

ENVIRONMENTAL PROTECTION AGENCY, PUNJAB

Environmental Assessment Checklists and Sectoral Guidelines For

Oil & Gas, Petroleum Exploration, Storage and Fuel Handling Cluster

**(Oil and Gas Projects, Bulk Oil Storage, Petroleum Industry, Drilling of Oil from Well,
Gas Production, Fuel/Oil Storage, Pipelines)**

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1. INTRODUCTION

1.1 Scope of Guidelines

These guidelines are issued by the Environmental Protection Agency, Punjab (EPA Punjab) to assist project proponents, consultants and reviewing officers in the preparation and evaluation of IEE/EIA documents for construction projects in the Oil & Gas sector covering,

- Oil and gas exploration (Seismic surveys & geological mapping)
- Drilling and associated well-site and facility development activities
- Production, separation and gathering systems
- Associated pipelines and transfer infrastructure
- Gas processing plants and petroleum refineries
- Bulk oil storage depots and petroleum terminals
- Fuel/oil storage and handling facilities
- LPG storage, handling and distribution facilities
- Site decommissioning, well plugging, and abandonment

Guidelines apply to new installations, expansions, modernization and relocations of existing facilities. Projects must comply with Punjab IEE/EIA Regulations 2022, and submit either an IEE or EIA depending on project scale, storage capacity and location sensitivity

1.2 Context

Oil and gas related projects involve the key environmental risks include:

- Oil spills contaminating soil and groundwater
- Fire and explosion hazards
- Emissions of volatile organic compounds (VOCs)
- Wastewater contamination from drilling fluids
- Improper disposal of oily sludge
- Leakage from pipelines and storage tanks
- Noise pollution from compressors and drilling rigs
- Community safety risks due to hazardous operations

These guidelines aim to ensure safe design, spill prevention, emergency preparedness and compliance with environmental standards. These guidelines should be read alongside all applicable sector-specific regulatory requirements. Companies are expected to self-regulate and meet or exceed the provisions set out here.

1.3 Environmental Approval

Where permitted under the Punjab IEE/EIA Regulations, 2022, exploration activities within the oil and gas, petroleum exploration, storage, and fuel handling cluster shall be considered for streamlined environmental approval.

Approval remains subject to compliance with these sectoral guidelines and all applicable legal requirements. In such cases, the proponent shall use these guidelines as reference to the environmental management standards detailed across this document.

1.4 Glossary

Act: Punjab Environmental Protection Act, 1997
EPA Punjab: Environmental Protection Agency, Punjab

IEE:	Initial Environmental Examination
EIA:	Environmental Impact Assessment
EMP:	Environmental Management Plan
IFC:	International Finance Corporation
EHS:	Environment, Health and safety
VOC:	Volatile Organic Compounds
Bund Wall:	Secondary containment structure around tanks
Oily Sludge:	Residue from oil storage and handling operations
LDAR:	Leak Detection and Repair
QRA:	Quantitative risk assessment
BOP:	Blowout Preventer: Safety device used in drilling operations
P&IDs:	Piping and Instrumentation Diagrams (systematic program to identify, monitor, and repair leaking equipment that releases fugitive VOCs, methane, Hazardous Air Pollutants, and H ₂ S)
HAZOP:	Hazard and Operability Study (structured, systematic risk assessment technique used to identify potential hazards and operational problems in a process plant)
NFPA:	National Fire Protection Association
VRU:	Vapor Recovery Unit
WBM:	Water-Based Mud
OBM:	Oil-Based Mud
SBM:	Synthetic-Based Mud
MSDS:	Material Safety Data Sheet
HDPE:	High Density Polyethylene
MS:	Motor Spirit (Refined petroleum product used as fuel in spark-ignition engines. Commonly called petrol or gasoline)

2. PROJECT PROFILE / SECTOR OVERVIEW

Pakistan's oil and gas cluster plays a vital role in reducing the country's heavy reliance on imported energy while powering its economic growth. The sector spans a massive industrial network from upstream exploration to downstream retail distribution. It bridges remote extraction fields with major urban and industrial demand centers across the nation

The lifecycles of these diverse subsectors present distinct environmental challenges:

- **Terrestrial Disturbance:** Axis-road construction, site clearing, and pipeline trenching trigger localized soil erosion, habitat fragmentation, and natural drainage disruptions.
- **Atmospheric Emissions:** Well testing, emergency flaring, and refinery operations release greenhouse gases, volatile organic compounds (VOCs), and hazardous air pollutants like hydrogen sulfide.
- **Noise Pollution:** Continuous operation of heavy drilling rig engines, seismic testing detonations, and midstream compressor stations generate substantial noise disturbances.
- **Waste and Water Risks:** Industrial activities generate drilling fluids, hazardous oily sludge, and contaminated produced water that can alter local groundwater tables if improperly managed or spilled

The Concessionaires should classify a project as Category A or Category B. Consistent with World Bank guidelines, the screening criteria explained in OGDCL's Corporate Health, Safety, Environment, And Quality Policy document should be used to classify projects.

Main Projects in this cluster may include but not limited to:

2.1 Oil and Gas Exploration/Production

- Well sites and production facilities (Drilling waste management plan, BOP test records, Erosion & sediment control plan, Groundwater monitoring plan)
- Separation units (P&IDs showing closed drains, LDAR program, HAZOP study)
- Gas compressors (Air dispersion modeling, Noise contour maps, Preventive maintenance schedule)
- Flaring systems (Flare minimization plan, Flare gas recovery feasibility, Radiation isopleths)
- Storage tanks and loading facilities (QRA to calculate the level of risk to people, environment, and assets from major accident hazards at an Oil & Gas or petroleum storage facility. Firewater calculations, Tank integrity management plan, Spill response equipment list).

2.2 Drilling Projects

- Drilling rigs and support equipment (BOP testing program, noise modeling with mitigation like acoustic barriers, air emission inventory, rig site layout with containment, emergency response plan for blowouts, H₂S contingency if >10 ppm expected)
- Drilling mud circulation system Closed-loop system vs reserve pits, mud type justification - WBM vs OBM vs SBM, chemical inventory with MSDS, liner specifications for pits HDPE 1.5mm minimum, mud recycling plan, disposal plan for spent mud)
- Drill cuttings and waste pits (Pit design - double HDPE liner, leachate collection, fencing. Prohibition of OBM cuttings in pits. Cuttings treatment: thermal desorption, landfarming, or landfill at approved site. Oil-on-cuttings <1% before disposal. Pit closure plan: backfill, re-vegetation, post-closure monitoring)
- Temporary camps and storage areas (Sewage treatment plant or septic tank + soak pit sized for peak manpower, solid waste segregation & disposal contract, impervious flooring + dykes for fuel/chemical storage, potable water source & quality, camp decommissioning & site restoration plan)

2.3 Bulk Oil Storage Depots

- storage tanks and bunded tank farms (QRA + domino effect study, Bund integrity test cert, Tank spacing per NFPA, VR on MS tanks)
- loading/unloading terminals (VRU design for MS, OWS sized for gantry area, Scully system specs, Overfill alarm test procedure)
- tanker truck parking areas (Parking layout with separation distances, Drainage plan, Security SOP, No hot work zone)
- pipelines and transfer pumps (Pipe stress analysis, Leak detection system, LDAR program, Pump seal type confirmation)
- fire water storage and hydrants (Fire water demand calc, Hydraulic report, Foam calculation, Containment plan for fire runoff)

2.4 Fuel/Oil Storage Facilities

- Diesel storage tanks
- Lubricants and waste oil storage
- Generator fuel tanks
- Refueling stations for industrial use

2.5 Supporting Facilities may include:

- Power generation systems
- Wastewater treatment units
- Workshops and maintenance areas
- Security and control rooms

3. How to Prepare IEE/EIA Reports?

3.1 Policy, Legal, and Administrative Framework

- Provincial Environmental Legislation (e.g., Punjab Environmental Protection Act, 1997, Punjab IEE/EIA Regulations, 2022)
- Sector-Specific Regulatory Compliance (e.g., Oil & Gas Regulatory Authority - OGRA, Department of Explosives, Ministry of Energy guidelines)
- Applicable Environmental Standards (The Punjab Environmental Quality Standards - PEQS for air, noise, and liquid effluents, International Conventions and Best Practices (If applicable, e.g., IFC Performance Standards, World Bank EHS Guidelines for Onshore Oil and Gas)

3.2 Project Description and Scope of the Cluster

- Detailed Technical Profile of Proposed Subsectors (Upstream exploration, midstream pipelines, or downstream bulk storage/LPG terminals)
- Project Footprint and Spatial Boundaries (Coordinates of wellheads, pipeline routes, or depot boundaries)
- Resource and Chemical Inventory (Quantities of drilling muds, chemicals, fuel storage capacities, water requirements, and power generation)
- Project Lifecycle Stages (Detailed mapping of activities during Site Selection, Construction, Operation, and Decommissioning/Abandonment)

3.3 Environmental and Social Baseline Mapping

- Physical Environment Baseline (Geology, soil types, seismicity, air quality, ambient noise, hydrology, and groundwater quality near storage/drilling areas)
- Biological Environment Baseline (Flora, fauna, migratory bird corridors, and proximity to protected forests, wildlife sanctuaries, or critical habitats)
- Socio-Economic and Cultural Baseline (Demographics, local livelihoods, land-use patterns, proximity to residential communities, and cultural/archaeological heritage sites)

3.4 Stakeholder Consultation and Public Disclosure

- Identification of Stakeholders (Local communities, land owners, NGOs, district administration, and relevant government departments)
- Public Consultation Methodology (Focus group discussions, public hearings as required by Punjab EPA, and grievance redress mechanisms)
- Documentation and Addressing of Public Concerns (Matrix of stakeholder feedback and how the project design accommodates these concerns)

3.5 Hazard Identification, Risk Assessment, and Safety Zoning

- Quantitative Risk Assessment (QRA) (Modeling of potential major accidents: oil spills, pipeline ruptures, BLEVE—Boiling Liquid Expanding Vapor Explosion at LPG terminals, and toxic gas releases like H₂S)
- Safety Buffers and Exclusion Zones (Defining minimum safe distances from residential areas and sensitive receptors for fuel handling and storage)
- Occupational Health and Safety (OHS) Risk Profiles (Fire, explosions, chemical exposure, and high-pressure system failures)

3.6 Impact Prediction and Evaluation

- Construction-Phase Impacts (Land clearing, habitat fragmentation, dust emissions, traffic disruption, and construction waste disposal)
- Operational-Phase Impacts (Process emissions, flaring, noise from compressor stations/drilling rigs, oily sludge generation, and accidental leakages or product spills)
- Decommissioning and Site Closure Impacts (Well plugging, decontamination of storage tanks, soil remediation, and land restoration)
- Cumulative Impact Assessment (Evaluating the combined impact if multiple storage facilities, pipelines, or wells are clustered in one geographical region)

3.7 Environmental Management and Monitoring Plan (EMMP)

- Impact Mitigation Matrix (Specific, actionable mitigation measures linked to every identified impact across all project phases)
- Environmental Monitoring Protocol (Parameters to measure, frequency, location, and institutional responsibilities for testing air, water, soil, and noise)
- Waste Management Plan (Specific protocols for drilling cuttings, produced water, oily sludge, and hazardous chemical containers)

- Spill Contingency and Emergency Response Plan (ERP) (Containment strategies, firefighting systems, evacuation protocols, and coordination with local disaster management authorities)
- Restoration, Decommissioning, and Abandonment Plan (Step-by-step procedures for safely closing facilities, removing infrastructure, and restoring the ecosystem)

3.8 Institutional Capacity and Financial Commitments

- Institutional Arrangements (Roles and responsibilities of the proponent's environmental team, contractors, and third-party monitors)
- Environmental Training and Awareness Programs (Capacity building for workers regarding spill response, hazardous material handling, and PEQS compliance)
- Environmental Budget and Performance Bonds (Capital and operational costs for mitigation, and details of the monetary bond required by EPA Punjab for restoration)

3.9 Climate Change Risk Assessment and Adaptation

- As Province of Punjab has recently experienced Extreme heatwaves, Floods of 2022, Water scarcity and Increased drought frequency. Hence, the proponents are required to assess project vulnerability to Extreme heat, Flooding, Flash floods, Drought, Dust storms, Changing groundwater availability, Evaluation of climate risks over project life cycle.

4. IMPACTS AND MITIGATION MEASURES

4.1 Surveying

Geological and topographic surveys are the first step in any exploration program. Whichever method is used conventional theodolite/GPS or satellite positioning, care shall be taken to minimize disturbance to indigenous flora and wildlife. Vehicles shall avoid unnecessary vegetation clearance by selecting reference points that do not require it. All survey waste materials shall be collected and either buried on site or removed.

4.2 Land Use

The preliminary survey shall identify all land uses that could be adversely affected. Camp, equipment storage and well sites shall be located with sensitivity to existing land use. Community consultation is mandatory prior to site selection. A minimum buffer of 500 meters shall be maintained between any drilling or camp site and the nearest settlement. Where this separation is not achievable, the proponent shall consider temporary or permanent resettlement, with appropriate compensation agreed with affected landowners.

4.3 Seismic Operations

Seismic surveys can have very low environmental impacts if carefully planned. The position of seismic lines shall be selected to avoid densely vegetated areas. Where isolated stands of vegetation lie along a line, the survey route shall be re-routed around them. If habitats of rare or endangered species are present, seismic activities shall be scheduled to avoid sensitive breeding or nesting seasons. Waste and litter management provisions in Section 3.9 apply equally during seismic operations.

4.4 Well Site Location and Preparation

Site selection shall account for proximity to human settlements, local flora and fauna, water sources and groundwater tables. Site preparation involves major earthworks to achieve a level platform for

the rig, waste pits and camp. Employment during this phase will be highest; unskilled labour should preferably be sourced from local villages. Proper site layout planning covering the drill platform, waste pits, water storage, chemical and fuel storage, sewage disposal and flare pit is required before work commences.

4.5 Camp for Exploration Operations

Camp layout shall provide appropriate separation between sleeping, recreation, eating, ablution and hazardous materials storage areas. Septic tanks or other approved sewage disposal systems are required. All kitchen and camp waste shall be collected and disposed of by re-use or burial in designated purpose-built pits. Pits shall be sited and constructed to prevent leaching to groundwater and shall be covered with at least one meter of soil when full or upon camp abandonment. The wastewater system shall include capacity for storm-water runoff collected within the camp area.

4.6 Road Location, Construction and Maintenance

Roads shall follow natural contours wherever possible, and construction on steep slopes or unstable soils shall be avoided. Natural drainage shall not be blocked; culverts shall be provided to maintain free storm-water flow. A minimum separation of 100 meter shall be maintained between roads and sensitive receptors (houses, hospitals, schools, markets). Where this is not possible, unsealed road surfaces near sensitive receptors shall be watered regularly to suppress dust.

New roads can open fragile habitats to illegal logging or hunting; the Forest and Wildlife Departments shall be notified in such cases to allow them to take protective measures. Road alignments shall be discussed with local communities to maximize benefits and minimize adverse impacts.

4.7 Drilling Activities

Key environmental concerns associated with drilling include effects on groundwater, large water consumption, noise and air pollution from power generation, and the handling and storage of drilling mud chemicals. Each concern is addressed in the sections below.

4.8 Groundwater and Water Supply

A typical exploration well requires approximately 100–150 m³/day of fresh water during drilling, which may last from several weeks to one year. The water supply survey shall confirm that the existing supply to local communities and crops will not be adversely affected. Water shall be piped wherever possible to avoid road-tanker impacts. New water sources developed for operations shall be shared with, and handed over to, the local community at program completion.

Waste pit contamination of groundwater is a serious risk. Existing water table levels and soil conditions shall be assessed at and near the site. Where shallow drinking-water aquifers are present, lined pits, excess pit capacity and minimization of hazardous additives are mandatory. The Guidelines for Operational Safety, Health & Environmental Management (DGPC, 1996), Section 11.3.2 on plugging procedures, shall be observed.

4.9 Drilling Fluid and Drilling Wastes

Water-based mud (WBM) shall be used wherever possible. Where oil-based mud (OBM) cannot be avoided, it shall be stored in steel tanks upon completion and removed from site for reuse or secure landfill disposal. Key requirements:

- Minimize hazardous chemical additives; use weighting materials with low heavy-metal content
- Line all mud waste pits; maintain minimum 600 mm ullage to prevent overflow
- Sample and analyze drilling mud and cuttings for chemical contaminants and heavy metals
- Where safe limits are exceeded, remediate by in situ dilution, encapsulation or solidification

- Packaging materials shall be removed from site before closure; containers of hazardous materials shall be incinerated or otherwise controlled
- Unused chemicals shall be returned to suppliers under prior agreement
- Spent oils and lubricants shall be stored, removed from site and recycled where possible
- General refuse shall be recycled, incinerated or buried at least one meter below natural ground surface

4.10 Power Supply

On-site diesel generators shall be installed on prepared hard standing with bunded storage tanks. Any diesel or lubricant spill shall be collected and disposed of in an environmentally acceptable manner (e.g., used as low-grade fuel, incinerated or transported to a recycling facility).

4.11 Air Emissions

NO_x, SO_x and other generator emissions shall be managed by siting generators downwind of accommodation areas. Stack height shall be sufficient to ensure ground-level concentrations comply with PEQS and World Bank guidelines (150 µg/m³ for NO_x); approximately 7 meters is typically adequate for a 1 MW generator.

Flaring during well testing is permitted under license conditions where the gas purchaser declines associated gas delivery. VOC emissions from storage tanks shall be controlled through vapor recovery systems where applicable. Continuous monitoring for hydrogen Sulphide (H₂S) at the surface is required, supported by a contingency plan for the safety of all persons in the area.

a. Methane Leak Detection & Repair (LDAR)

- A Methane Leak Detection and Repair (LDAR) Programme shall be developed and implemented for all production, storage and transfer facilities.
- The programme shall include periodic inspection of valves, flanges, seals, compressors, tanks and associated equipment using appropriate leak detection technologies.
- Identified leaks shall be documented and repaired within a defined timeframe based on severity.
- Records of leak detection, repair actions and methane emissions shall be maintained and submitted to EPA Punjab as part of environmental monitoring reports.

4.12 Wastewater Discharge

All drilling wastewater shall be retained in pits and managed according to the waste disposal plan. Decanted water shall be reused for drilling mud preparation wherever possible. Any discharge to the environment must comply with PEQS. Oily wastewater from storage and maintenance operations shall pass through oil-water separators before discharge. No oil or fuel may be discharged into drains or canals.

a. Produced Water Management

Produced water generated during oil and gas production shall be characterized prior to treatment or disposal.

- Characterization of produced water for salinity, hydrocarbons, heavy metals and other contaminants.
- Compliance with PEQS before discharge or disposal.
- Regular monitoring of salinity, hydrocarbons and heavy metals.
- Maintenance of analytical records and submission to EPA Punjab during reporting.

4.13 Flora and Fauna

A complete record of the Flora and Fauna will be maintained at planning stage. Exploration activities shall not unnecessarily destroy habitat or remove vegetation. Hunting of birds or animals by rig staff or sub-contractors is strictly prohibited. Contamination of soil and groundwater that could affect fauna shall be minimized through the mitigation measures described above. Where protected species or habitats are identified, mitigation in consultation with the relevant Wildlife and Forest Departments is required.

a. Biodiversity & Critical Habitat

- i. Biodiversity Baseline Survey prior to commencement of exploration or production activities.
- ii. Critical Habitat Assessment where project sites are located near protected areas, wetlands, forests or ecologically sensitive habitats.
- iii. Wildlife Monitoring Programme during project lifecycle to assess impacts on fauna, migration routes and breeding patterns.
- iv. Where critical habitats or endangered species are identified, site-specific mitigation and biodiversity management plans shall be developed in consultation with Wildlife and Forest Departments.

4.14 Socio-Economic Impacts

Key affected groups include landowners, shepherds, and residents near drilling sites and access roads. Mitigation measures shall include:

- Meaningful community consultation prior to the commencement of activities
- Employment opportunities for local people and procurement of local goods and services
- New road alignments designed to meet local community needs
- A minimum buffer distance of 500 metres from drilling sites to settlements
- Appropriate compensation to landowners for crop losses and land use impacts
- Sharing of any new water sources with local communities
- Community welfare programmes where significant impacts are anticipated
- The proponent shall establish a formal community engagement mechanism including grievance registration, complaint resolution timelines, appointment of a Community Liaison Officer, and periodic reporting to EPA Punjab.

The approximate cost of each mitigation component shall be budgeted and communicated to the community at the appropriate stage.

4.15 LPG Storage and Handling

LPG facilities present additional fire, explosion and vapour-release risks. Requirements include:

- Bund walls with adequate capacity around all LPG storage vessels
- Pressure relief and emergency shutdown valves on all vessels
- Flameproof electrical fittings and proper grounding and lightning protection throughout
- Adequate separation distances from residential areas per applicable safety standards
- Vapour recovery or leak detection and repair (LDAR) programme
- Clearly demarcated no-smoking and no-open-flame zones

4.16 Well Testing

During flow testing, petroleum products may need to be flared. A dedicated flare pit with sufficiently high walls and adequate capacity to contain both combustion products and liquid discharge shall be provided, positioned away from all other rig-site activities. Local communities shall be informed in advance of any well test to prevent alarm from noise and the visible flare.

4.17 Control of Sub-Contractors

The project proponent is responsible for the environmental performance of all sub-contractors. Environmental requirements shall be incorporated into all contracts, and sub-contractors shall be liable for breaches. This obligation extends to sub-contractor work camps outside the fenced drill site.

4.18 Pipeline Management

- i. Corrosion monitoring programme for all pipelines.
- ii. Leak detection systems for transfer and transmission pipelines.
- iii. Periodic inspection and maintenance schedules.
- iv. Pipeline Emergency Response Plan including spill containment and public safety procedures.

4.19 Oil Refinery Operations and Environmental Management

Oil refinery operations involve complex processing activities that may result in air emissions, effluent generation, solid and hazardous waste, and fire and explosion risks. The proponent shall ensure:

- i. Preparation and implementation of a refinery-specific Environmental Management Plan (EMP).
- ii. Installation of air emission control systems for SO_x, NO_x, VOCs and particulate matter.
- iii. Safe storage, transfer and handling of crude oil, intermediates and refined products.
- iv. Operation of an Effluent Treatment Plant (ETP) for all process wastewater prior to discharge or reuse.
- v. Implementation of hazardous waste management plan including sludge, spent catalysts and oil residues.
- vi. Fire prevention and emergency response systems including foam systems, alarms and emergency shutdown mechanisms.
- vii. Continuous monitoring of air emissions, wastewater quality and ambient environmental conditions.
- viii. Leak Detection and Repair (LDAR) programme for VOC and hydrocarbon control.
- ix. Occupational health and safety measures including PPE, training and hazard communication.
- x. Community safety measures including buffer zones, emergency awareness and grievance mechanism.

4.20 Operational Health and Safety

Operational safety is governed by the Oil and Gas (Safety in Drilling and Production) Regulations, 1974. Maximum workplace noise exposure is 85 dBA. All areas exceeding 80 dBA shall be clearly

marked and workers in those areas shall be provided with and required to use hearing protection. Material Safety Data Sheets (MSDS) shall be available on site for all chemicals, and no chemical shall be brought on site without them.

A contingency plan shall be prepared and maintained for: hydrogen sulphide reaching the surface; blowout; major fire; and sabotage of site equipment.

4.21 Traffic and Transport Management

Transportation through tankers and heavy vehicles may cause traffic, safety and community impacts. The proponent shall ensure:

- i. Preparation and implementation of a Traffic Management Plan.
- ii. Driver training on safe driving, emergency response and spill management.
- iii. Enforcement of speed limits for all project vehicles, especially near sensitive receptors.
- iv. Route risk assessment to identify accident-prone and sensitive areas.
- v. Community road safety measures including signage, awareness and traffic controls.

4.22 Well Abandonment and Site Restoration

Wells shall be plugged, abandoned or suspended in a manner that ensures downhole isolation of hydrocarbon zones, protects fresh water aquifers and prevents migration of formation fluids within the well bore. Procedures shall conform to the Guidelines for Operating Safety, Health and Environmental Management (DGPC, 1996).

All structures and materials associated with the operation shall be removed from the site and access roads. All waste pits shall be filled to natural ground level. Heaped top soil shall be spread and suitable vegetation planted to minimize erosion risk. The site shall be returned to a condition consistent with its prior or intended future land use.

4.23 Decommissioning & Closure Plan

A Decommissioning and Closure Plan shall be prepared and submitted to EPA Punjab prior to commencement of production activities. The proponent shall establish adequate financial provisions to ensure site restoration, waste removal and environmental rehabilitation upon closure.

4. EMERGENCY RESPONSE AND SPILL CONTROL

4.1 Emergency Response Plan

Consistent with Article 6.9 (g) of the Concession Agreement, which requires that the Concessionaire should provide as part of the Development Plan "measures to deal with emergencies and environmental measures", the Concessionaire should prepare an Environmental Emergency Response Plan and submit it to DGPC for approval (as part of the Emergency Response and Control Program specified in Section 2.3 of these guidelines) before a lease is granted.

The Concessionaire should prepare emergency response procedures for all

reasonably foreseeable but unexpected events and incidents. The Emergency Response Plan should include the following considerations:

1. **Potential Events:** List possible events that could require emergency response during the project. These events could include: significant spills (see Section 9.2 below); other waste spills; damage to wells, pipelines and other surface structures; fires and explosions in the survey area; sour gas release; medical evacuation, and other emergencies such as storms, floods, and civil unrest.
2. **Welfare and Safety Officer:** Name the Welfare and Safety Officer as the key person responsible for implementation and management of the emergency response plan. The Manager of the Well is responsible for reporting the event
3. **Public Spokesperson:** Identify the Public Spokesperson who should ensure that accurate and useful information is conveyed in a timely and responsible manner to the authorities and public.
4. **Individual Crew Members (Seismic, Drilling or Production):** Individual crew members should be identified and be assigned emergency response responsibilities by the Manager of the Well and the Welfare and Safety Officer.
5. **List of Procedures:** A list of procedures should be provided to prevent, mitigate and monitor environmental effects of emergency actions. Systems and procedures should also be provided to mobilize equipment, facilities, and personnel.
6. **Training:** The Welfare and Safety Officer should ensure that all field personnel are trained in emergency response procedures which should include appropriate response to accidental spills and releases to the environment.
7. **Equipment:** The Concessionaire should ensure that all necessary emergency response equipment is onsite or immediately available during an emergency situation

4.2 Spill Prevention, Containment and Clean-up (SPCC) Plans

The Concessionaire with facilities storing large quantities of oil should develop and implement SPCC Plans at all production worksites. These plans should be submitted to DGPC as part of the Development Plan and to the Federal Agency in the EIA/IEE. The SPCC plan seeks to minimize the risk of oil spills and is applicable to facilities located in an area where there is a potential for discharge of oil to navigable waters and storing the following:

- a. More than 1320 gallons of oil above ground;
- b. Oil in a single aboveground container with a capacity greater than 660 gallons: or
- c. More than 42,000 gallons of oil below ground.

All facilities shall maintain an Oil Spill Contingency Plan and a broader Emergency Response Plan covering fire, explosion, toxic gas release and any other major accident hazard. Requirements include:

- Firefighting system (hydrants, extinguishers, foam calculation for storage facilities) installed and operational
- Spill kits and containment materials positioned at key locations
- Emergency shutdown valves on all major pipelines and storage equipment
- Emergency contact list prominently displayed, including coordination with Rescue 1122
- All staff trained in spill response and fire safety procedures, with drills at least annually
- Contaminated soil from spill events disposed of through an authorized contractor
- Pipeline rupture scenarios to be included in emergency drills.

5. MONITORING AND REPORTING

The proponent shall routinely monitor the following parameters and report results to EPA Punjab:

- Ambient air quality (intermittently when H₂S is expected; continuously if H₂S is detected)
- Ambient noise levels near drilling operations
- Downstream surface water quality (random sampling)
- Composition and quantity of all drilling muds, chemicals and additives
- Groundwater quality in the vicinity of waste pits
- Wastewater effluent quality prior to any discharge

Monitoring records shall be maintained by the proponent for at least two years following site abandonment. On completion of activities at each site, the proponent shall submit a short written report to EPA Punjab certifying that the site has been restored in accordance with these guidelines. EPA Punjab may carry out spot-check inspections of field operations at any time.

6. REFERENCES

- Policy and procedures for filing, review and approval of environmental assessments
- Punjab Environmental Protection (Review of IEE/EIA) Regulations, 2022
- Punjab Environmental Quality Standards (PEQS) for air emissions and wastewater
- Model Petroleum Concession Agreement — Government of Pakistan, Ministry of Petroleum & Natural Resources, July 1994
- OGRA Regulations (applicable provisions)
- Government of Pakistan Federal EPA Sectoral Guidelines: Oil and Gas Exploration and Production, November 1997
- Oil and Gas (Safety in Drilling and Production) Regulations, 1974
- IFC EHS Guidelines for Onshore Oil and Gas Development
- IFC EHS Guidelines for Petroleum Refining and Storage
- National Fire Protection Association (NFPA) Standards
- Guidelines For Operational Safety, Health, & Environmental Management (Petroleum Exploration & Production Sector)- OGDCL's Corporate Health, Safety, Environment, And Quality Policy
- Guidelines for sensitive and critical areas

These guidelines should be read alongside all applicable sector-specific standards. Companies are expected to self-regulate and meet or exceed the provisions set out here. EPA Punjab reserves the right to conduct spot inspections at any time.

APPENDIX I — Environmental Impact Checklist

Summary checklist of key actions, potential impacts and recommended mitigation measures for Oil and Gas Exploration and Production in Punjab.

Activity	Potential Impact	Required Mitigation
Surveying	Habitat and vegetation disturbance	Minimize clearing; choose reference points that avoid vegetation; collect and bury waste
Seismic Operations	Disturbance to flora, fauna and breeding cycles	Avoid vegetated areas; schedule away from breeding seasons of rare/endangered species
Land Use	Disruption to adjacent communities and livelihoods	500 m buffer from settlements; community consultation; compensation to landowners
Well Site Preparation	Habitat destruction; drainage and groundwater impacts	Planned site layout; proper pit design; erosion and sediment control
Camp Operations	Health/safety risks; sewage and waste impacts	Adequate separation of uses; septic tanks; waste pits lined and covered on closure
Road Construction	Erosion; altered drainage; habitat fragmentation	Follow natural contours; culverts; 100 m buffer from sensitive receptors; dust suppression
Groundwater & Water Supply	Depletion of local supply; groundwater contamination	Pipe water; reuse; share new sources with community; line waste pits
Drilling Mud & Wastes	Land and water contamination from chemicals	Use WBM; minimise hazardous additives; line pits; safe disposal of cuttings; recycle waste oil
Power Supply	Soil and water contamination from diesel spills	Bunded storage tanks; collect and dispose of spilt diesel responsibly
Air Emissions	NOx/SOx from generators; H ₂ S hazard	Generator sited downwind; adequate stack height; H ₂ S continuous monitoring; contingency plan
Wastewater Discharge	Contamination of local water bodies	Retain in pits; treat through OWS; comply with PEQS before any discharge
Flora and Fauna	Habitat loss; exposure to hazardous substances	No hunting; minimize vegetation removal; prevent soil and groundwater contamination
LPG Storage & Handling	Fire, explosion and vapour release	Bund walls; pressure relief valves; LDAR programme; no-flame zones; lightning protection
Socio-Economic Impacts	Displacement; loss of livelihoods; community tensions	Community consultation; local employment; welfare programmes; adequate compensation
Well Testing	Flaring hazards; noise and light nuisance	Dedicated flare pit with containment; inform local communities in advance
Sub-Contractor Activities	Environmental breaches by third parties	Environmental clauses in all contracts; proponent responsible for sub-contractor compliance

Well Abandonment & Site Restoration	Groundwater contamination; adverse impact on land use	Downhole isolation; protect aquifers; remove all structures; fill pits; re-vegetate
Operational Health & Safety	Occupational injury; noise damage; chemical exposure	Mark areas >80 dBA; provide PPE; MSDS for all chemicals; maintain contingency plan

APPENDIX II — Statement by Proponent

SECTION I: PROJECT DESCRIPTION

1. Name of Project: _____
2. Proponent/Owner: _____
3. CNIC/NTN: _____
4. Address: _____
5. Contact Person: _____
6. Contact No.: _____
7. Location (District/Tehsil): _____
8. GPS Coordinates: _____
9. Total Project Cost (PKR): _____
10. Project Type (tick):
☐ New Installation ☐ Expansion ☐ Modernization ☐ Relocation

Facility Type (tick):

- ☐ Oil and Gas Project ☐ Gas Production Facility ☐ Drilling Project ☐ Bulk Oil Storage Depot ☐
Petroleum Industry Facility ☐ Fuel/Oil Storage Facility ☐ Pipeline / Transfer Facility

11. Total site area (acres): _____
12. Storage capacity (liters/tons): _____
13. No. of storage tanks: _____
14. Total employees: _____
15. Working shifts: ☐ 1 ☐ 2 ☐ 3

Fuel and Product Details

16. Product handled:

- ☐ Diesel ☐ Petrol ☐ Furnace oil ☐ Crude oil ☐ Natural gas ☐ Lubricants ☐ Other: _____
-

SECTION II: SCREENING

1. Does the project fall under Punjab IEE/EIA Regulations, 2022? ☐ Yes ☐ No
 2. Category: ☐ IEE Category ☐ EIA Category
 3. Is project within Environmentally Sensitive/ restricted/ negative Area? ☐ Yes ☐ No
 4. Is project near residential area (within 500m)? ☐ Yes ☐ No
 5. Is project near canal/drain/river (within 500m)? ☐ Yes ☐ No
 6. Does project involve storage of hazardous fuel/oil? ☐ Yes ☐ No
-

SECTION III: SCOPING

Has the following been identified for detailed assessment?

1. Potential soil and groundwater contamination risks ☐ Yes ☐ No
 2. Air emissions (VOC, NOx, SOx, flaring emissions) ☐ Yes ☐ No
 3. Noise and vibration impacts (drilling, compressors, traffic) ☐ Yes ☐ No
 4. Fire, explosion, and hazardous material risks ☐ Yes ☐ No
 5. Waste generation (hazardous waste, oily sludge, drilling waste) ☐ Yes ☐ No
 6. Community health, safety, and resettlement risks ☐ Yes ☐ No
-

SECTION IV: ENVIRONMENTAL PROFILE

1. Existing land use: ☐ Industrial ☐ Agricultural ☐ Residential ☐ Mixed
 2. Nearest human settlement distance: _____ meters
 3. Nearest canal/drain distance: _____ meters
 4. Groundwater depth: _____ ft
 5. Nearby sensitive receptors:
☐ Schools ☐ Hospitals ☐ Water bodies ☐ Agricultural lands ☐ Other: _____
-

SECTION V: CONSTRUCTION PHASE CHECKLIST

1. Dust control measures implemented? ☐ Yes ☐ No
 2. Construction waste disposed properly? ☐ Yes ☐ No
 3. Fuel storage properly managed? ☐ Yes ☐ No
 4. Spill kits available? ☐ Yes ☐ No
 5. Workers PPE provided? ☐ Yes ☐ No
 6. Fire extinguishers available onsite? ☐ Yes ☐ No
 7. Safe storage of chemicals ensured? ☐ Yes ☐ No
 8. Site drainage plan available? ☐ Yes ☐ No
-

SECTION VI: DRILLING / EXPLORATION OPERATIONS CHECKLIST

1. Methane leakage risk assessed and mitigation plan prepared? ☐ Yes ☐ No
 2. Biodiversity & critical habitat assessment conducted? ☐ Yes ☐ No
 3. Produced water characterization completed (quality, volume, disposal route)? ☐ Yes ☐ No
 4. Pipeline integrity management plan in place (inspection, monitoring, maintenance)? ☐ Yes ☐ No
 5. Community grievance mechanism established and operational? ☐ Yes ☐ No
 6. Traffic risk management plan prepared for project operations? ☐ Yes ☐ No
 7. Closure & decommissioning plan prepared, including site restoration measures? ☐ Yes ☐ No
-

SECTION VII: OPERATION PHASE CHECKLIST

1. Bund walls inspected regularly? ☐ Yes ☐ No
 2. Tank leakage detection system available? ☐ Yes ☐ No
 3. Oil-water separator functional? ☐ Yes ☐ No
 4. Hazardous waste storage area available? ☐ Yes ☐ No
 5. Waste disposal records maintained? ☐ Yes ☐ No
 6. Firefighting system operational? ☐ Yes ☐ No
 7. Emergency response drills conducted? ☐ Yes ☐ No
 8. VOC emission controls maintained? ☐ Yes ☐ No
 9. Noise levels monitored? ☐ Yes ☐ No
-

SECTION VIII: OIL REFINERY OPERATIONS (NEW SECTION)

Oil Refinery Compliance Checklist:

1. EMP specific to refinery operations prepared and implemented ☐ Yes ☐ No
 2. Air emission control systems for SOx, NOx, VOCs and PM installed ☐ Yes ☐ No
 3. Safe storage, transfer and handling of crude oil, intermediates and products ensured ☐ Yes ☐ No
 4. Effluent Treatment Plant (ETP) installed and all wastewater treated before discharge or reuse ☐ Yes ☐ No
 5. Hazardous waste management system for sludge, spent catalysts and residues in place ☐ Yes ☐ No
 6. Fire prevention and emergency response systems installed (foam, alarms, ESD systems) ☐ Yes ☐ No
 7. Leak Detection and Repair (LDAR) programme implemented ☐ Yes ☐ No
 8. Continuous monitoring of air emissions and wastewater quality conducted ☐ Yes ☐ No
 9. Occupational health & safety measures including PPE and training implemented ☐ Yes ☐ No
 10. Buffer zones and community safety measures established ☐ Yes ☐ No
-

SECTION IX: SPILL RESPONSE CHECKLIST

1. Spill contingency plan available? ☐ Yes ☐ No
2. Emergency contact list displayed? ☐ Yes ☐ No
3. Spill kits available in key areas? ☐ Yes ☐ No
4. Trained staff for spill response available? ☐ Yes ☐ No
5. Containment drains and sump available? ☐ Yes ☐ No
6. Waste contaminated soil disposal plan available? ☐ Yes ☐ No

SECTION X: IMPACT ASSESSMENT AND MITIGATION MEASURES

Potential Environmental Impacts | Applicable (✓) | Mitigation Measures | Proposed (✓) | Monitoring Requirements

Oil spill contamination ☐ | Bunding, spill kits, training ☐ | Inspection
Groundwater contamination ☐ | Impermeable flooring, monitoring ☐ | Water testing
VOC emissions from tanks ☐ | Vapor control systems, sealing ☐ | Inspection
Oily wastewater discharge ☐ | Oil-water separator, treatment ☐ | Effluent testing
Disposal of oily sludge ☐ | Secure storage and disposal plan ☐ | Disposal record
Noise from compressors ☐ | Noise barriers, silencers ☐ | Noise monitoring
Fire and explosion risk ☐ | Fire system, emergency plan ☐ | Safety audit
Hazardous waste mismanagement ☐ | Authorized disposal system ☐ | Waste record
Traffic hazard from tankers ☐ | Traffic management plan ☐ | Complaints record

SECTION XI: DECOMMISSIONING / CLOSURE PHASE CHECKLIST

1. Well plugging and abandonment verification ☐ Yes ☐ No
2. Removal of infrastructure (tanks, pipelines, equipment) ☐ Yes ☐ No
3. Waste pit closure and backfilling ☐ Yes ☐ No
4. Site remediation and soil restoration completed ☐ Yes ☐ No
5. Vegetation restoration / re-plantation carried out ☐ Yes ☐ No
6. Contaminated soil / groundwater remediation completed ☐ Yes ☐ No
7. Post-closure monitoring plan implemented ☐ Yes ☐ No
8. Final environmental clearance / compliance report submitted ☐ Yes ☐ No

SECTION XI: MANDATORY REQUIREMENTS (EPA PUNJAB)

1. Bund walls are mandatory for all storage tanks
2. Oily wastewater must be treated through oil-water separator
3. No discharge of oil or fuel into drains/canals is allowed
4. Firefighting and emergency response system is mandatory
5. Hazardous waste disposal must be through authorized contractors
6. Regular inspection of pipelines and tanks is mandatory

SECTION VIII: UNDERTAKING

I, _____ S/O, D/O _____

as the owner/proponent/authorized representative of the project titled:

“ _____ ”

located at _____, Punjab, solemnly affirm and undertake that:

1. The information provided in this checklist and supporting documents is true and correct.
2. The project shall be established and operated strictly in compliance with Punjab Environmental Protection Act, 1997 and Punjab IEE/EIA Regulations, 2022.
3. All mitigation measures identified in Section IV shall be implemented.
4. Spill prevention, hazardous waste management and fire safety requirements shall be strictly complied with.
5. No oily wastewater or fuel shall be discharged into drains/canals.
6. EPA Punjab may inspect the project site at any stage, and I shall provide full cooperation.
7. Any false statement or non-compliance may lead to legal action, penalties, or cancellation of approval.

Signature of Proponent: _____

Name: _____

CNIC: _____

Designation: _____

Date: _____

Stamp: _____

Witnesses:

1. Name: _____ CNIC: _____ Signature: _____
2. Name: _____ CNIC: _____ Signature: _____