.	00:00	Noise Meter	dB	43.6	
3.	01:00	Noise Meter	dB	42.6	
4.	02:00	Noise Meter	dB	43.6	
5.	03:00	Noise Meter	dB	43.6	
6.	04:00	Noise Meter	dB	42.6	
7.	05:00	Noise Meter	dB	43.6	
8.	06:00	Noise Meter	dB	41.5	
Night Time Average			dB	43.18	45.0
Day Time					
9.	07:00	Noise Meter	dB	43.6	55.0
10.	08:00	Noise Meter	dB	44.7	
11.	09:00	Noise Meter	dB	52.7	
12.	10:00	Noise Meter	dB	54.7	
13.	11:00	Noise Meter	dB	53.6	
14.	12:00	Noise Meter	dB	54.7	
15.	13:00	Noise Meter	dB	54.6	
16.	14:00	Noise Meter	dB	52.6	
17.	15:00	Noise Meter	dB	54.7	
18.	16:00	Noise Meter	dB	53.6	
19.	17:00	Noise Meter	dB	53.6	
20.	18:00	Noise Meter	dB	51.7	
21.	19:00	Noise Meter	dB	52.5	
22.	20:00	Noise Meter	dB	53.6	
23.	21:00	Noise Meter	dB	52.5	
24.	22:00	Noise Meter	dB	53.5	
Day Time Average			dB	52.31	55.0

Monitoring Performed By:

Deputy Analyst
Mohsin Raza

Name of Chief Analyst with Seal:

Mr. Usman Raza Jaswal

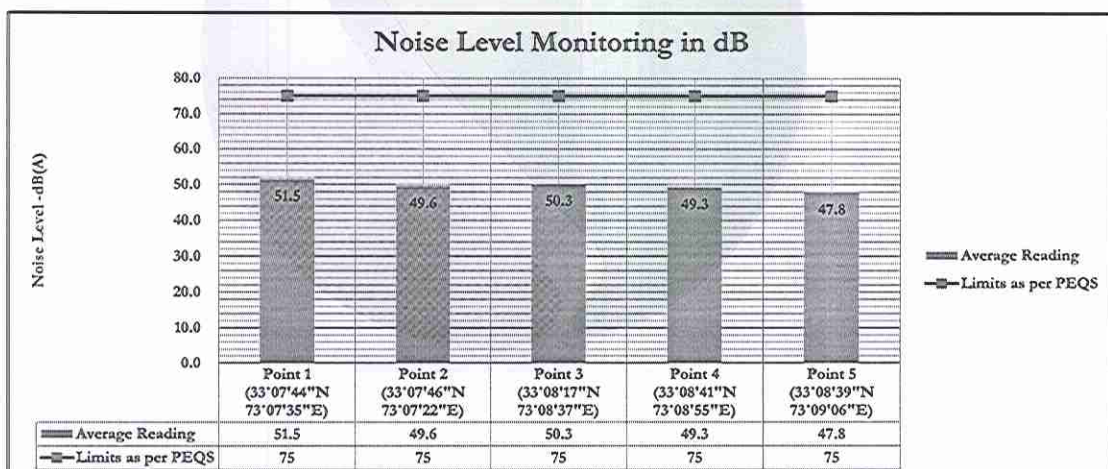


Noise Level Monitoring Report

Job Ref. Number : GCEC-PK-PU-73/2023
Client Name: EMC Pakistan
Monitoring Date: 31-Mar-2023
Monitoring Location: Gujar Khan
Monitoring Validated By: Muhammad Nadeem

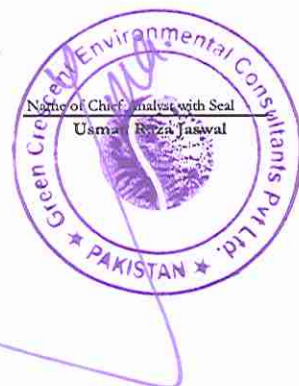
Reporting Date: 11-April-2023

Monitoring Point Details & Monitoring Results							
Sr.No	Points	Unit	Reading 01	Reading 02	Reading 03	Average Reading	Limits as per PEQS
1	Point 1 (33°07'44"N 73°07'35"E)	dB(A)	52.9	51.3	50.4	51.5	75
2	Point 2 (33°07'46"N 73°07'22"E)		49.8	50.3	48.6	49.6	
3	Point 3 (33°08'17"N 73°08'37"E)		50.2	51.2	49.4	50.3	
4	Point 4 (33°08'41"N 73°08'55"E)		48.4	49.3	50.2	49.3	
5	Point 5 (33°08'39"N 73°09'06"E)		47.6	48.7	47.1	47.8	



Abbreviations:
PEQS = Punjab Environmental Quality Standards
dB = Decibel

Deputy Analyst
Mohsin Raza





**Pictorial Evidence For Ground Water, Surface Water Sampling,
Ambient Air & Noise Level Monitoring**

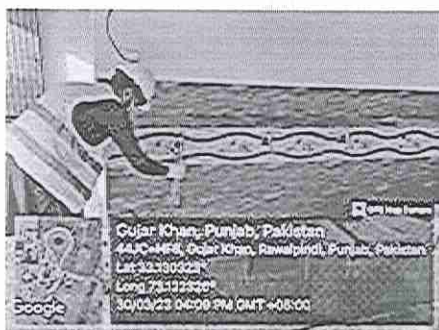


Figure 1: Ground Water Sampling at Ahdi Javed Mour



Figure 2: Ground Water Sampling at Mastala

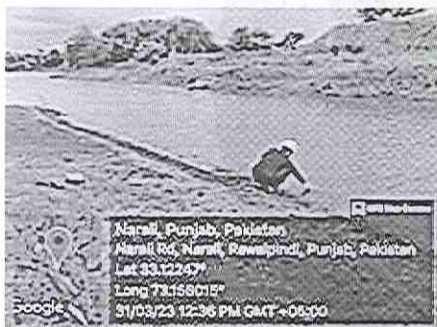


Figure 3: Surface Water Sampling at Narali Dam

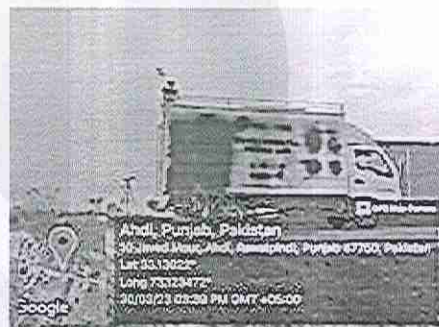


Figure 4: Ambient Air Monitoring of Ahdi Javed Mour



Figure 5: Ambient Air Monitoring of Mastala

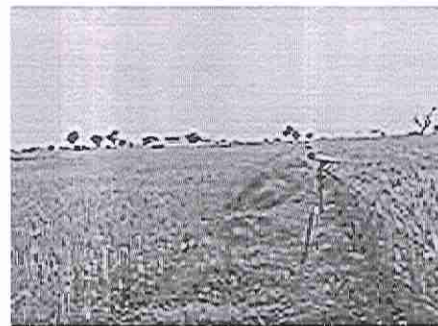


Figure 6: Noise Level Monitoring at Point 1



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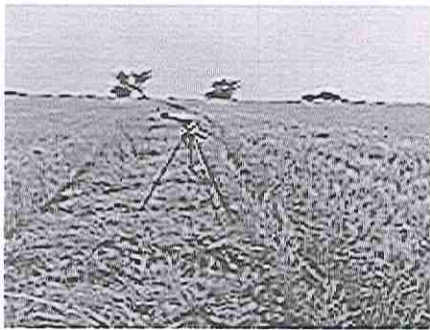


Figure 7: Noise Level Monitoring at Point 2

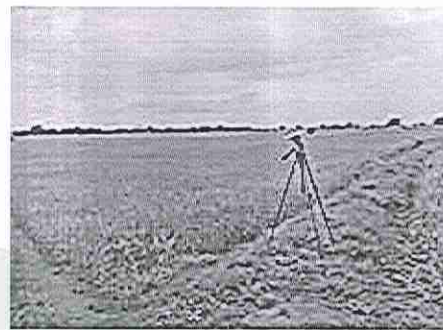


Figure 8: Noise Level Monitoring at Point 3

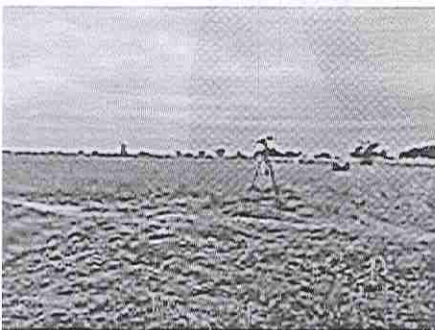


Figure 9: Noise Level Monitoring at Point 4

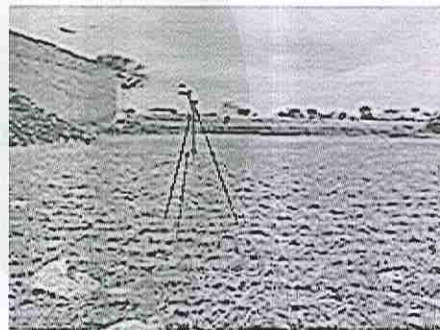


Figure 10: Noise Level Monitoring at Point 5

End of Report

