Environmental Impact Assessment (EIA)

Enhancement of Storage Capacity of Shikarpur Terminal

Final Report
May 2020

EMC PAKISTAN PRIVATE LIMITED
EMC

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

TOTAL PARCO PAKISTAN LIMITED (TPPL) ENCHANCEMENT OF STORAGE CAPACITY OF SHIKARPUR TERMINAL

Final Report

May 2020

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EXECUTIVE SUMMARY

Total Parco Pakistan Limited (TPPL) Shikarpur Terminal is a refined oil storage facility comprising of above ground/ mounded tanks for High Speed Diesel (HSD)/Gasoline (Mogas). Moreover, some basic infrastructure like, office building, pump rooms, loading/ unloading gantry, meter room, switch room etc. are also available at the terminal. The expansion project at Shikarpur Terminal was planned to take pipeline receipts of Motor Gasoline (Mogas) after commissioning of cross country multi-grade pipeline, owned by PAPCO, starting from Karachi and ending at Machike-Lahore. Expansion project will involve construction of above ground tanks for petroleum products, construction of tank for storage of firewater and associated structures described in table below.

Table Ex 1: Salient Features of the Project	
Proponent	Total Parco Pakistan Limited (TPPL)
Project Location	Plot no. 223 & 224, Deh Ali Murad Village, Kandhkot Road (opposite PARCO terminal), District Shikarpur, Sindh
Total Area of Plot	8 acres
Components	• Construction of 3 above ground tanks for the storage of petroleum products (1 HSD tank and 2 Mogas tanks) • Construction of one tank for the storage of firewater • Firefighting system upgrade • Miscellaneous civil structures • Receipt line from PARCO Installation at Shikarpur for Mogas • Internal piping for HSD/ Mogas • Area built-up

The storage capacity enhancement of the Shikarpur Terminal is the continuation of TPPL aim to remain one of the leaders of energy market in Pakistan. In the country like Pakistan, petroleum products distribution challenges arise from the fact that petroleum products are refined in only a few geographic regions but they are consumed all across the country. Keeping in view this fact, Bulk Storage and Handling terminals have proved their importance in the recent years and they play an important role in the supply chain management, ensuring proper storage and delivery of high-value refined products to the consumers. The development of storage depots in different parts of the country not only strengthens the supply chain network thereby enabling the general consumers for continuous and reliable supply of POL products but also help in reducing the operational cost and the proposed project is the continuation of this idea.

The baseline conditions of the project area were studied based on the results of the investigations conducted by the field study team as well as through studying available materials and literature.

This Environmental Impact Assessment document is aimed to provide a description of existing environmental situation in the project areas, identification of the relevant legal and administrative framework; revealing the potential beneficial and adverse impacts associated with project implementation and defining the measures that are appropriate to enhance the potential beneficial impacts and to prevent, mitigate or minimize potential adverse impacts.

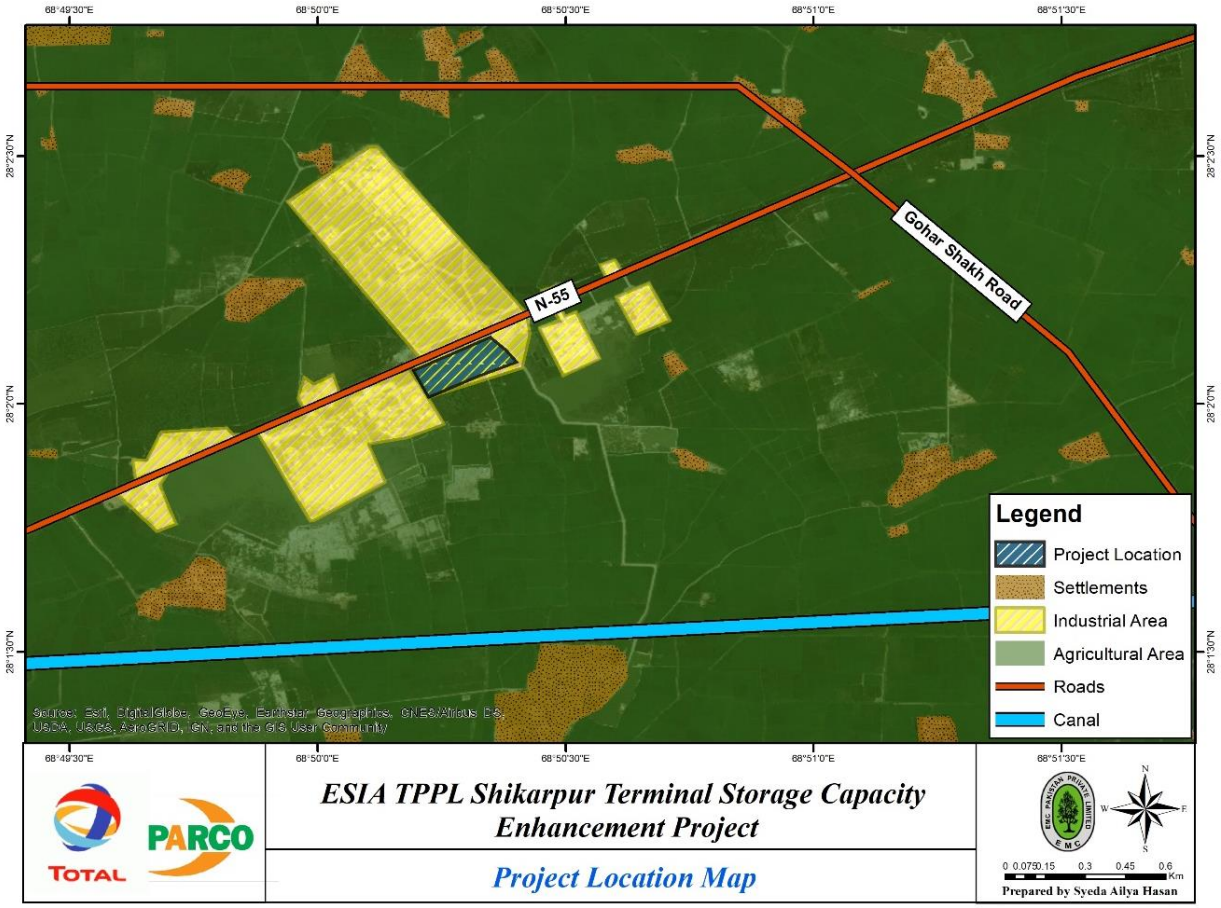

Figure Ex.1: Location map of Shikarpur Terminal

Sindh Environmental Protection Act (SEP Act) was legislated in 2014. Section 17 of SEP Act 2014 requires that every new project has to be preceded by an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) depending upon the size and severity of impacts anticipated on commissioning of the project. Sindh Environmental Protection Agency (Review of IEE and EIA) Regulations, 2014 have been notified under section 37 of SEPA 2014. These Regulations categorize projects in Three separate schedules which requires either an IEE (Schedule-I) or an EIA (Schedule-II) or Environmental Checklist (Schedule III) where provisions of Section 17 shall apply. Oil and gas gathering system, separation and storage have been placed in Schedule – II, Category B4, thus requiring an EIA.

The project is not expected to have long-term significant or irreversible negative environmental impacts neither at the construction, nor at operation phases. Strict measures will be required for the environmental friendly operations of the terminal. There are no specially protected areas or threatened or endangered endemic species in the project area.

The likely adverse environmental impacts during the construction phase will include the following: degradation of soil, landscape and soil erosion due to improper disposal of excavated materials and construction waste; spillage of oil and other substances from machinery and vehicles during the construction; pollution of water resources and soil by construction run-offs; temporary air pollution related to increased truck traffic during the construction, release of dust from digging -loading works and heavy machinery operation; noise and vibration disturbances; safety hazards during implementation

of construction works. The likely adverse environmental impacts during the operation phase include: emissions to atmosphere associated with the vehicular movement and operation of Genset due to emission of pollutants originated during burning of fuel; impacts on water and soil as a result of improper maintenance of water supply and wastewater system, drainage system, vehicles and equipment and safety hazards associated with improper operation or absence of fire-fighting system; waste disposal issues associated with improper categorization and disposal.

The mitigation measures specifically developed for the construction phase of the project include: construction materials storage, compact the top surface of access roads and work sites to facilitate water runoff and avoid flooding the area; conduct dust-depressing measures aimed at prevention of air pollution; use closed/covered trucks for transportation of loose construction materials; regular check of proper technical conditions of machinery and equipment; disposal of excavated materials and construction waste in agreed disposal sites; ban disposal of waste into waterways. Where possible; restoration to original conditions of landscape after completion of construction works; use of appropriate safety equipment by personnel involved in construction works.

Mitigation measures proposed for the operation phase include: proper maintenance of water supply and wastewater system; regular check of proper technical conditions of vehicles and equipment; proper operations and maintenance of standby power plant; ensure presence and working condition of fire-fighting equipment, proper disposal of hazardous and non-hazardous waste as well as Effective monitoring & control of storage tanks, ensuring their mechanical integrity through preventive maintenance, third-party inspections/ calibrations, installation of spill prevention measures, concreting of tank farm area etc.

The EIA study concludes that the likely adverse impacts from the project activities which will be carried out inside the existing terminal, can be prevented and minimized by timely and due implementation of mitigation measures provided in the study and the adherence to Environmental Management Plan (EMP).

TABLE OF CONTENTS

ANNEXURES

Annex-I	**:**	Sindh Environmental Protection Act, 2014
Annex-II	**:**	Sindh EPA (Review of IEE/EIA) Regulations, 2014
Annex-III	**:**	Sindh Environmental Quality Standards (SEQS)
Annex-IV	**:**	Approvals/NOCs from Authorities
Annex-V	**:**	ISO and OHSAS Certificates
Annex-VI	**:**	Waste Disposal Certificate for Hazardous Waste (Existing Terminal Operations)
Annex-VII	**:**	Emergency Response Plan (ERP) – TPPL Shikarpur Terminal
Annex-VIII	**:**	Environmental Monitoring Reports (Existing Terminal Operations)

Chapter 1 INTRODUCTION

1.1 General

This report presents the findings of the Environmental Impact Assessment (EIA) study conducted by EMC Pakistan Pvt. Ltd for the proposed Storage Capacity Enhancement Project at Total Parco Pakistan Limited (TPPL), Shikarpur Terminal. The EIA study has been conducted in compliance with the mandatory requirements of Section 17 of Sindh Environmental Protection Act 2014 and the rules & regulations framed thereunder.

Environmental Impact Assessment is a planning tool accepted as an integral component of sound decision making. The purpose of EIA is to give environment its due place in the decision-making process by clearly evaluating the environmental consequences of the proposed activities before action is taken. Early identification and characterization of critical environmental impacts allows the public and the government to form a view about the environmental acceptability of the proposed developmental project and what conditions should apply to mitigate, reduce or compensate those risks and impacts.

Field surveys were conducted in the study area by EMC Pakistan Pvt. Limited team which included environmentalist, sociologist and ecologist. Field data collection included observational surveys; consultations and meetings for data collection with government departments, industries; and ground verification of available secondary information. Secondary information was collected from proponent, in-house sources, Government Departments and NGOs. Applicable international guidelines, conventions and environmental assessment procedures prepared by the Pakistan EPA have been gone through while preparing this document.

1.2 Need of Environmental Impact Assessment

Environmental Impact Assessment (EIA) of the Project has been carried out in compliance with the mandatory requirement of Section 17 of Sindh Environmental Protection Act (SEPA), 2014 which requires that:

“No Project shall commence construction or operation unless it has filed with the Agency an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) and has obtained from Agency approval in respect thereof. SEPA shall review the IEE & EIA and accord approval subject to such terms and conditions as it may prescribe or require.”

This Environmental Impact Assessment report presents the evaluation of environmental impacts of the construction and operation of a project namely “Enhancement of Storage Capacity of TPPL Shikarpur Terminal”.

1.3 Background of the Project

Petroleum products are one of the largest sources of energy being utilized in the present world. Increased demand of petroleum products accelerated the exploration and production of fossil fuels which are the basis of petroleum products through its refining. Furthermore, the development of storage, handling and transportation facilities for the finished petroleum products also hastened. This is also creating employment opportunities especially in the developing countries.

Pakistan is among those countries which have high demand of petroleum products due to rapid increase in private transport and other local needs. However, demand of some petroleum products have also reduced such as furnace oil. The balance recoverable reserves of crude oil of the country as on 30th

June, 2018 were 347.878 million barrels while the production during FY 2017-18 was recorded as 32.56 million barrels. The total oil refining capacity of the country as on 30th June, 2018 was 19.37 million tonnes per year while the total crude oil processed in the refineries of the country was 14.01 million tonnes. The total import of the crude oil of the country during 2017-18 was 10.33 million tonnes with cost amounting to US$ 4,903.65 million while during 2016-17 the total import of crude oil was 8.66 million tonnes with total cost of US$ 2,899.29 million. The consumption of petroleum products (Furnace Oil, Light Diesel Oil, High Speed Diesel and Motor Spirit) within the power sector was recorded as 6.377 million tonnes during 2017-18 while during 2016-17 it was recorded as 8.532 million tonnes[1].

Oil consumption of different energy products is dominated by Gasoline and Fuel oil. In Pakistan transport sector in the biggest user of the petroleum products which accounts about 48 percent followed by power generation which uses about 36 percent, and industrial sector which has a share of 12 percent while remaining is shared by the residential sector. Like other sectors of the oil and gas business, the marketing and distribution of petroleum products takes place on a vast, global scale. Every day, hundreds of millions of companies and individuals buy these products at wholesale or directly from retail outlets that number in the hundreds of thousands worldwide. If we include indirect users of petroleum products, the number of consumers runs into the billions.

1.4 Analysis of the Desirability of the Project

The proposed site is one of the better practicable environmental options for this storage enhancement project, given the industrial zoning of the area in which the terminal already exists and the activities are the add-on to the existing terminal facilities and the fact that the area has many other bulk fuel storage facilities and the optimal location at the N55 Indus Highway.

The Project aims to have the site utilized by an ongoing, sustainable, profitable business. The proposed Project is also not anticipated to result in unmanageable adverse and residual impacts.

1.5 Project Proponent

The fourth largest Oil and Gas Company in the world, TOTAL S.A. and the most modern refinery in Pakistan with a cross-country pipeline network, Pak Arab Refinery Limited (PARCO) together formed this joint venture company in 2001, and the organization has been on an upward trajectory ever since. After merging with Total Oil Pakistan Ltd. In 2015, Total PARCO acquired the Chevron retail network raising its network footprint to more than 800 stations and priming it to become the second largest OMC operating within Pakistan.

Lubricants operations were launched in 1999 and TPPL has been successfully marketing a complete range of Automotive and Industrial lubricants catering to the diversified needs of consumers across various industries. The automotive oils include the ‘TOTAL QUARTZ’ Range for gasoline engines and the ‘TOTAL RUBIA’ range for diesel engines. In addition, ‘TOTAL HI-PERF’ is amongst the leading brands in the motorcycle oil category.

[1] NEPRA State of Industry Report 2018.

1.6 The Project at a Glance

Following infrastructure is going to be added after completion of the expansion project at Shikarpur Terminal:

- Construction of three (03) above ground tanks for the storage of petroleum products (1 HSD tank and 2 Mogas tank)
- Construction of one (01) tank for the storage of firewater
- Firefighting system upgradation
- Misc. civil structures
- Receipt line from PARCO installation at Shikarpur for Mogas
- Internal piping for HSD/ Mogas
- Area built-up

1.7 Project Location

Total Parco Pakistan Limited Shikarpur Terminal is located at Plot no. 223 & 224, Deh Ali Murad Village, Kandhkot road (opposite PARCO terminal) at District Shikarpur. Site coordinates are 28°02’05.5"N & 68°50’16.2"E.

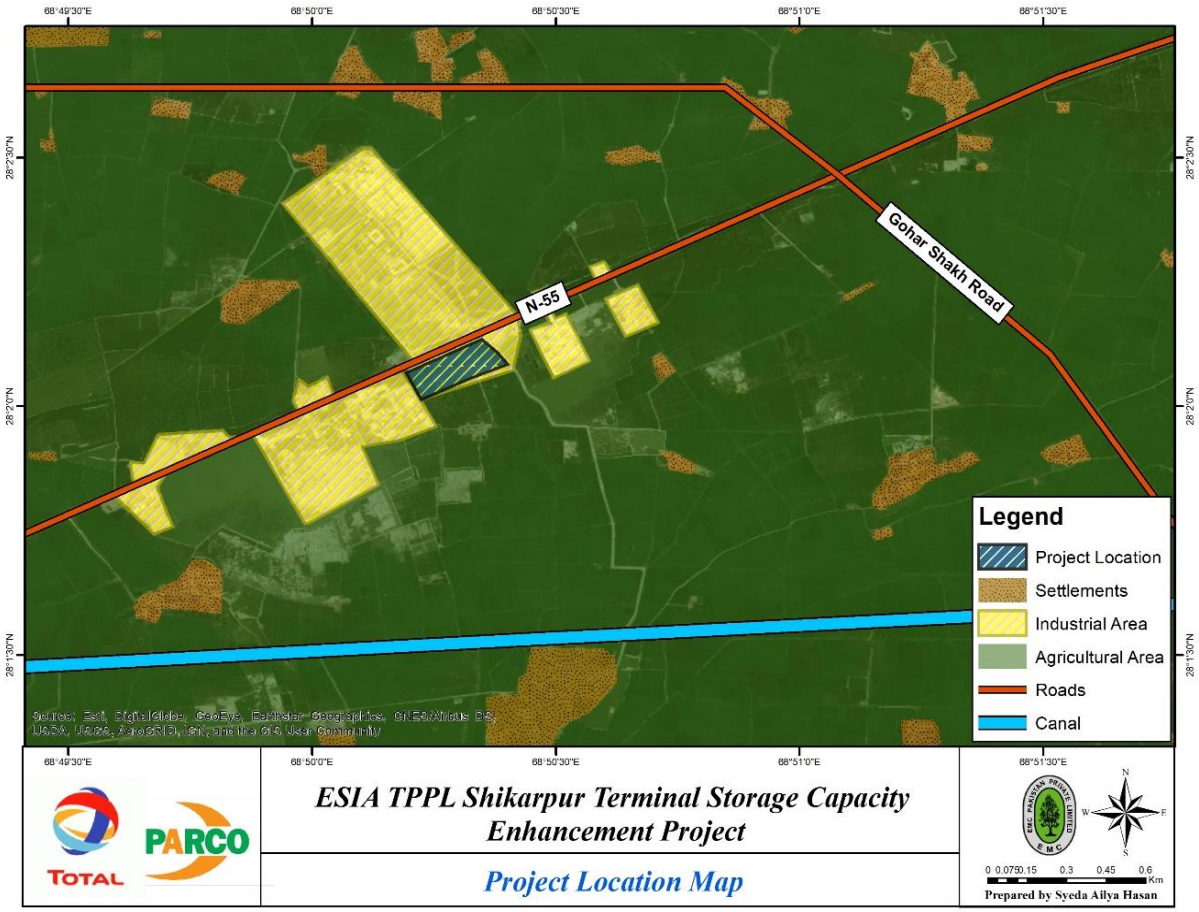

Figure 1.1: Project Location

1.8 Objective of EIA

The main objectives of the Environmental Impact Assessment (EIA) study are to:

- Describe the key components of the microenvironment & macro environment of project area.
- Identify, analyze and evaluate the type and extent of potential environmental and social impacts with emphasis on significant beneficial/adverse effects the proposed project will cause on the existing biological, physical and socio-economic environments of the project area.
- Recommend mitigation measures and strategies to minimize or avoid adverse environmental and social impacts including monitoring plans for implementation of the mitigation measures.
- Assist planners and decision-makers in evaluating the project's feasibility based on its potential environmental impacts.
- Describe the project & all the activities to be carried out during the life of the project, including design, construction, operation, maintenance or any other activities relating to the project.

1.9 Project Categorization

Sindh Environmental Protection Act (SEP Act) was legislated in 2014. Section 17 of SEP Act, 2014 requires that every new project has to be preceded by an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) depending upon the size and severity of impacts anticipated on commissioning of the project. Sindh Environmental Protection Agency (Review of IEE and EIA) Regulations, 2014 have been notified under section 37 of SEPA 2014. These Regulations categorize projects in three separate schedules which require either an IEE (Schedule-I) or an EIA (Schedule-II) or Environmental Checklist (Schedule III), where provisions of Section 17 shall apply. Oil and gas gathering system, separation and storage have been placed in Schedule – II, Category B4, thus requiring an EIA.

1.10 Methodology of EIA

Environmental Impact Assessment (EIA) is a systematic process that identifies and evaluates the potential impacts (positive and negative) that a proposed project may have on the biophysical and socio-economic environment. It identifies mitigation measures that need to be implemented in order to avoid, minimize or reduce the negative impacts, and also identifies measures to enhance positive impacts. The EIA is not fully a linear process, but one where several stages are carried out in parallel and where the assumptions and conclusions are revisited and modified as the project progresses. The following sections provide additional detail regarding the key stages in this EIA process. These stages are:

- Scoping Phase;
- Specialist Study Phase; and
- Integration and Assessment Phase.

Figure 1.5 shows different phases of EIA.

1.10.1 Obtaining Project Specific Data

This was the very first step to embark on the study initiated through meetings held with the officials of TPPL. In the meetings, discussions were made to clarify the nature and extent of project in environmental perspectives. Basic information on the form of raw input received from the proponent was analyzed by the experts to comprehend the project & to assess its influence on the environment.

1.10.2 Literature Review

While the project details were being acquired, desktop study was also initiated simultaneously to draft environmental baseline information of the project area. The desktop study comprised of literature

review, collection of updated authenticated published/printed data on the physical ecological and social environment related to the focused area. The same was also used to delineate the scope of surveys which would then form the basis of environmental assessment.

1.10.3 Stakeholder Consultation

Stakeholder consultations were held to involve the public in the decision making process and to have a fair interaction with all community groups and assuring them that every attempt would be made to reduce the negative impacts of the project, and that adequate remedial measures would be taken to recompense the loss of the affected persons, if any.

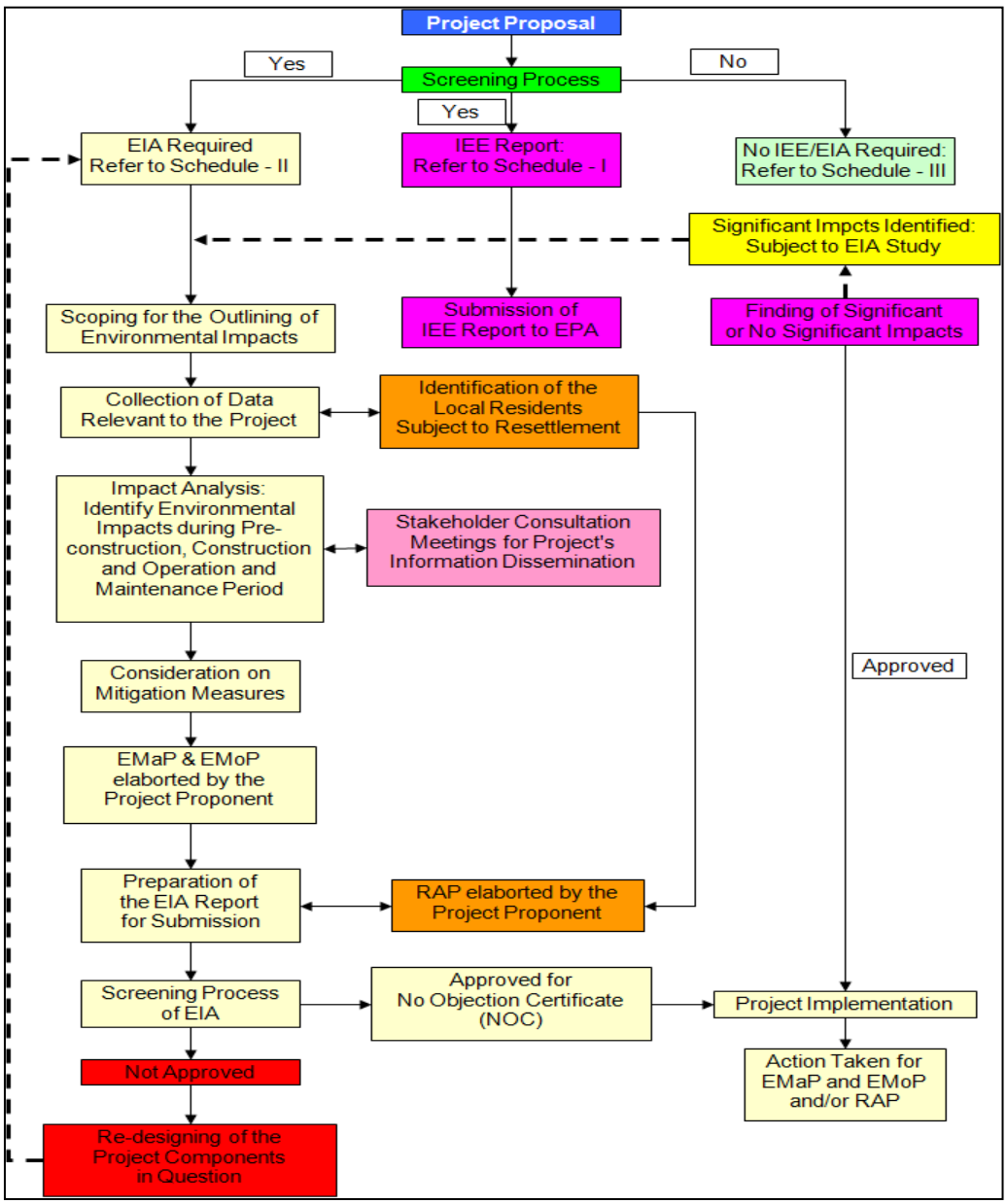

Figure 1.5: Methodology of EIA

1.10.4 Reconnaissance and Detailed Surveys

Preliminary surveys of project location were organized by EMC Pakistan Pvt. Ltd in which experts visited the area and assessed the physical scenario in order to plan various detailed studies. The relevant surveys were carried out under the supervision of environmental experts. Preliminary socio-economic evaluation was also undertaken. This was followed by detailed and comprehensive surveys which were

carried out in order to investigate various domains of environment and socio-economic sector to highlight various issues, and concerns that may lead to the identification of aspects and subsequent assessment of impacts.

Detailed environmental baseline survey was conducted to collect primary data in the Project surrounding to help identify sensitive receptors. The primary data were examined and compared with secondary data available from earlier environmental studies in the region. The scope of survey included collection of environmental and social baseline information on following key aspects:

- Climate and Rainfall
- Air Quality
- Noise Quality
- Land and Soil
- Soil
- Geology
- Hydrology
- Vegetation
- Fauna
- Geomorphology
- Administrative Division
- Nearby settlements
- Socio-Economic Activities
- Land use
- Infrastructure & Social Services

1.10.5 Aspects Identification

The EIA process requires development of an inventory of all possible environmental and socio-economic aspects, which provides the basis of categorization and evaluation of impacts and their likelihood to occur due to the materialization of the project. Aspects are those which are the causes of positive and negative impacts. Those aspects are primarily associated with activities performed during construction and operation phases of the project.

1.10.6 Impact Assessment & Mitigation Measures

Based on the developed aspects inventory, experts analyzed the aspects for their logical outcome as potential impacts on the physical, ecological and social environment. These impacts have been identified, assessed and weighed for different activities during construction, commissioning and operational phases of the project. Mitigation measures were also proposed for various activities of projects in order to minimize the potential impacts during the life span of the project.

1.10.7 Environmental Management & Monitoring Plan

In the light of impacts identified and mitigations proposed, an Environmental Management Plan (EMP) has been developed which has a pivotal role in assigning tasks to personnel for the environmental management and implementation of mitigation measures as well as to monitor its effectiveness throughout the life cycle of the project. It also provided monitoring plans/procedures to be followed for checking and compliance maintenance of environmental quality and legal requirements through suggested mitigation measures.

1.10.8 Documentation Review & Conclusion

This is the final step to complete the environmental assessment and compile all the work done in shape of a report. Report writing started just after the initiation of environmental assessment. The report has been written by experts of EMC and compiled by the office staff in coordination with the experts. At the end of the study, the entire report is reviewed by the team leader followed by recommendations and conclusion in the light of the assessment.

1.10.9 Report Structure

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

Chapter 1: Provides an introduction and overview of the project

Chapter 2: Details the project description, its objective, location of the facilities and construction & operation details including analysis of alternatives along with proposed schedule for implementation

Chapter 3: Gives an overview of policy and legislation along with international guidelines relevant to the project

Chapter 4: Provides description of the microenvironment and macro environment of the project area. This chapter contains the description of the physical environment, socio-economic condition and built environment of the area.

Chapter 5: Provides details of stakeholder consultation and the issues and concerns raised by the stakeholders and interested parties.

Chapter 6: Describes the potential environmental and social impacts of the proposed Project. General and project specific guidelines were used to assess the potential environmental impacts at the various stages - designing, construction and operations of the project.

Chapter 7: Presents the Environmental Management Plan and Monitoring Program for the project

Chapter 8: Presents Risk Management Plan.

Chapter 8: Summarizes the report and presents its conclusions.

1.11 Study Team

Table 1.3: List of EIA Study Team

S. No	Names	Positions
1.	Engr. Syed Nadeem Arif	Managing Director/Team Lead
2.	Dr. Syed Ali Ghalib	Senior Ecologist
3.	Engr. Ahmed Zohair	Senior Environmental Engineer
4.	Muhammad Haseeb	Environmental Specialist
5.	Khurram Shams Khan	Sr. Sociologist
6.	Engr. Sohaib Tariq	Environmental Engineer
7.	Mr. Vijay Kumar	Sociologist
8.	Ather Adil	Field Sampling Officer

Chapter 2 PROJECT DESCRIPTION

2.1 The Project

Total PARCO Pakistan Limited (TPPL) plans to adding 03 tanks for storage of Mogas and HSD at their Shikarpur Terminal. The objective of the project is to increase the storage capacity of the terminal in order to increase the supply of petroleum products and fulfill market requirements. In addition to the construction of storage tanks, TPPL also plans to construct 01 fire water tank, dykes around the product tanks, Mogas line from PARCO and ancillary structures.

The salient features of the project are as under:

Table 2.1: Salient Features of the Project	
Owner	Total PARCO Pakistan Limited
Project Location	Deh Ali Murad Village, Kandhkot road, Khanpur, District Shikarpur, Sindh
Total Area of Plot	8 Acres
Components	• 02 Nos. above ground vertical tanks for MOGAS (3282 KLs each) • 01 Nos. of above ground vertical tanks for HSD (3282 KLs) **Other Components** • 01 Nos. Fire Storage Vertical Water Tank • Firefighting system upgradation • Misc. civil structures • Receipt line from PARCO installation at Shikarpur • Internal piping for HSD/MOGAS • Area built-up

The approvals from Oil and Gas Regulatory Authority (OGRA), dated: July 3, 2019 and Ministry of Defense, GoP, dated: July 17, 2019, for the proposed project have been obtained. They have been attached as Annex-IV.

2.2 Project Location

The site is located on Total Parco Pakistan Limited, Shikarpur Terminal, plot no. 223 & 224, Deh Ali Murad Village, KandhKot road (opposite PARCO terminal), District Shikarpur. The site can be located at co-ordinates 28°02’05.5"N, 68°50’16.2"E.

2.3 Operational Areas of Oil Storage Terminal

Bulk Storage Terminal for petroleum products is an industrial facility for the storage of different petroleum products and from where these products are usually transported to end users for further storage or utilization. Bulk Storage Terminals or Depots of such type typically have tankage, either above ground or underground, and gantries for the discharge of products into tank trucks. An oil terminal is a comparatively unsophisticated facility in that (in most cases) there is no processing or other transformation on site. The products which reach the depot are in their final form suitable for delivery to customers. In some cases, additives may be injected into products in tanks, but there is usually no manufacturing plant on site.

Shikarpur Terminal is a refined oil storage facility comprising of above ground/ mounded tanks for HSD & MOGAS. Moreover, some basic infrastructure like, office building, pump rooms, loading/ unloading gantry, meter room, switch room etc. are also available at the terminal. Currently, Shikarpur

Terminal is storing MOGAS and HSD. HSD is received through pipeline from PARCO installation (opposite of TPPL terminal) while MOGAS is received through tank trucks. Dispatches to retail stations and other customers are done through tank trucks. The terminal operation is managed by TPPL staff.

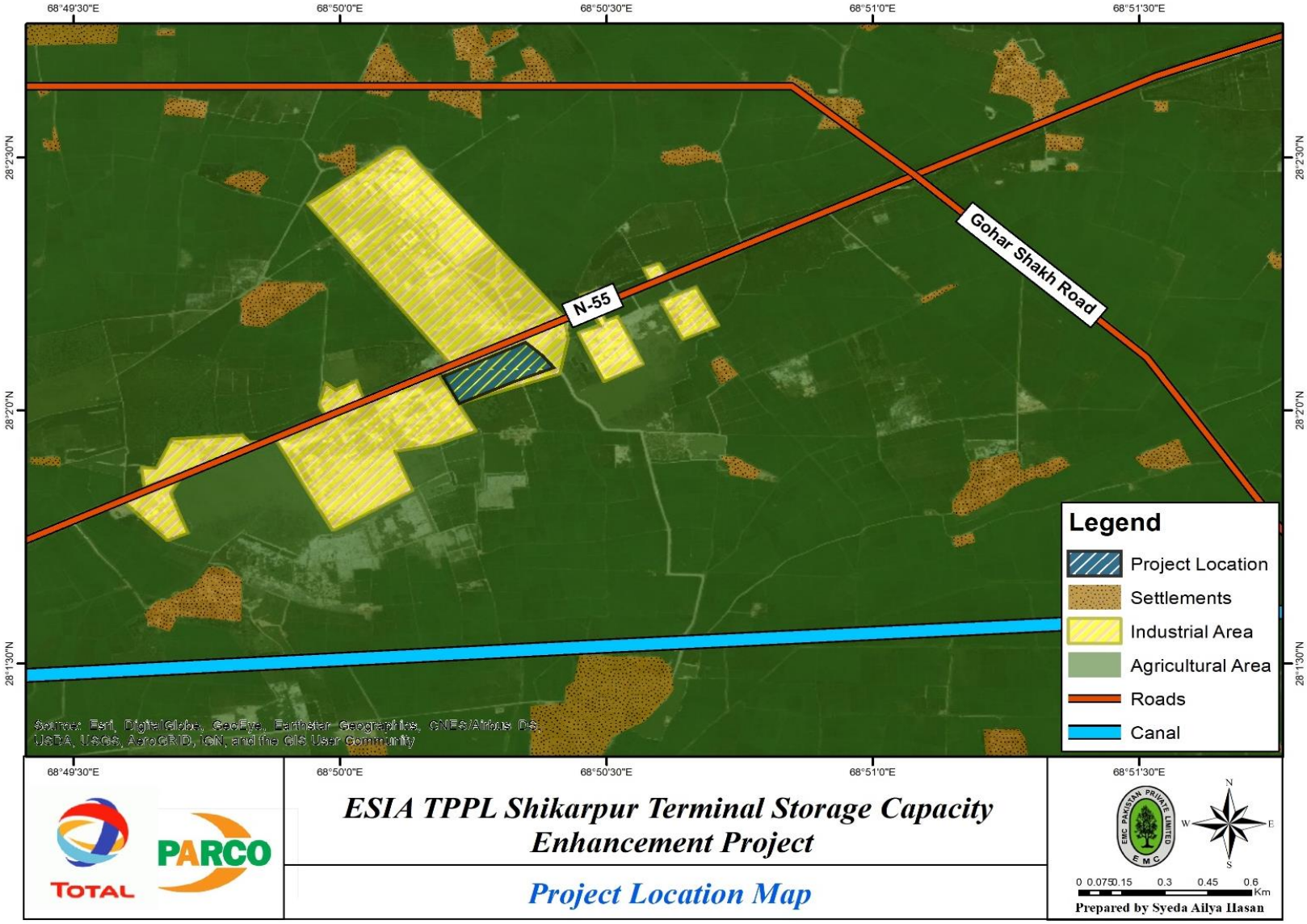

Figure 2.1: Location of the Project

The expansion project at Shikarpur Terminal was planned to take pipeline receipts of MOGAS after commissioning of cross country multi-grade pipeline starting from Karachi and ending at Machike-Lahore.

2.3.1 High Speed Diesel (HSD) Storage

In the existing Shikarpur terminal, HSD is stored in 02 above ground vertical tanks having combined capacity of 2700 KL (1519 KL and 1018 KL). The proposed third tank, having capacity of 3282 KL, shall be added.

2.3.2 Motor Gasoline (MOGAS) storage

Existing MOGAS storage at Shikarpur terminal is 214 KL in total of 03 tanks which are mounded. 02 above ground tanks are proposed each having capacity of 3282 KL. At present, Mogas is transported to/from the terminal through tank trucks. Under the proposed project, a pipeline will be laid from PARCO terminal opposite to the facility, for Mogas receipt with diameter of approx. 8 inches.

2.3.3 Spill Control

At Shikarpur Terminal, all the Storage Tanks will be constructed & maintained as per the established International Standards (API 650 for Construction & API 653 for Maintenance) thereby ensuring integrity of tanks during their life-cycle, limiting chances of any leaks and spills from them. Routine preventive maintenance (including third-party inspections) of all pipelines, fittings, valves etc. are carried out to ensure their integrity. Moreover, for effective spill control measures for Above-Ground Tanks such as ATG (Auto Tank Gauging) and independent HHLA (High, High Level Alarms) are installed, to handle any spill / leaks.

Written working SOPs and Emergency Procedures and Trained Workforce is available to mitigate any spill & leaks impacts. Emergency response drill (to control any possible leaks) are conducted at the terminal. Cathodic Protection (CP) is available at the terminal for corrosion protection. Moreover, Tank bund area and Tank Truck Loading Rack are fully paved to avoid any spilled product from entering into the sub-soil and ground-water.

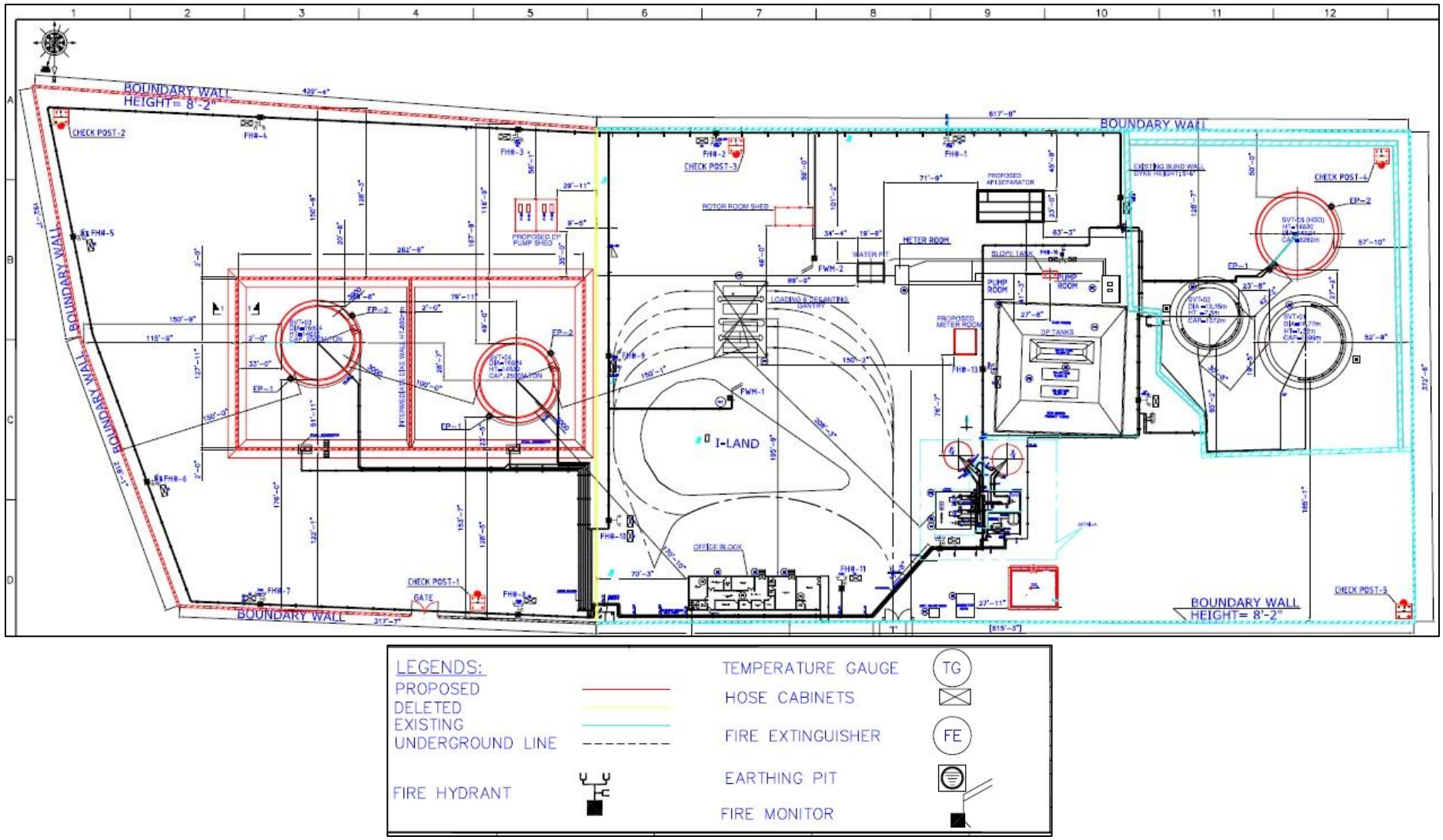

Figure 2.2: Layout of the Shikarpur Terminal and Project Interventions (in red)

Dyke wall of 7-foot & 8-inch height and 13-foot wide base will be constructed around Tanks for spill control (shown in Figure 2.3 a & b). Manholes and Catch Basins will also be constructed as a part of secondary containment for restricting accidental spills. 75 mm thick layer of Bitumen and Sand compound will also be laid under the fuel tanks to avoid contamination of the ground.

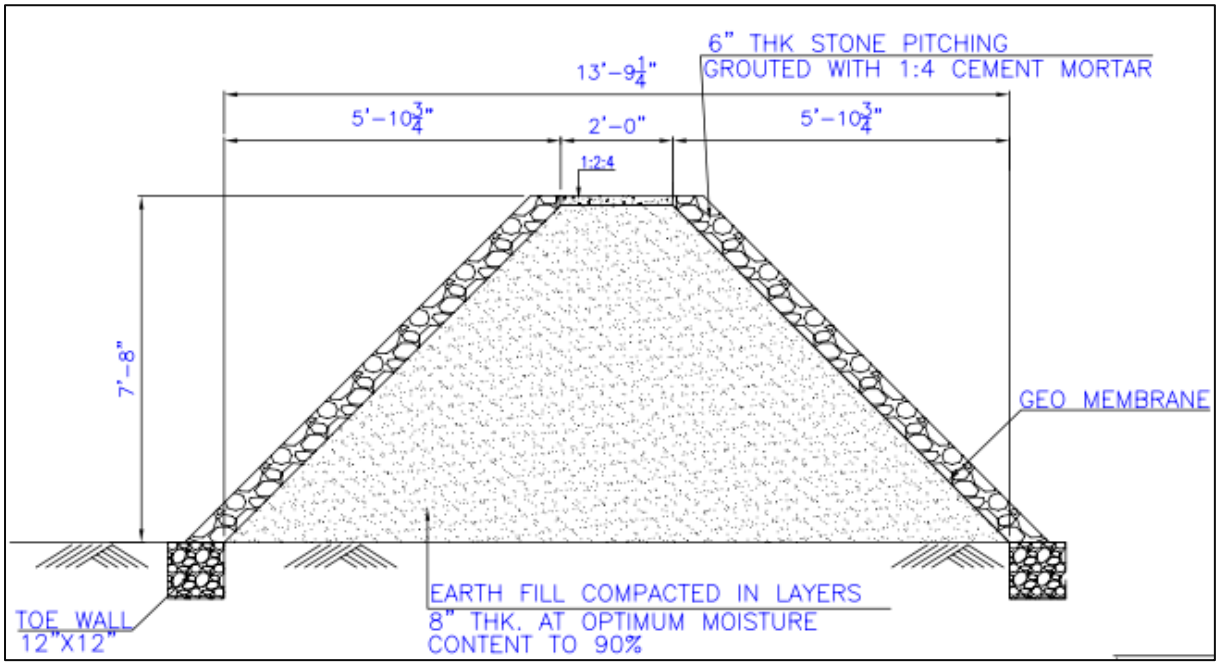

Figure 2.3(a): Dyke Walls

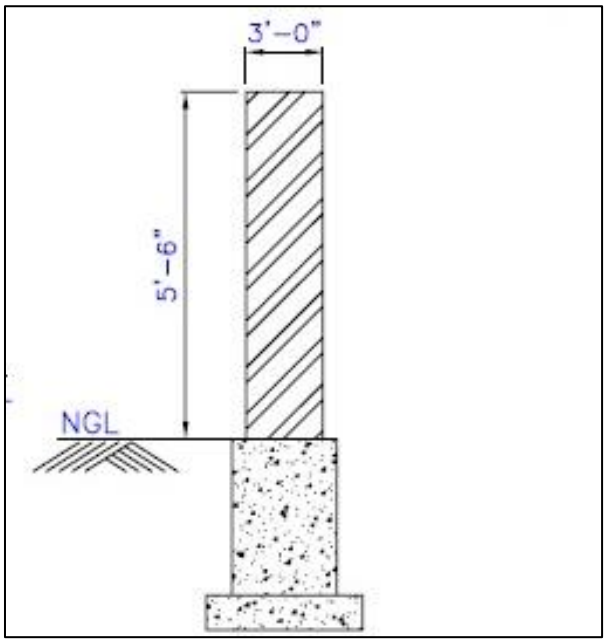

Figure 2.3(b): Dyke Walls

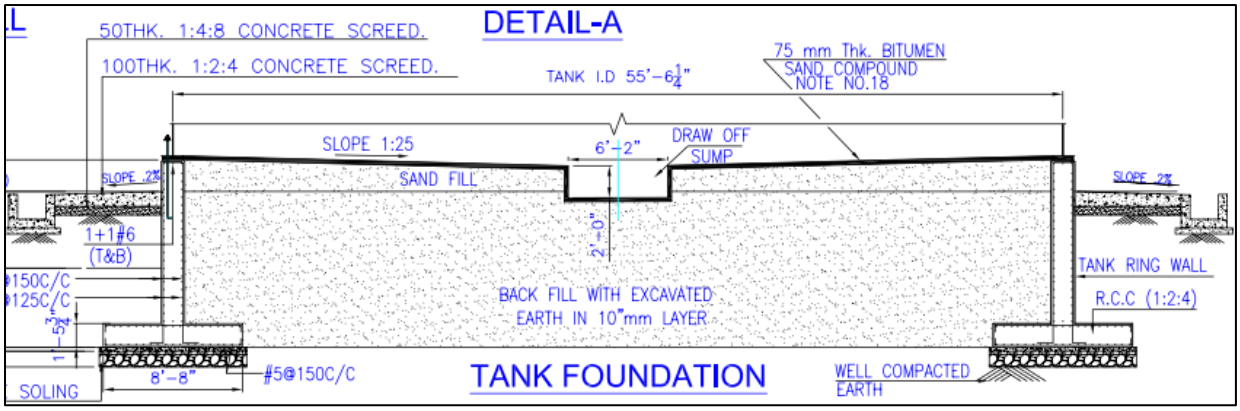

Figure 2.4(a): Tank Foundation

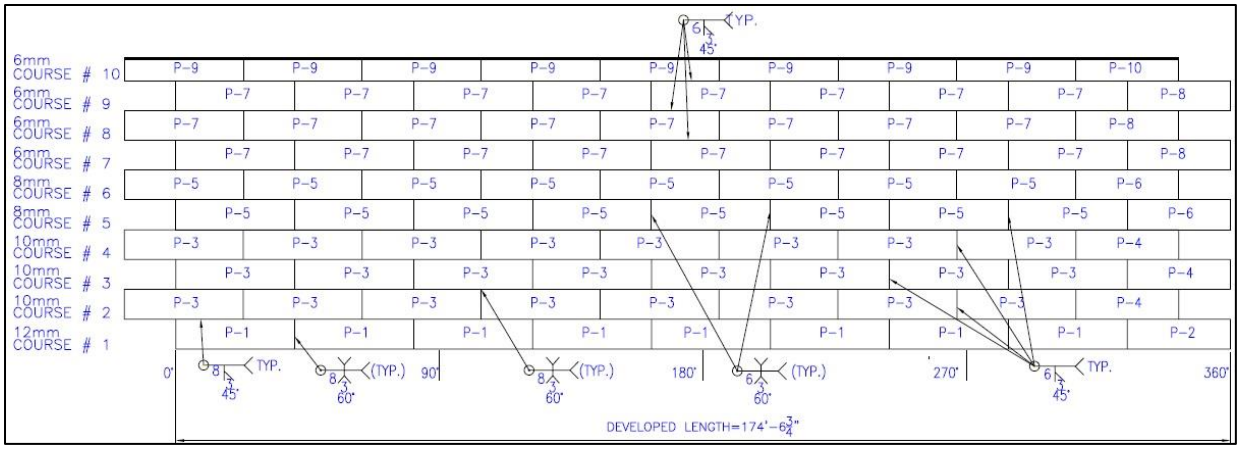

Figure 2.4(b): Tank Shell Plate Layout

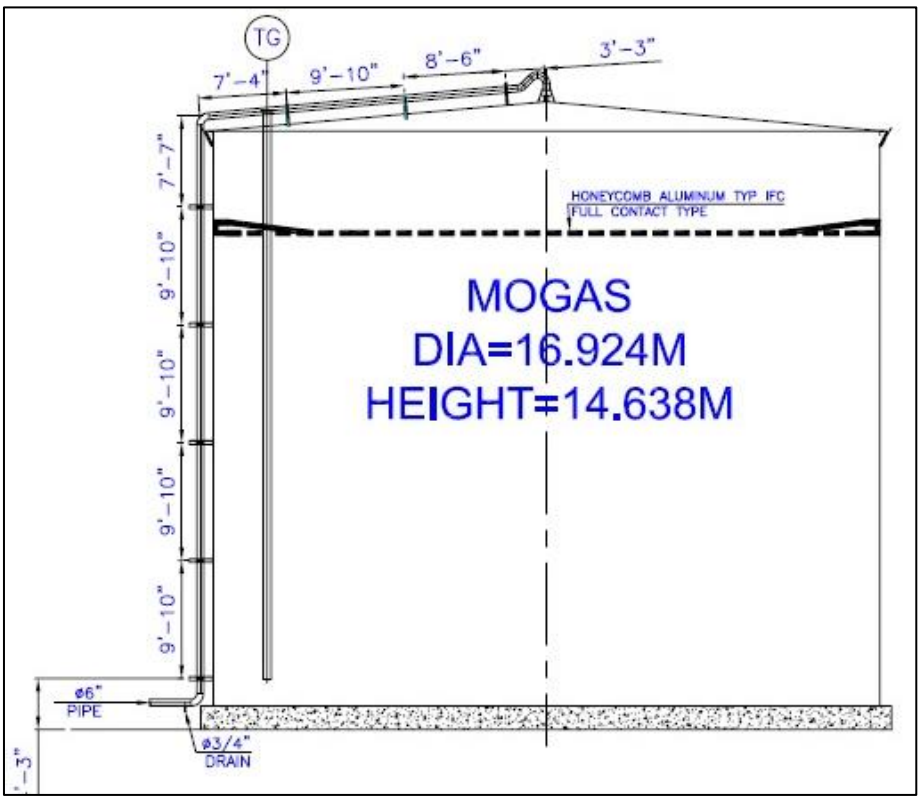

Figure 2.4(c): MOGAS Tank Cooling system

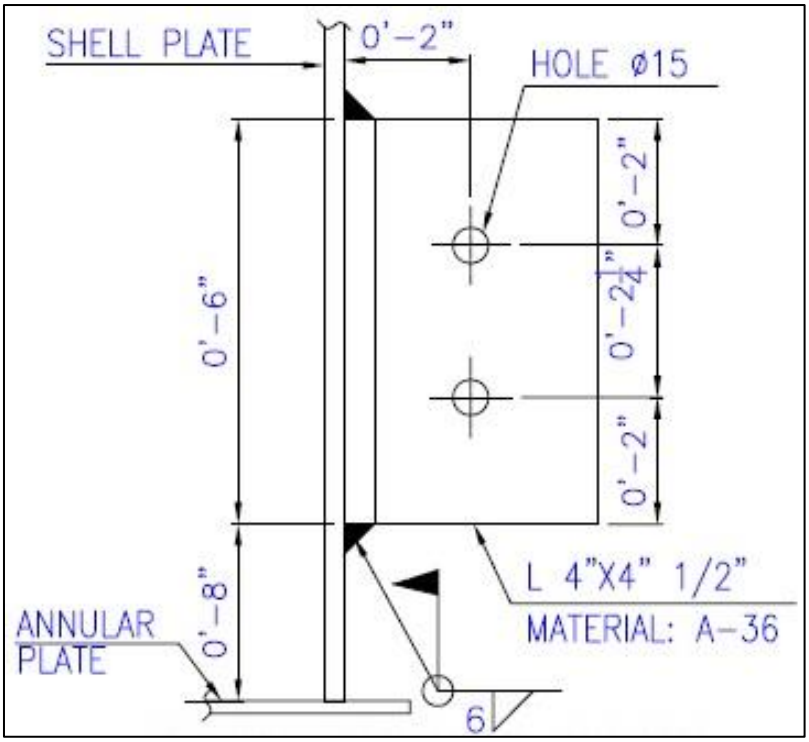

Figure 2.5: Tank Earthing

2.3.4 Corrosion Protection

Protection against corrosion is essential to forestall any possibility of leakage of product into the surrounding environment. For this reason, bottom of the storage tanks will be protected externally and internally against corrosion by epoxy coating and Cathodic Protection.

2.3.5 Waste Management

Solid and Liquid waste will be generated during construction and operations of TPPL Shikarpur Terminal. Generated solid waste will mainly include construction waste which will be managed at a designated area and will be appropriately disposed-off through contractor.

Wastewater of the TPPL Shikarpur Terminal primarily includes sewerage and terminal wastewater. Terminal wastewater consists mainly of tank bottom draining and contaminated storm water runoff, including water from tank leaks and spills that collects in hydrocarbon contaminated secondary containment areas. Wastewater will therefore be not continuous and will only be generated during or after the above mentioned activities. To cater this intermittently generated wastewater, API 421 compliant Oil Water Separator (OWS) is in the final stages of completion.

Shikarpur Terminal is ISO 14001 Environmental Management System (EMS) certified and complies with all waste management requirements. Hazardous waste generated at the terminal is properly recorded as per the defined SOP and sent to Karachi where it is disposed-off through a SEPA approved waste contractor. The terminal is also ISO 9001 and OHSAS 18001 certified, as attached in Annex-V. As part of overall environmental compliance for current terminal operations, Environmental Monitoring is periodically carried out, reports of which have been attached as Annex-VIII.

2.3.6 Sewerage Plan

Wastewater from office block will be routed into septic tank where its sludge will settle and the grey water after retention will be headed towards soakage pit. The sludge will be periodically removed from the tank through bowsers. Soakage pit will be approx. 20-25 ft. deep with a drip hole slab having 3 inch

dia holes. The wall of the pit is supported by brick masonry. Soakage pit will be connected with septic tank via pipe.

2.3.7 Drainage Plan

The drainage system already exists inside the project boundaries. Wastewater from terminal comprising of tank bottom draining, contaminated storm water runoff, including water from tank leaks and spills that collects in hydrocarbon contaminated secondary containment areas will be directed towards the API separator (Figure 2.5) which will separate oil from water.

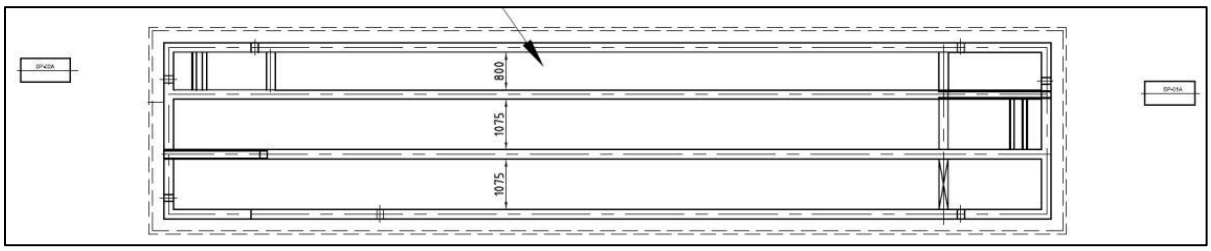

Figure 2.5: API Separator

2.3.8 Work force

During construction phase, 40 persons will be employed, whereas, operational phase will involve employment of around 15 personnel for the daily operations of the depot. The work force during construction phase will be accommodated in temporary campsites in vicinity of construction site.

2.3.9 Construction Activities

Construction will start from ground works including earth filling followed by concrete works for installations.

Typical activities that will be conducted during civil construction are:

- Excavation for foundations
- Laying of foundations
- Masonry works
- Concrete works
- Iron works
- Finishing (plastering, painting etc.)

Civil work comprise construction of all plant units and their auxiliaries, besides site leveling, internal roads, drainage, sewerage and all other infrastructure within the plant boundaries. The general specifications / details in respect of type of structures, grade of concrete, materials, etc. for all major units have been assumed to conform the standard practice of civil works.

Steel structures will include column bracings, rafters, roof trusses, purloins, side runners, roof bracings, stairs, ladders, handrails, columns, floor beams (both rolled and built-up plated sections), chequered plate flooring, GCS sheets for side cladding and roof cladding. Main equipment to be used in the civil works is given in Table 2.2.

Table 2.2: List of equipment/machinery used in the construction works

S. No	Equipment / Machinery	S. No	Equipment / Machinery
1.	Graders / Levelers	2.	Compactors
3.	Excavators	4.	Road Rollers
5.	Pneumatic chisels / Hammers	6.	Mobile Cranes
7.	Scaffolding Pipes and Fittings	8.	Concrete Lifters

9.	Tractors with trolleys	10.	Concrete mixers or Ready-mix concrete trucks
11.	Vibrators and grouting pressure	12.	Welding sets including auto / MIG welders

There will be a dedicated overhead fire water tank.

2.4 Fire and other Safety Considerations in Design Phase

For fire prevention, all the product storage tanks, pipelines, loading rack etc. are properly bonded and grounded and ground continuity is regularly monitored. Strict administrative controls like prohibition of use of mobile phones, smoking, removal of all potential ignition sources etc. are in place. 100% cotton uniforms (to avoid build-up of static charges) have been provided to workers, all the hot work is performed under strict controls with proper gas detection. Explosion proof lights, switches, cables etc. are used in the classified area. Trained workers and defined SOPs are available. Advanced Scully grounding system is available in the Tank truck loading area. All the Gasoline tanks are installed with Internal Floating Roof (IFRs).

For fire control, terminal is equipped with state-of the-art fire-fighting network designed as per the International Standards (NFPA/ API) and OGRA standards for Depots requirements including firewater pumps (designed as per NFPA 20) of 1500 GPM capacity, fire-fighting foam (FP 70) (14000 liters available). All the above-ground vertical tanks are installed with foam pourers, foam generators are installed in all gasoline tanks bunds. Fire-water tank of capacity 299 KL is available, while another firewater tank with capacity 385 KL will be installed. Elaborate Emergency Response Plans (ERP) is available to be followed in an event of any emergency. Monthly drills are conducted and staff is trained on fire-fighting at the terminal to tackle any emergency.

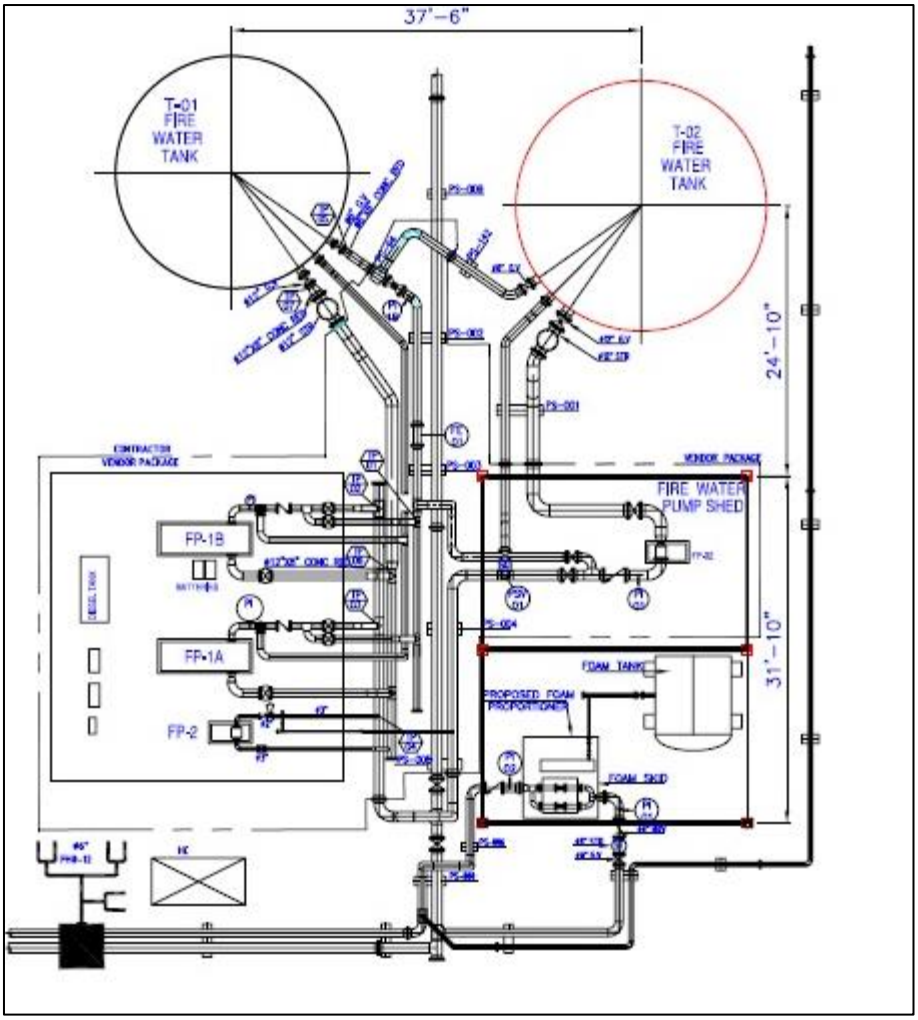

Figure 2.6: Existing (Black circle) and proposed (Red circle) fire water tanks

Fire and Safety considerations in accordance with NFPA 30 shall be applied for the project. NFPA codes, standards, recommended practices, and guides, are developed through a consensus standards development process approved by the American National Standards Institute. This process brings together volunteers representing varied viewpoints and interests to achieve consensus on fire and other safety issues. While the NFPA administers the process and establishes rules to promote fairness in the development of consensus, it does not independently test, evaluate, or verify the accuracy of any information or the soundness of any judgments contained in its codes and standards.

Fire Control

A fire-extinguishing system in accordance with an applicable NFPA standard shall be provided or shall be available for vertical atmospheric fixed-roof storage tanks larger than 190 m3 (50,000 gal or 1190 bbl.) capacity, storing Class I liquids, if located in a congested area where there is an unusual exposure hazard to the tank from adjacent property or to adjacent property from the tank.

The following equipment will be used for fire-control:

Fire Fighting System

- Fire Pump Motor Driven (Operating) = 1500 US GPM @ 150 PSI
- Fire Pump Motor Driven (Standby) = 750 US GPM @ 150 PSI
- Fire Pump Motor Driven (Standby) = 750 US GPM @ 150 PSI

- Jockey Pump (Motor Driven) = 100 US GPM @ 150 PSI
- Fire Water Spray System for Cooling on each Tank as well as Hydrants and Monitors all around Tank Farm Area.

Foam System

- Centralized Fixed Foam System with Fixed Top Foam Pourer at all tanks
- Foam trolleys with Foam/Water monitors for Spill Fire Protection at Strategic Location.
- Firewater Network Dia 10'' with Hydrants at 60 meters C/C available at all risk area

It is recommended that all applicable Fire Code regulations must be followed; some of the most important ones are as follows:

- According to the NFPA 30 all above-ground tanks storing gasoline, diesel and kerosene must be constructed of steel.
- Tanks storing flammable or combustible liquids must have secondary containment capable of holding 110 per cent of the tanks' volume according to UL142.
- The tank must have a normal vent, which must be at least a 1-1/4" diameter steel pipe for tanks up to 2,000 Imperial gallons. If the tank contains gasoline the vent cap shall be no less than 12 feet above ground level.
- Tanks are to be placed on steel or concrete supports, and anchored if it's elevation is below the flood stage.
- All tanks storing flammable or combustible liquids shall be fitted with an emergency vent in case of exposure to fire.
- The tank's capacity must be labeled on the tank, and a level gauge should be visible to the operator filling the tank.
- A 20-pound ABC fire extinguisher must be installed no closer than 20 feet, but no farther than 100 feet, from the tank, which shall be maintained and tagged at quarterly intervals.
- The NFPA 30's minimum safe distances for placing tanks from property lines or public ways must be followed, depending on the tank capacity.

Equipment, Piping, and Fire Protection Systems in Impoundment Areas or Diked Areas.

- Only piping for product, utility, or fire protection purposes directly connected to a tank or tanks within a single diked area shall be routed through a diked area, a remote impoundment area, a spillway draining to a remote impoundment area, or above a storage tank drainage area where the piping can be exposed to a fire.
- Drainage shall be arranged to prevent accumulation of any liquid under the piping by sloping. Corrosion-resistant piping and piping that is protected against corrosion shall be permitted to be buried where such drainage is not provided or is not practical. Hose connections, controls, and control valves for application of fire protection foam or water to tanks shall be located outside remote impoundment areas, diked areas, or spillways draining to a remote impoundment area
- Structures such as stairways, walkways, instrumentation shelters, and supports for piping and equipment that are located in a remote impoundment area, diked area, or spillway draining to a remote impoundment area shall be constructed of noncombustible materials.

- Each connection to an aboveground tank through which liquid can normally flow shall be provided with an internal or an external valve located as close as practical to the shell of the tank.
- Each connection below the liquid level through which liquid does not normally flow shall be provided with a liquid tight closure such as a valve, plug, or blind, or a combination of these.
- Openings for gauging on tanks storing Class I liquids shall be provided with a vapor tight cap or cover.
- An approved means shall be provided to promptly notify those within the plant and the available public or mutual aid fire department of any fire or other emergency. Those areas, including buildings, where the potential exists for a flammable liquid spill shall be monitored as appropriate. Such methods shall include both of the following:
  1) Personnel observation or patrol
  2) Monitoring equipment that indicates a spill or leak has occurred in an unattended area

Fire Prevention and Control:

Tank storage facilities shall have fire prevention and control for life safety, for minimizing property loss, and for reducing fire exposure to adjoining facilities resulting from fire and explosion.

Control of Ignition Sources:

Precautions shall be taken to prevent the ignition of flammable vapors from sources such as the following:

1) Open Flames
2) Lightning
3) Hot Surface
4) Radiant Heat
5) Smoking
6) Cutting and Welding
7) Spontaneous Ignition
8) Friction Heat or Spark
9) Static Electricity
10) Electrical Sparks
11) Stray Currents

Smoking shall be permitted only in designated and properly identified areas.

Welding, cutting, and similar spark-producing operations shall not be permitted in areas containing flammable liquids until a written permit authorizing such work has been issued. The permit shall be issued by a person in authority following inspection of the area to assure that proper precautions have been taken and will be followed until the job is completed.

Management of Fire Hazards:

The extent of fire prevention and control provided for tank storage facilities shall be determined by an engineering evaluation of the installation and operation, followed by the application of sound fire protection and process engineering principles. The evaluation shall include, but not be limited to, the following:

1) Analysis of fire and explosion hazards of the facility
2) Analysis of local conditions, such as exposure to and from adjacent properties, flood potential, or earthquake potential
3) Fire department or mutual aid response.

2.5 Decommissioning Activities

As per the scope of project, Decommissioning is not included in the scope of the project. However, when the storage facility will be no longer required for storage, e.g. in case it could not make profitable contribution to the company, it will be decommissioned.

Decommissioning entails demolition of tanks, buildings, removal of infrastructure, decommission of flow lines, rehabilitation and re-vegetation. Areas disturbed by the project are to be rehabilitated to a stable, pollution free, landform with an indigenous self-sustaining vegetation cover. Progressive rehabilitation will commence immediately that areas become available for rehabilitation purposes.

Any infrastructure left in place must be deemed to be safe, taking into consideration the resources and capability of the new users.

2.6 Analysis of Alternatives

The objective of screening out alternatives during the EIA exercise, is to identify options that most effectively meet the project's environmental objectives, either by enhancing the environmental benefits of the proposed activity, or through reducing or avoiding potentially significant negative impacts.

For the proposed Oil Storage Terminal Project, alternatives were assessed for feasibility:

1. Project Alternative
2. 'No project' alternative
3. Location Alternative

2.6.1 Project Alternative

The proposed oil storage facility project in Shikarpur has been planned with the objective to fulfil market requirements of different petroleum products through speedy supply in the area. The project will increase TPPL's storage capacity thus catering the increased market demands. The facility will be equipped with state of the art products receiving, storage, filling and dispatching facilities.

2.6.2 No Project Alternative

The 'No-Project' alternative is the option of not implementing the activity or executing the proposed development. Assuming that the storage capacity expansion is not under taken at the proposed site, the opportunity to improve the efficiency in the logistical fuel supply chain would be lost. The economic incitement and potential which the proposed development has to create would not be achieved. As discussed in subsequent sections, there are no significantly negative environmental impacts anticipated from the proposed development, which through the 'No Project' option, are likely to be contained.

2.6.3 Site Location Alternatives

The proposed activity is expansion of an operational facility located in an area dedicated for the storage and supply of petroleum products in Shikarpur district. The location assessment proves feasible due to following features:

- The 08-acres area for the terminal is already owned by Total PARCO Pakistan Limited

TPPL's Shikarpur terminal lies opposite to this facility and connected through pipeline. This makes the site attractive for the project because additional ROW for pipelines would not be needed.

2.7 Construction Schedule

Construction phase of the project is expected to last one year.

2.8 Utilities

For the construction work, contractors will be using their own generators. Electric power connection is available at the terminal for routine operation. No other utilities are available at the terminal site.

Chapter 3 LEGISLATIVE & ADMINISTRATIVE FRAMEWORK

3.1 Introduction

This chapter provides synopsis of policies, legislation, and guidelines that may have relevance to the project. The proponent of this project will comprehensively follow the relevant requirements of the policy documents and legislative framework as well as those recommendations as described in the national and international guidelines. Many of those guidelines have been incorporated in the mitigation measures and the Environmental Management Plan (EMP) which has been formulated for the better environmental management.

3.2 National Environmental Policy & Plan

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 Strategy approved by the Federal Cabinet in March 1992 was also recognized by International Financial Institutions, principally the World Bank. The NCS had identified 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage. It had also recommended immediate attention to the stated core areas in order to preserve the environment of Pakistan.

A mid-term review of the NCS in 2000 concluded that achievements under the NCS were primarily awareness raising and institutional building rather than meaningful improvement of the environment and natural resources and that the NCS was neither designed nor adequately focused as a national sustainable development strategy (GoP), November 2002. Thus the need for a more focused National Environmental Action Plan (NEAP) was formulated and approved by the Pakistan Environmental Protection Council in 2001 to practically improve the national environment with emphasis on poverty reduction, and economic as well as sustainable development.

NEAP now constitutes the national environmental agenda and its core objective is to initiate actions that would safeguard public health, promote sustainable livelihoods and enhance the quality of life for the people of Pakistan.

The GoP and United Nations Development Program (UNDP) have jointly initiated an umbrella support Program called the NEAP-Support Program that was signed in October 2001 and implemented in 2002. The development objective supported by NEAP-Support Program 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 National Environmental Policy 2005

The National Environmental Policy provides an overreaching framework for addressing the environmental issues facing Pakistan, particularly pollution of fresh water bodies and coastal waters, air pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management, deforestation, and loss of biodiversity, desertification, natural disasters and climatic change.

It also gives direction for addressing the cross sectional issues as well as the underlying causes of environmental degradation and meeting international obligations.

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

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

3.2.3 Pakistan Petroleum Exploration & Production Policy, 2012

Pakistan has developed a comprehensive policy in 2012 to promote the petroleum business in Pakistan. This policy elaborates the importance and view of Pakistan with regards to exploration, production, refining, marketing, distribution of petroleum products in Pakistan as well as procedural/regulatory measures, economic terms, infrastructure development, environmental and safety control, energy conservation, contingency plan, etc.

3.2.4 Biodiversity Action Plan

The key to protection of the biological heritage of Pakistan lies in the involvement of local people and in the support provided by competent institutions for conservation and sustainable use. The Government of Pakistan has recognized the importance of these measures in the preparation of National Conservation Strategy and in becoming a signatory to, and ratifying, the Convention on Biological Diversity (CBD) in 1994. Developing the Biodiversity Action Plan for Pakistan, 2000 has been the most significant direct steps towards addressing the biodiversity loss.

3.3 National Legislations

3.3.1 Pakistan Penal Code, 1860[2]

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.

[2] *Pakistan Penal Code (XLV of 1860) 6th October 1860*

3.3.2 Antiquities Act, 1975[3]

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.

There are no structures of historical or cultural significance within or immediately neighboring the project site.

3.3.3 Land Acquisition Act, 1894[4]

This Act provides law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be made on account of such acquisitions. The law provides details of various peculiarities involved in acquisition of land such as preliminary investigation, objection to acquisition, declaration of intended acquisition, enquiry This Act provides law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be made on account of such acquisitions. The law provides details of various peculiarities involved in acquisition of land such as preliminary investigation, objection to acquisition, declaration of intended acquisition, enquiry into measurements, value & claims, taking possession, reference to court and procedure thereon, apportionment of compensation, payment, temporary occupation of land, acquisition of land for companies, disputes resolutions, penalties and exemptions etc. This Act has 55 sections addressing different areas. Such as section 4(2) mentions that it shall be lawful for any official authorized by the Collector to enter upon and survey, to dig or to do all other acts necessary to ascertain that whether the land is adapted for such purpose.

The project activities are within the existing terminal premises so no land acquisition is required.

3.3.4 Guidelines for Sensitive and Critical Area, October 1997

The above guidelines list up a number of areas subject to protection in terms of sensitive ecosystems and archaeological importance.

None of such sites however exist within the impact zone of the proposed Project.

3.3.5 Petroleum Act & Petroleum Policy

The petroleum act deals with the transport and storage of the petroleum. It specifies the nature and condition of pipelines in which the petroleum may be transported. The forms and conditions of licensing for the transport and storage of petroleum products are prescribed in this act.

Pakistan has developed a comprehensive policy in the 1997 to promote the petroleum business in Pakistan. This policy elaborates the importance and view of Pakistan with regards to exploration, production, refining, marketing, distribution of petroleum products in Pakistan as well as procedural/regulatory measures, economic terms, infrastructure development, environmental and safety control, energy conservation, contingency plan, etc.

3.3.6 Guidelines for Public Consultation

Public consultation is mandated under 2014 Act. Regulation 11 of the 2014 Regulations provides the general requirements whereas the sectoral guidelines indicating specific assessment requirements are

[3] Act VII of 1976(Gazette of Pakistan, Extraordinary, Part 1, 14th January, 1976
[4] The Land Acquisition Act 1894 (Act of 1894)

provided in the Guidelines for Public Consultation 1997 (the 'Guidelines'). These are summarized below:

Objectives of Public Involvement: 'To inform stakeholders about the proposed project, to provide an opportunity for those otherwise unrepresented to present their views and values, providing better transparency and accountability in decision making, creating a sense of ownership with the stakeholders';

Stakeholders: 'People who may be directly or indirectly affected by a proposal will clearly be the focus of public involvement. Those who are directly affected may be project beneficiaries, those likely to be adversely affected, or other stakeholders. The identification of those indirectly affected is more difficult, and to some extent it will be a subjective judgment. For this reason, it is good practice to have a very wide definition of who should be involved and to include any person or group who thinks that they have an interest. Sometimes it may be necessary to consult with a representative from a particular interest group. In such cases the choice of representative should be left to the group itself. Consultation should include not only those likely to be affected, positively or negatively, by the outcome of a proposal, but should also include those who can affect the outcome of a proposal';

Mechanism of consultations: 'Provide sufficient relevant information in a form that is easily understood by non-experts (without being simplistic or insulting), allow sufficient time for stakeholders to read, discuss, consider the information and its implications and to present their views, responses should be provided to issues and problems raised or comments made by stakeholders, selection of venues and timings of events should encourage maximum attendance';

Timing and Frequency: Planning for the public consultation program needs to begin at a very early stage; ideally it should commence at the screening stage of the proposal and continue throughout the EIA process;

Consultation Tools: Some specific consultation tools that can be used for conducting consultations include; focus group meetings, needs assessment, semi-structured interviews; village meetings and workshops;

Other Important Considerations: 'The development of a public involvement program would typically involve consideration of the following issues; objectives of the proposal and the study; identification of stakeholders; identification of appropriate techniques to consult with the stakeholders; identification of approaches to ensure feedback to involved stakeholders; and mechanisms to ensure stakeholders' consideration are taken into account'.

As above, the Guidelines for Public Consultation introduce effective ways to inform the contents of the project to the general public during the planning stage and that eventually consensus building toward the implementation of project is reached. However, there are instances where in middle of a project on direction of tribunal or court environmental assessment carried out with public consultation.

Incorporating public involvement into the stages of environmental assessment is explained in the guidelines that public consultation meeting has to be carried out after the works on "developing options, and assessing and mitigating impacts" for comments and assessment.

3.3.7 Oil and Gas Regulatory Authority Ordinance, 2002

Oil and Gas Regulatory Authority (OGRA) issues all the licenses related to Oil & Gas setup. Section 23 states that no person shall construct or operate any installation relating to oil, undertake storage of oil, or undertake marketing of refined oil products unless a general or specific license to undertake such activity has been issued and in in full force and effect and the person is the licensee. The authority may

grant a license subject to such conditions, restrictions or stipulations as may be set out in, or attached to, the license.

3.3.8 Technical Standards for the Petroleum Industry (Depots for the Storage of Petroleum Products), 2009

These regulations may be called the Technical Standards for the Petroleum Industry (Depots for the Storage of Petroleum Products) made by OGRA as per Section 42 of Oil and Gas Regulatory Authority Ordinance, 2002. These regulations shall be applied to all such licensees undertaking the regulated activity for storage of petroleum products. These standards prescribed the technical standards relating to design, materials, construction, testing and layout of bulk plant depots and terminals used for the storage of petroleum products and also includes safety distances and standards for the product storage systems, firefighting systems, plant equipment layout and electrical systems required for such storage plants and terminals.

These standard include:

- **Road System** - The roadway system should be arranged to form a complete ring around the entire site area, with branch roads crossing through the various areas. The roads should have minimum width of 10 ft. to permit easy maneuvering of vehicles, with corner radii to suit the turning circle of the largest vehicle. Pedestrian pathways adjacent to roads should be allowed in areas of high personnel concentration and traffic movement only. There should be adequate parking space for vehicles to load or unload, or to receive clearance to enter or leave the site.
- **Loading and Unloading System** - A loading or unloading facility shall have the canopy or roof that does not limit the dissipation of heat or dispersion of flammable vapors and also does not restrict firefighting access and control. Loading area should be fully paved, curbed and drained so that all spills from trucks and equipment would flow quickly to adequately sized and suitably located catch pits and drains. These catch pits and drains shall be connected with oily/water drains system
- **Building and Protective Boundaries** - The Installation/ depot shall be protected on all sides by concrete/ brick wall having a minimum height of 7 ft.
- **Diking Around Tanks** - The volumetric capacity of the diked area shall not be less than the greatest amount of liquid that can be released from the largest tank within the diked area assuming a full tank. To allow for volume occupied by tanks, the capacity of the diked area enclosing more than one tank shall be calculated after deducting the volume of the tanks, other than the largest tank, below the height of the dike. Each diked area containing two or more tanks shall be subdivided, preferably by drainage channels or at least by intermediate dikes, in order to prevent spills from endangering adjacent tanks within the diked area. The provision for draining water from diked areas shall be controlled to prevent flammable or combustible liquids from entering natural watercourses, public sewers, or public drains. Control of drainage through block valves shall be accessible under fire conditions from outside the dike.
- **Venting Requirements** - Atmospheric storage tanks shall be adequately vented to prevent the development of vacuum or pressure sufficient to distort the roof of a cone roof tank or exceeding the design pressure in the case of other atmospheric tanks, as a result of filling or emptying, and atmospheric temperature changes. Normal vents/ambient emergency vents shall be sized in accordance with API Standard 2000, Venting Atmospheric and low-pressure Storage Tanks. Tanks and pressure vessels storing Class IA liquids shall be equipped with venting devices that shall be normally closed except when venting to pressure or vacuum conditions. Tanks and pressure vessels storing Class IB Liquids and Class IC liquids shall be equipped with venting devices or with flame arrestors.
- **Prevention of overfilling of Tanks** - Tanks gauged at frequent intervals by personnel continuously on the premises during product receipt with two-way communication maintained with the supplier so that product in-flow in a tank can be promptly shut down or diverted.

- **Firefighting System** - The rates of application of firefighting agents given below shall be used in conjunction with equipment spacing mentioned in section 4.3 of NFPA 30, Flammable and Combustible Code. Tables 2A to 2F specifying spacing/ distances are attached as appendix A. Each fire main shall be provided with a suitable number of hydrants spaced at appropriate distances and sized to give adequate cover to the appropriate area or process unit. Hydrants shall be sited in accessible positions, usually adjacent to fire roads.

Enhancement in terminal capacity will be carried out following the OGRA standards.

3.3.9 Oil Transportation (Pipeline) Technical Standards, 2009

These regulations may be called Oil Transportation (Pipeline) Technical Standards, 2009 made by OGRA as per Section 42 of Oil and Gas Regulatory Authority Ordinance, 2002. These regulations shall be applicable to all such licensees undertaking the regulated activity for transportation of petroleum products through pipeline.

This standard covers the design, material, construction, assembly, inspection, testing, operation and maintenance of an oil pipeline system between producers lease facilities, tank farms, refineries, station, terminals (Marine, Rail and Truck) and other delivery and receiving points. The pipeline shall be considered to consist of the following:

- Pipe;
- Flanges;
- Bolting;
- Gaskets;
- Valves;
- Relief devices;
- Fitting;
- Pressure containing parts of the other piping systems;
- Block valve assembly; and
- Strainer.

Pipe route should be selected so as to minimize the possibility of hazard from future industrial or urban development, encroachment of the right of way or line routing and damage to environmental by sensitive or archeological and historical sites. Inconvenience to the land owner/resident should be minimized and safety of the public shall be given prime consideration. The land is to be restored to as nearly original condition as is practical. In constructing pipeline crossing of railroads, highway, streams, lakes, rivers, etc. safety precaution such as sign, light, guard rails, supporting structures etc. shall be maintained in the interest of public safety.

- A minimum clearance of 12 inch (0.3m) shall be provided between the outside of any buried pipe or component and the extremity of any other underground structures, except for drainage tile which shall have a minimum clearance of 2 inch (50 mm).
- Fire protection when provided shall be in accordance with recommendations in NFPA 30.
- Water used for hydrostatic testing should be displaced with splits, squeegees and/or other pigging devices. Water should be disposed-off at approved locations in a manner that will cause minimal environment effects.
- Each operating company shall maintain a pipeline patrol program to observe surface conditions on and adjacent to the pipeline right of way, indication of leaks, construction activity other than that performed by the company and any other factors affecting the safety and operation of the pipeline. All pipe containing leaks shall be removed or repaired.
- Formulating and placing in operation procedures for an area cooperative pipeline leak notification emergency action system between operating companies having piping system in the area; reduction of pipeline pressure by ceasing pumping operation on the piping system, opening the system to delivery

storage on either side of the leak site, and expeditious closing of block valves on both sides of the leak site.

3.3.10 Technical Standards for the Transportation of Petroleum Products

These regulations may be called the Technical Standards for the Petroleum Industry (Road Transport Vehicles, Containers and Equipment used for the Transportation of Petroleum Products). These regulations shall be applicable to all road transport vehicles, containers and equipment used for the transportation of petroleum products by the Oil Marketing Companies. These technical standards for road transport vehicles, containers and equipment used for the transportation of the petroleum products. Petroleum products include petrochemicals, aviation fuels, petroleum spirits, including petrol and motor gasoline, kerosene oil including paraffin and gas oil including distillation and diesel.

3.3.11 Pakistan Oil (Refining, Blending, Transportation, Storage and Marketing) Rules, 2016

These regulations are made by OGRA as per Section 41 of Oil and Gas Regulatory Authority Ordinance, 2002. Part IV and V of the rules are related to TPPL bulk oil storage project. These rules specify the requirement of obtaining NOC from concerned EPA in case of Pipeline and Storage terminal before applying for the license from OGRA. Therefore, this EIA study will be submitted to Sindh EPA for the acquisition of NOC.

3.4 Provincial/Local Legislations

3.4.1 Sindh Environmental Protection Act 2014

The Sindh Environmental Protection Act, 2014 (2014 Act) was passed by the Sindh Assembly on February 24, 2014. The 2014 Act is the basic legislative tool empowering the provincial government to frame regulations for the protection of the environment. The 2014 Act envisages protection, improvement, conservation & rehabilitation of environment of Sindh with the help of legal action against polluters and green awakening of communities. It equally lays emphasis for the preservation of the natural resources of Sindh and to adopt ways and means for restoring the balance in its eco-system by avoiding all types of environmental hazards. The 2014 Act is applicable to a broad range of issues and extends to air, water, industrial liquid effluent, marine, and noise pollution, as well as to the handling of hazardous wastes.

The following articles of the SEPA 2014 have a direct bearing on the proposed Project:

- **Article 11(1):** 'Subject to the provisions of this Act and the rules and regulations therein, no person shall discharge or emit or allow the discharge or emission of any effluent, waste, pollutant, noise or any other matter that may cause or likely cause pollution or adverse environmental effects, as defined in Section 2 of this Act, in an amount, concentration or level which is in excess to that specified in Sindh Environmental Quality Standards…'
- **Article 11(2):** 'All persons, in industrial or commercial or other operations, shall ensure compliance with the Environmental Quality Standards for ambient air, drinking water, noise or any other Standards established under section 6(1)(g)(i); shall maintain monitoring records for such compliances; shall make available these records to the authorized person for inspection; and shall report or communicate the record to the Agency as required under any directions issued, notified or required under any rules and regulations.'

- Section 11(3): Monitoring and analysis under sub-section (1) and (2), shall be acceptable only when carried out by the Environmental Laboratory certified by the Agency as prescribed in the rules.

  All stipulated tests will be regularly performed from designated laboratories approved by Sindh EPA.

- **Article 14 (1):** 'Subject to the provisions of this Act and the rules and regulations, no person shall cause any act, deed or any activity', including;

  a) disposal of solid and hazardous wastes at unauthorized places as prescribed;

  b) dumping of wastes or hazardous substances into coastal waters and inland water bodies; and

  c) release of emissions or discharges from industrial or commercial operations as prescribed.

- **Article 15 (1):** 'Subject to the provisions of this Act, no person shall operate or manufacture a motor vehicle or class of vehicles from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the Sindh Environmental Quality Standards or, where applicable, the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6'.

- **Article 17(1):** 'No proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment, and has obtained from the Agency approval in respect thereof'

- **Article 17(2):** The agency shall;

  a) review the initial environmental examination and accord its approval, subject to such terms and conditions as it may prescribe, or require submission of an environmental impact assessment by the proponent; or

  b) review the environmental impact assessment and accord its approval subject to such terms and conditions as it may deem fit to impose or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or decline approval of the environmental impact assessment as being contrary to environmental objectives.

- **Article 17(3):** 'Every review of an environment impact assessment shall be carried out with public participation and, subject to the provisions of this Act, after full disclosure of the particulars of the project'.

- **Article 17(4):** 'The Agency shall communicate its approval or otherwise within a period of two months from the date that the initial environmental examination is filed, and within a period of four months from the date that the environmental impact assessment is filed complete in all respects in accordance with the regulations, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations'.

- **Article 20(1):** 'The Agency shall from time to time require the person in charge of a project to furnish, within such period as may be specified, an environmental audit or environmental review report or environmental management plan containing a comprehensive appraisal of the environmental aspects of the project'.

- **Article 20(2):** The report of a project prepared under sub-section (1) shall include:

  a) analysis of the predicted qualitative and quantitative impact of the project as compared to the actual impact;
  b) evaluation of the efficacy of the preventive, mitigation and compensatory measures taken with respect to the project; and
  c) Recommendations for further minimizing or mitigating the adverse environmental impact of the project.

- **Article 20(3):** 'Based on its review of the environmental audit report, the Agency may, after giving the person in charge of the project an opportunity of being heard, direct that specified mitigation and compensatory measures be adopted within a specified time period and may also, where necessary, modify the approval granted by it under section 17'.

- **Section 31(1):** The Agency shall cause relevant details of any proposed project regarding which an Environmental Impact Assessment has been received to be published, along with an invitation to the public to furnish their comments thereon within a specified period. (2) In accordance with such procedure as may be prescribed, the Agency shall hold public hearings to receive additional comments and hear oral submissions. (3) All comments received under sub-sections (1) and (2) shall be duly considered by the Agency while reviewing the environmental impact assessment or strategic impact assessment, and decision or action taken thereon shall be communicated to the persons who have furnished the said comments.

  a) A number of rules and regulations have been promulgated under the SEPA 2014. These are:
  b) Environmental Samples Rules, 2014
  c) Pollution Charge for Industry (Calculation and Collection) Rules, 2014
  d) Provincial Sustainable Development Fund Board (Procedure) Rules, 2001
  e) The Sindh Environmental Quality Standard (Self-Monitoring and Reporting by Industry) Rule, 2014
  f) Sindh Environmental Protection Agency (Review of IEE and EIA), Regulations 2014
  g) Sindh Environmental Quality Standards (SEQS).

3.4.2 Relevant Organization

Administration on environment has been divided into federal and provincial government. International issues such as the environmental policy and regulation has been managed by Ministry of Climate Change. On the other hand, national environmental matter has been managed by provincial government. In Sindh province, Sind EPA has been responsible for the provincial matters. All of the environmental technical issues such as EIA, monitoring, enforcement of law/environmental quality standards are headed by Director General of Sindh EPA. The structure of Sindh EPA is shown in **Figure 3.1**.

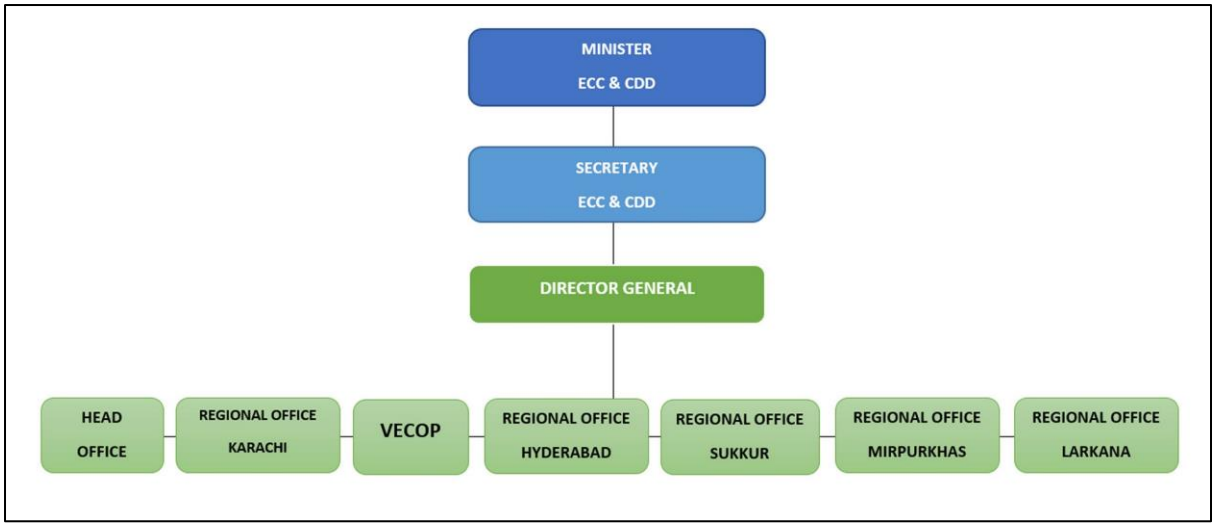

Figure 3.1: Structure of Sindh EPA (*Source: Sindh EPA)*

3.4.3 Environmental Protection Council (EPC)

It has been formed consisting of Chief Minister as Chairman with Minister in charge of Environment Protection Department, Addl. Chief Secretary, Planning & Development Department, Government of Sindh and Secretaries of Environment, Finance, Public Health Engineering, Irrigation, Health, Agriculture, Local Government, Industries, Livestock & Fisheries Forest & Wildlife, Energy, Education Departments Government of Sindh and Divisional Commissioners of Sindh. Non-official members are also included (i.e. representatives of Chamber of Commerce & Industry and from medical or legal professions etc.) along with DG, EPA & two Members of Provincial Assembly also form part of EPC.

The functions and powers of EPC include coordination & supervision of provisions of Act, approving provincial environmental & sustainable development policies & SEQS, provide guidance for protection & conservation, consider annual Sindh Environmental Report, deal with interprovincial and federal provincial issues, provide guidance for bio safety and assist Federal Government in implementation of various provisions of UN Convention on laws on Seas (UNCLOS).

3.4.4 Sindh Environmental Protection Agency (SEPA)

SEPA would be headed by Director General (DG) with the aim to exercise the powers and perform the functions assigned to it under the provisions of this Act and the rules and regulations made there under. The Agency shall have technical and legal staff and may form advisory committees.

The Agency shall administer and implement the provisions of this Act and rules and regulations. It shall also prepare environmental policies, take measures for implementation of environmental policies, prepare Sindh Environment Report and prepare or revise Sindh Environmental Quality Standards. SEPA shall also establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation research, inspection and audit to prevent and control pollution and to estimate the costs of cleaning up pollution and rehabilitating the environment and sustainable development. SEPA would also take measures for protection of environment such as to promote research; issues licenses for dealing with hazardous substances, certify laboratories, identify need for or initiate legislation, specify safeguards etc. SEPA would also encourage public awareness and education regarding environmental issues.

SEPA would have powers to enter or inspect under a search warrant issued by Environmental Protection Tribunal or a Court search at any time, any land or building etc. where there are reasonable grounds to believe that an offence under this Act has been or is being or likely to be committed. SEPA may also

take samples, arrange for testing or confiscate any article in discharge of their duties.

3.4.5 Sindh EPA (Review of IEE and EIA) Regulations 2014

Sindh Environmental Protection Agency (Review of IEE / EIA) Regulations, 2014 ("2014 Regulations") made in exercise of powers conferred under section 37 of the 2014 Act provide the necessary guidelines on the preparation, submission, & review of Initial Environmental Examinations (IEEs) and Environmental Impact Assessments (EIAs). The 2014 Regulations categorize projects in three categories provided in Schedule I, II and III of the 2014 Regulations.

Oil Storage Terminals falls in Category B.4 of the Schedule II (List of Projects requiring EIA) of the 2014 Regulations, which provides:

B. Oil and Gas Projects

1. Petroleum refineries.
2. LPG and LNG Projects including LNG Terminals, re-gasification units) except LPG filling stations
3. Oil and gas transmission systems
4. **Oil and gas gathering system, separation and storage.**

The submission and approval procedure for the EIA is summarized below:

- The EIA report shall be submitted, together with a review fee and form included as Schedule-V of the 2014 Regulations.
- The SEPA shall conduct a preliminary scrutiny and reply within 15 working days of the submittal of the report a) confirming completeness, or b) asking for additional information, if needed, or c) returning the report requiring additional studies, if necessary.
- The SEPA is required to make every effort to complete the EIA review process within four months of the issue of confirmation of completeness.
- SEPA shall call for a Public Hearing for the project to invite all the concerned persons to raise concerns on the project.
- Following the Public Hearing, SEPA shall constitute a Committee of Experts to assist the agency in review of the EIA.
- The approval granted at the end of the review process is valid for three years for start of construction.
- Once project construction has been completed, the proponent is required to submit a request to the SEPA for confirmation of compliance. An environmental management plan for the operation phase is to accompany the request.
- The SEPA is required to communicate its decision within four months of receipt of the request. The project can commence operation only after it has received approval from the SEPA.

The overall flow of obtaining the approval of EIA is shown in **Figure 3.2**.

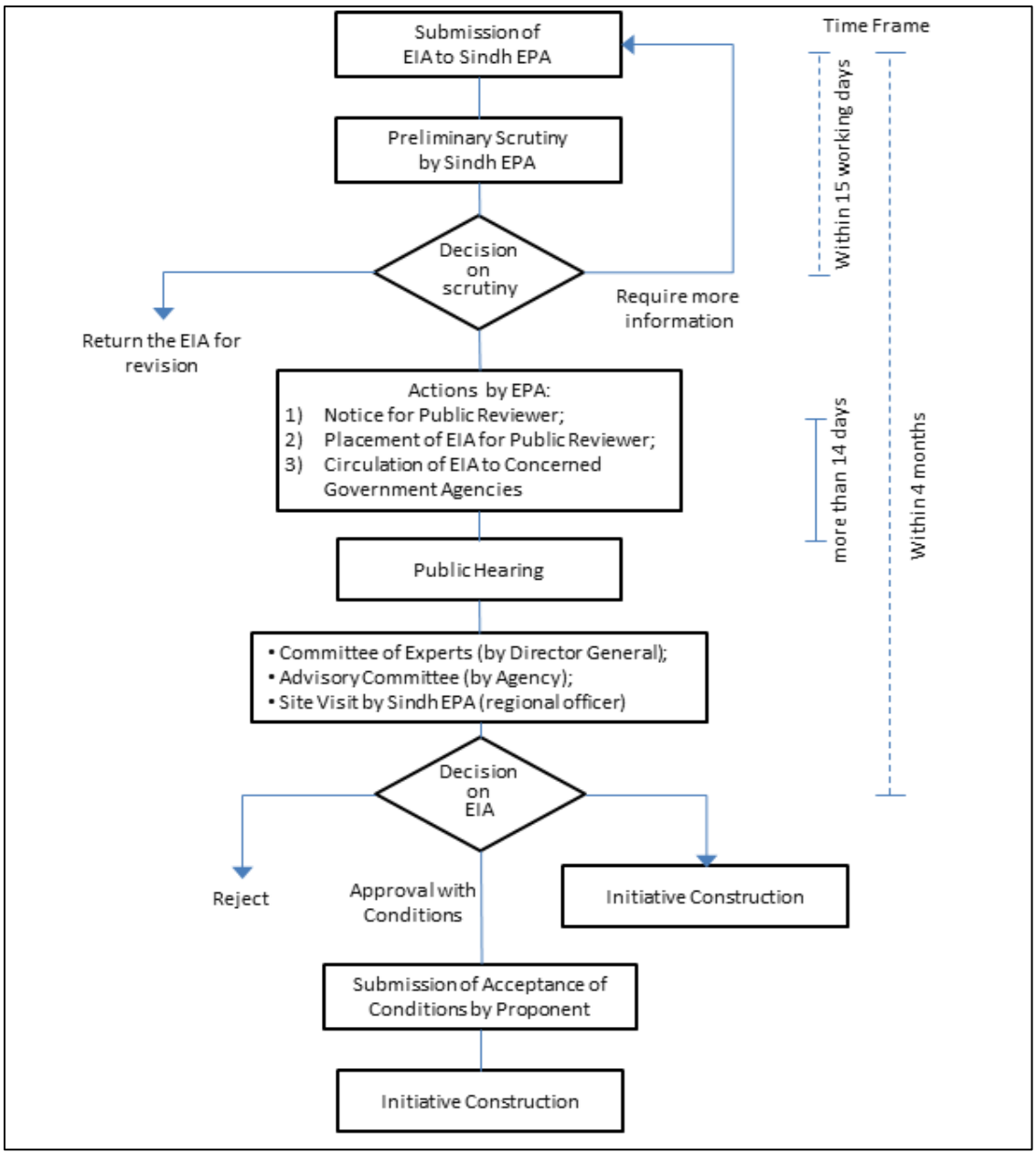

Figure 3.2: EIA Review and Approval Procedure (*Source: EIA Study Team)*

3.4.6 Sindh Environmental Quality Standards

On June 28, 2016, the Sindh Environmental Industrial Waste Water, Effluent, Domestic, Sewerage, Industrial Air Emission and Ambient Air, Noise for Vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards, 2015 have been notified by Sindh EPA.

Table 3.1- shows SEQS for ambient air.

Table 3.1: Sindh Environmental Quality Standard for Ambient Air

Pollutant	Time-weighted average	Concentration in Ambient Air	Method of Measurement
Sulfur Dioxide (SO_2)	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	
	Annual Average*	40 µg/m^3	Gas Phase Chemiluminescence

Oxides of Nitrogen as (NO_2)	24 hours**	80 µg/m^3	
Ozone (O_3)	1 hour	130 µg/m^3	Non dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	360 µg/m^3	High volume Sampling, (Average flow rate not less than 1.1m^3/minute)
	24 hours**	500 µg/m^3	
Respirable Particulate Matter (PM_{10})	Annual Average*	120 µg/m^3	B Ray absorption method
	24 hours**	150 µg/m^3	
Respirable Particulate Matter ($PM_{2.5}$)	Annual Average*	40 µg/m^3 ***	B Ray absorption method
	24 hours**	75 µg/m^3	
	1 hour	15 µg/m^3	
Lead (Pb)	Annual Average*	1 µg/m^3	ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	1.5 µg/m^3	
Carbon Monoxide (CO)	8hours**	5 mg/m^3	Non Dispersive Infra Red (NDIR) method
	1hours	10 mg/m^3	
*Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.			
**24 hourly / 8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days.			
*** or 9 µg/m^3 plus baseline, whichever is low			

Table 3.2 shows the standards for motor vehicle noise.

Table 3.2: The Motor Vehicle Ordinance (1965) and Roles (1969)		
Parameter	Standards (maximum permissible limit)	Measuring method
Noise	85dB(A)	Sound-meter at 7.5meter from the source

Table 3.3 shows the proposed national environmental quality standard for noise.

Table 3.3: Sindh Environmental Quality Standard for Noise			
S. No.	**Category of Area / Zone**	**Effective from 1st January, 2015**	
		Limit it in dB(A) Leq*	
		Day Time	**Night Time**
1	Residential area (A)	55	45
2	Commercial area (B)	65	55
3	Industrial area (C)	75	65
4	Silence Zone (D)	50	45
Note: 1	Day time hours: 6.00 a. m to 10.00 p. m		
2	Night time hours: 10.00 p. m to 6.00p. m		
3	Silence zone; Zone which are declared as such by competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.		
4	Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.		
*dB(A)Leq	Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.		

The SEQS for effluents are shown in Table 3.4.

Table 3.4: Sindh Environmental Quality Standard for Municipal & Industrial Effluents					
S. #	**Parameter**	**Into Inland Waters**	**Into Sewage Treatment**	**Into Sea**	**unit**
1	Temperature or Temp. increase	<3	<3	<3	^oC
2	pH value (H^+)	6-9	6-9	6-9	-
3	Biological Oxygen Demand $(BOD)_5$ at 20°C	80	250	80	mg/l
4	Chemical Oxygen Demand (COD)	150	400	400	mg/l
5	Total Suspended Solids (TSS)	200	400	200	mg/l
6	Total Dissolved Solids (TDS)	3500	3500	3500	mg/l
7	Oil and Grease	10	10	10	mg/l
8	Phenolic Compounds (as Phenol)	0.1	0.3	0.3	mg/l
9	Chloride (as Cl^-)	1000	1000	SC	mg/l
10	Fluoride (as F^-)	10	10	10	mg/l
11	Cyanide (as CN^-)total	1.0	1.0	1.0	mg/l
12	An-ionic detergents (as MBAS)	20	20	20	mg/l
13	Sulphate(SO_4^{2-})	600	1000	SC	mg/l
14	Sulphide (S^{2-})	1.0	1.0	1.0	mg/l
15	Ammonia (NH_3)	40	40	40	mg/l
16	Pesticides	0.15	0.15	0.15	mg/l
17	Cadmium	0.1	0.1	0.1	mg/l
18	Chromium (trivalent and hexavalent)	1.0	1.0	1.0	mg/l
19	Copper	1.0	1.0	1.0	mg/l
20	Lead	0.5	0.5	0.5	mg/l
21	Mercury	0.01	0.01	0.01	mg/l
22	Selenium	0.5	0.5	0.5	mg/l
23	Nickel	1.0	1.0	1.0	mg/l
24	Silver	1.0	1.0	1.0	mg/l
25	Total toxic metals	2.0	2.0	2.0	mg/l
26	Zinc	5.0	5.0	5.0	mg/l
27	Arsenic	1.0	1.0	1.0	mg/l
28	Barium	1.5	1.5	1.5	mg/l
29	Iron	8.0	8.0	8.0	mg/l
30	Manganese	1.5	1.5	1.5	mg/l
31	Boron	6.0	6.0	6.0	mg/l
32	Chlorine	1.0	1.0	1.0	mg/l

The SEQS for drinking water are shown in table 3.5

Table 3.5: Sindh Environmental Quality Standards for Drinking Waters (mg/l)					
S.#	**Properties /Parameters**	**Standard Values for Pakistan**	**S.#**	**Properties / Parameters**	**Standard Values for Pakistan**
Bacterial			**Chemical**		
			Essential Inorganics (mg/liter)		
1	All water intended for drinking (E.Coli or Thermo tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	**1**	Aluminum (Al)	≤ 0.2
			2	Antimony (Sb)	≤ 0.005
2	Treated water entering the distribution system (Ecoli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	**3**	Arsenic (As)	≤ 0.05
			4	Barium (Ba)	0.7
			5	Boron (B)	0.3

3	Treated water in the distribution system (E.coli or thermo tolerant coliform and total coliform bacteria)	Must not be Detectable in any 100 ml sample. In case of large supplies, where sufficient samples are examined, must not be resent in 95% of the samples taken throughout any 12 month period.	**6**	Cadmium (Cd)	0.01
			7	Chloride (Cl-)	< 250
			8	Chromium (Cr)	≤ 0.05
			9	Copper (Cu)	2
			Organic (mg/L)		
			10	Phenolic compounds	<0.0002
			Toxic Inorganics (mg/liter)		
			11	Cyanide (CN)-	≤ 0.05
			12	Fluoride (F)	≤ 1.5
			13	Lead (Pb)	≤ 0.05
			14	Manganese (Mn)	≤ 0.5
Physical			**15**	Mercury (Hg)	≤ 0.001
4	Color	< 15 TCU	**16**	Nickel (Ni)	≤ 0.02
5	Taste	Non objectionable/ Acceptable	**17**	Nitrate (NO_3)-	≤ 50
6	Odor	Non objectionable/ Acceptable	**18**	Nitrite (NO_2)-	≤ 3
7	Turbidity	< 5 NTU	**19**	Selenium (Se)	≤ 0.01
8	Total Hardness as $CaCO_3$	< 500 mg/l	**20**	Residual Chlorine	0.2-0.5 At consumer end 0.5-1.5 at source
9	TDS	<1000			
10	pH	6.5-8.5			
Radioactive			**21**	Zinc (Zn)	5.0
11	Alpha Emitters bq/L	0.1			
12	Beta emitters	1			

3.4.7 Sindh Cultural Heritage (Preservation) Act, 1994

The Sindh Cultural Heritage (Preservation) Act, 1994 is the provincial law for the protection of cultural heritage. Its objectives are similar to those of the Antiquity Act, 1975.

None of the sites protected under this law has been identified in the vicinity/microenvironment of the project site. The project will therefore not influence the integrity of cultural heritage in the macro-environment.

3.4.8 Sindh Solid Waste Management Board Act, 2014

The SSWMB Act, 2014 enacted to establish a board for collection and disposal of all solid waste, to arrange effective delivery of sanitation services, to provide pollution free environment and to deal with other relevant matters. The Board established under the Act headed by the Chief Minister or his nominee and constitutes of thirteen other ex officio members of other relevant departments.

The Act was promulgated to establish a board for collection and disposal of all solid waste, to arrange effective delivery of sanitation services, to provide pollution free environment and to deal with other relevant matters. SSWMB will provide necessary infrastructure for disposal of waste.

3.4.9 Hazardous Substance Rule, 2014

These Rules were notified to streamline procedures for issuance of licenses to industries / businesses that generate hazardous waste, safety precautions for workers and devices them methods for the removal of hazardous wastes in an environmental friendly manner. The rules also specify procedures to be

adopted for import, transport and disposal of hazardous waste; and identify two hundred and forty-three hazardous substances and synthetic chemicals.

The rules also specify the requirement of obtaining license from Sindh EPA for the import, transport, storage and disposal of hazardous substances as specified in the rules.

3.4.10 Sindh Wildlife Protection Ordinance, 1972 (SWPO)

This ordinance provides for the preservation, protection and conservation of wildlife by the formation and management of protected areas and prohibition of hunting of wildlife species declared protected under the ordinance.

The ordinance also specifies three broad classifications of the protected areas; national parks, wildlife sanctuaries and game reserves. Activities such as hunting and breaking of land for mining are prohibited in national parks, as are removing vegetation or polluting water flowing through the park. Wildlife sanctuaries are areas that have been set aside as undisturbed breeding grounds and cultivation and grazing is prohibited in the demarked areas. Nobody is allowed to reside in a wildlife sanctuary and entrance for the general public is by special dispensation. However, these restrictions may be relaxed for scientific purpose or betterment of the respective area on the discretion of the governing authority in exceptional circumstances. Game reserves are designated as areas where hunting and shooting is not allowed except under special permits.

The project site does not fall in any protected area.

3.5 IFC's EHS Guidelines for Crude Oil & Petroleum Product Terminals

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors. For complex projects, use of multiple industry-sector guidelines may be necessary.

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account. The applicability of specific technical recommendations should be based on the professional opinion of qualified and experienced persons. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific

environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

The EHS Guidelines for Crude Oil and Petroleum Product Terminals include information relevant to land and shore-based petroleum storage terminals receiving and dispatching bulk shipments of crude oil, gasoline, middle distillates, aviation gas, lube oil, residual fuel oil, compressed natural gas (CNG), liquid petroleum gas (LPG), and specialty products from pipelines, tankers, railcars, and trucks for subsequent commercial distribution.

Chapter 4 DESCRIPTION OF ENVIRONMENT

4.1 General

In order to carry out environmental assessment study, it is first necessary to demarcate the existing environmental feature in and around the proposed project, on the existing environment. This section therefore describes the environmental and socioeconomic conditions of the project area covering information on physical, biological and socio-economic aspects of the macro-environment as well as the microenvironment of proposed "Enhancement of Storage Capacity of TPPL Shikarpur Terminal Project" site. Information for this section was collected from a variety of sources, including published literature, reports of other studies conducted in the area by the EMC and archives of the experts, consultations with institutions, and field surveys conducted for this study by the team of EMC. The physical environment of project has been described in this study with respect to the airshed, watershed, geology, soil characteristics and seismicity. Baseline data on the airshed describe the climatic conditions and quality of air in the microenvironment and macro environment and characterize the airshed in terms of level of pollution, viz. unpolluted, polluted or grossly polluted. Similarly, baseline data on watershed describe the hydrology and quality of surface and groundwater as well as water availability. Data on Geology, geomorphology, soil characteristics and seismicity are needed to evaluate the terrestrial resources with respect to quality of minerals and soil characteristics particularly stability.

4.2 Project Setting

Shikarpur Terminal of TPPL is located at Plot no. 223 & 224, Deh Ali Murad Village, Kandhkot road (opposite PARCO terminal) in District Shikarpur, Sindh. Project site coordinates are 28°02'05.5"N and 68°50'16.2"E. The project site is located at Indus Highway (N55), approx. 23km from Shikarpur city and 12km from Khanpur town.

Figure 4.1: Location of TPPL Shikarpur Terminal

4.3 Microenvironment and Macro environment of the Project Area

The microenvironment of the project area comprises the project site and its immediate surroundings which includes several other oil terminals such as Parco Pakistan Limited Terminal, Hascol Terminal, Bakri Pakistan Oil Depot, Taj Gasoline (Pvt.) Ltd, Shell Shikparpur Terminal, PSO Oil Depot and Al-Noor Petroleum Oil Terminal. Microenvironment also comprises of farmlands.

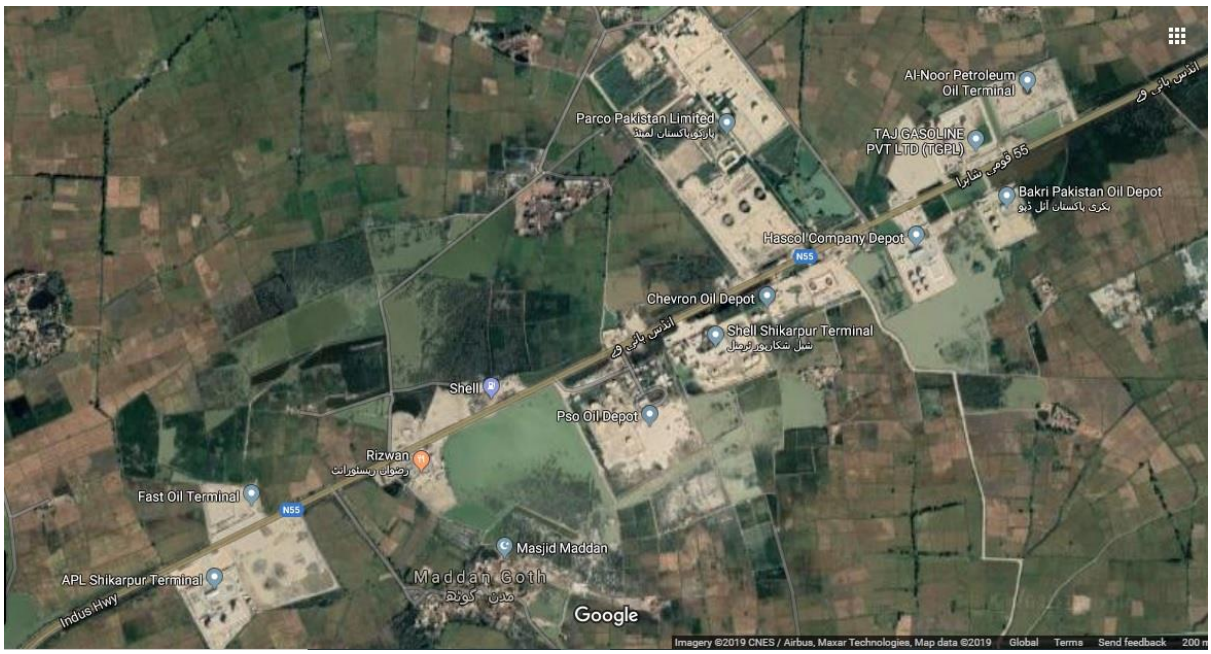

Figure 4.2: Location of oil terminals in the microenvironment of Project

Photographs of Project Surroundings	
	
Water-logged area near village Haji Khan Kalhoro south of project site	Access road towards village Haji Khan Kalhoro

	
Water-logged area near Brohi Village south of project site	Water-logged area used as sewage water disposal for village Haji Khan Kalhoro
	
Sewage disposal in a water-logged area	Irrigation channel southwest of terminal area
	
Water-logged land south of terminal area near Brohi Village	Farm fields south of terminal area

4.4 Macroenvironment

Macroenvironment of the project is the Khanpur taluka in District Shikarpur. Khanpur taluka borders Shikarpur taluka in west and Lakhi in southwest, district Jacobabad in north and northeast, district Kashmore in east and district Sukkur in south. Major road in Khanpur is Indus Highway (N55) and the taluka mainly comprises of farmlands.

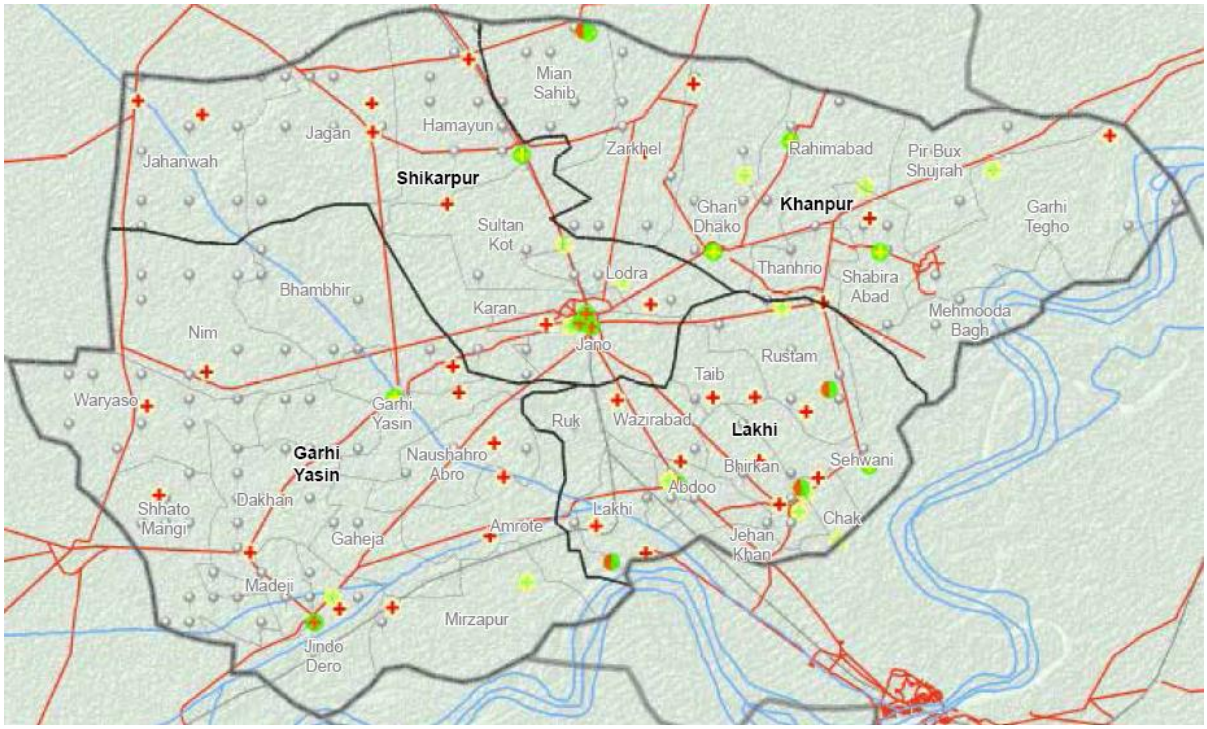

Figure 4.3: Map of Shikarpur District and its talukas

4.5 Physical Environment

4.6 Geological settings

The geology of Sindh is divisible in three main regions, the mountain ranges of Kirthar, Pab containing a chain of minor hills in the west and in east it is covered by the Thar Desert and part of Indian Platform where the main exposure is of Karoonjhar Mountains, which is famous for Nagarparkar Granite. In the north Sindh is enquired by rocks of Laki range extending to Suleiman range and its southern most part is encircled by the Arabian Sea. The rocks exposed in this area belong to upper Cretaceous which is recent in age. The sub-surface rocks are about 20,000 feet thick and belong to Cretaceous and Pre-Cretaceous periods. Mostly the rocks are of sedimentary origin of clastic and non-clastic nature and belong to marine, partly marine and fluviatile depositional environments.

Basin wise Sindh lies in the lower Indus Basin and its main tectonic features are the platform and fore deep areas. Thick sequences of Pab sandstone of Upper Cretaceous, Ranikot Group (Khadro, Bara, Lakhra) of Paleocene, Laki, Tiyon, and Kirthar of Eocene age, Nari Formation of Oligocene, Gaj Formation of Lower to Middle Miocene, Manchar of Upper Miocene to Pliocene, Dada Conglomerate of Pleistocene are present in various areas of Sindh. Limestone and sandstones are the most dominant sedimentary rocks in the area.

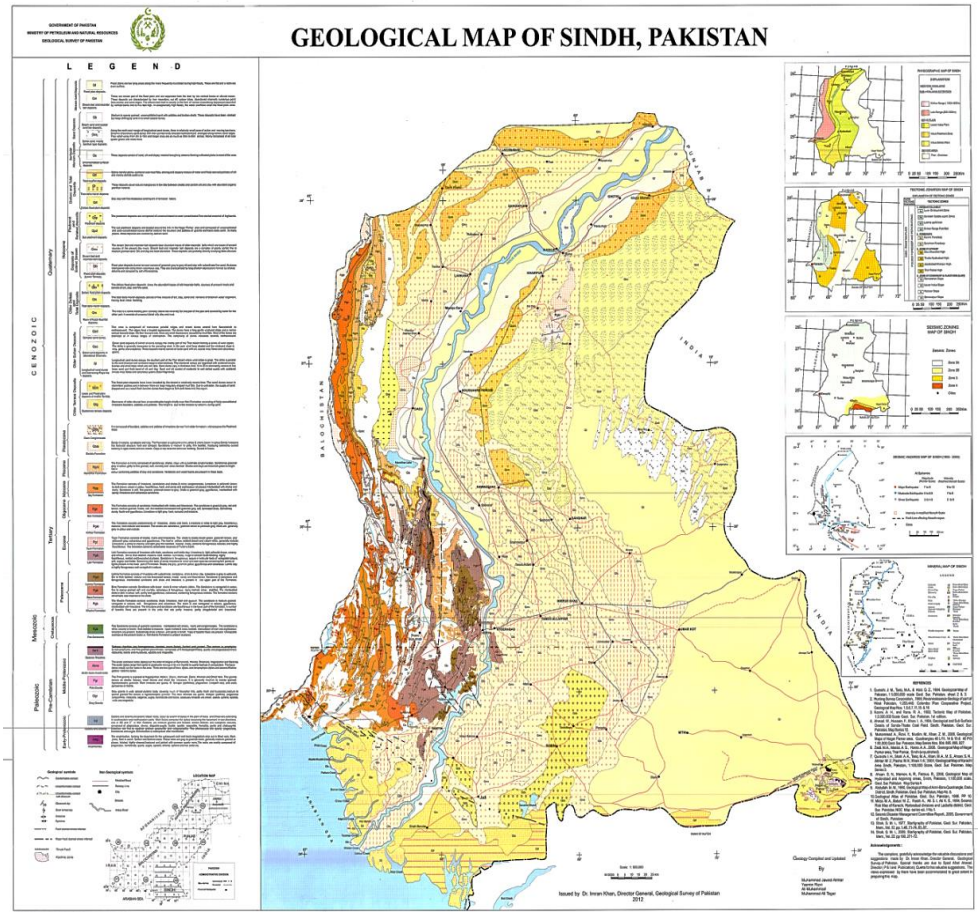

Figure 4.4: Geological map of Sindh[5]

4.7 Topography and Soil Features

Shikarpur district is a plain formed by the river Indus. There are no mountains or hills formations in Shikarpur district. The land gently slopes from north-west to south east. The general elevation of the land surface varies from about 50 to 100 meters above sea level. The topography of the area is depicted below;

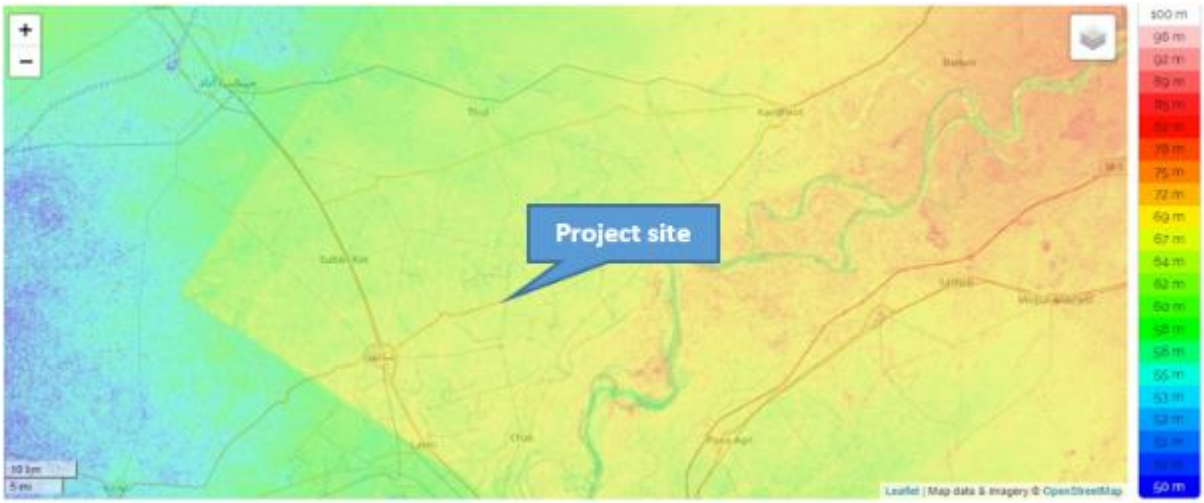

Figure 4.5: Topography of taluka Khanpur, District Shikarpur and adjoining areas[6]

[5] Geological survey of Pakistan (GSP).
[6] https://en-in.topographic-map.com/maps/gcep/Sindh/

Soils of the area are extremely rich in calcium and magnesium because of calcareous parent material but are deficient in nitrogen due to rapid decomposition of the organic matter under arid climate conditions. The natural surface of the soil show intersecting cracks and theses further develop on artificial irrigation and drying. The infiltration rate in the initial stage of wetting is very high, but thereafter it decreases considerably due to swelling nature of the clays. The soils are also rich in minerals and nutrients required for the plant growth. They have only minor problems of workability and seedbed preparation[7].

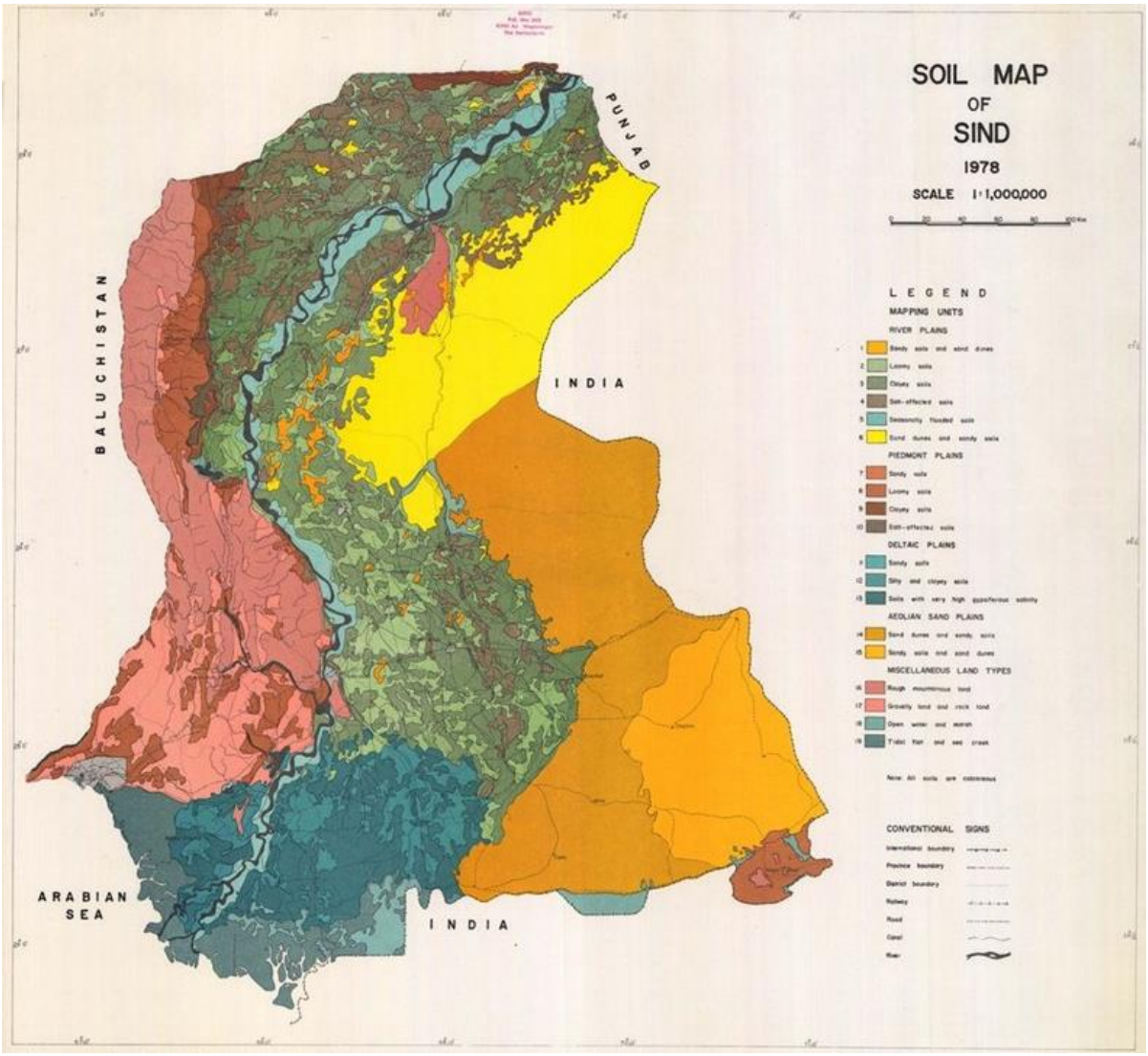

Figure 4.6: Soil map of Sindh[8]

[7] IEE of Proposed Multitranche Financing Facility II (MFF II) Second Power Transmission Enhancement Investment Program (Tranche 2) by NTDC submitted to ADB. July 2017. https://www.adb.org/sites/default/files/project-documents/48078/48078-004-iee-en_5.pdf

[8] Direction of Dt. M. Bashir Choudhri. Director General. Soil Survey of Pakistan. https://citypulse.com.pk/pakistangis/soil-map-of-sindh/

4.7.1 Land use

Land use of Shikarpur District is dominated with irrigated agriculture. River Indus flows along southeastern and southern boundary of the district.

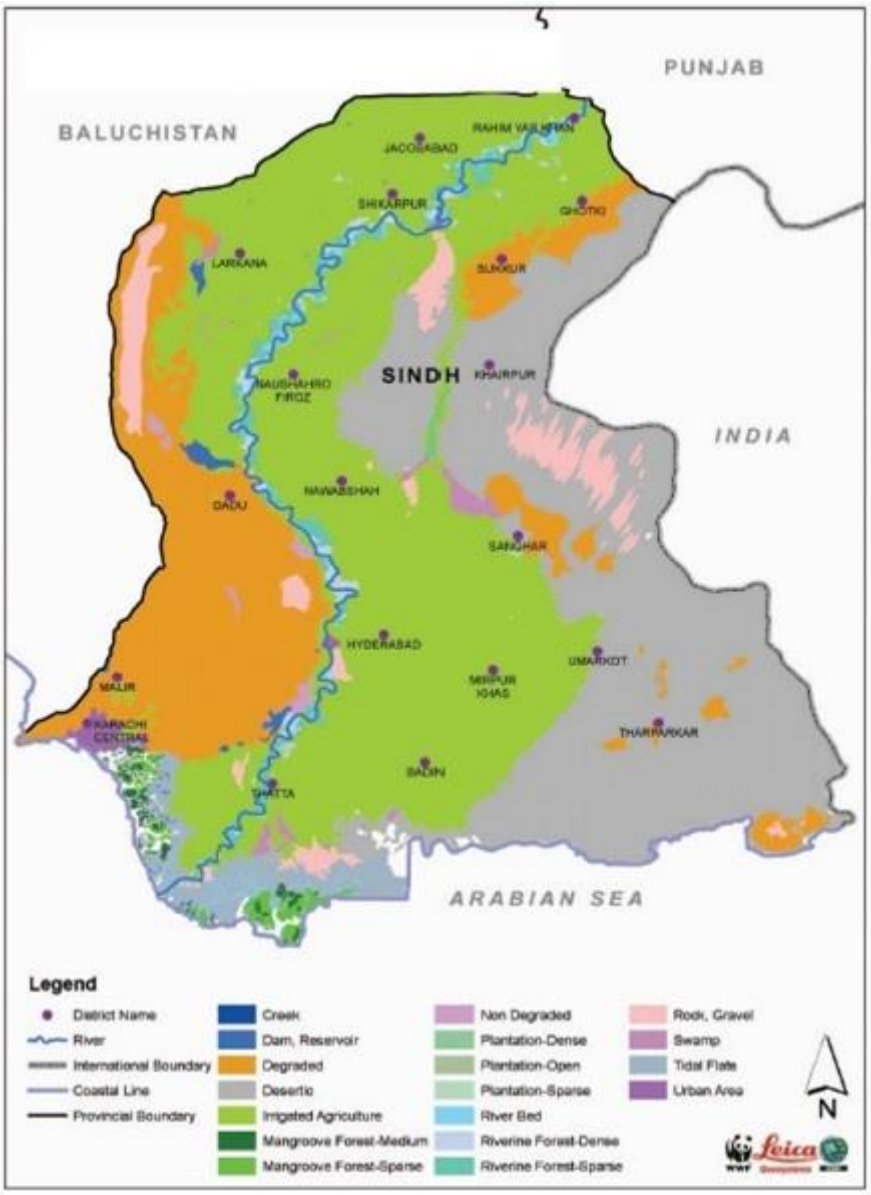

Figure 4.7: Vegetation map of Sindh

4.7.2 Seismicity

According to Seismic Map of Pakistan, District Shikarpur falls in Zone 2A based on Peak Ground Acceleration Values (PGA). This translates into PGA of 0.8 – 1.6 m/sec^2.[9]

The figure also indicates the occurrence of earthquakes in Sindh have been of the magnitude range 2.9 to 5.0 and 5.1 – 6.0 with higher magnitudes mostly occurring in the regions closer to Balochistan and in South close to Arabian Sea.

[9] https://www.researchgate.net/figure/Seismic-zoning-map-of-Pakistan-according-to-Building-Code-of-Pakistan-BCP-2007_fig2_274272010

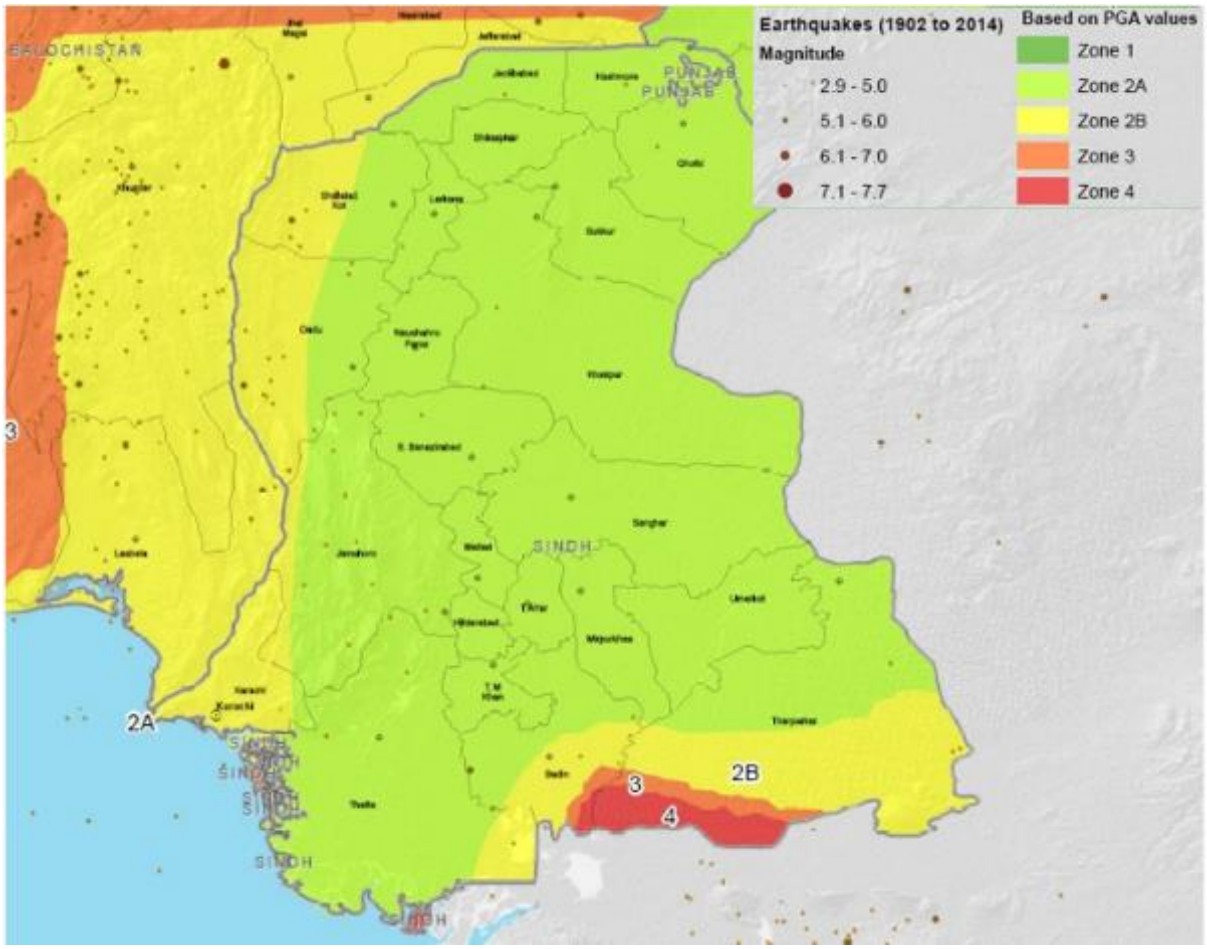

Figure 4.8: Seismic Zones of Pakistan[10]

4.7.3 Floods

Riverine and flash floods are reported in 2003, 2005, 2010 and 2011. According to Board of Revenue Sindh 2010, the relative severity of floods in Shikarpur is given a rank 2 which means low floods. River Indus after receiving water from 5 rivers system causes floods in the northern and southern parts of the Sindh province. The upper regions of the Sindh Province constitute the districts of Kashmore, Shikarpur, Jacobabad, Larkana and Kamber Shahdadkot on the right bank of River Indus and Ghotki, Sukkur, Khairpur, Naushahro Feroze and Shaheed Benazirabad on the left bank of River Indus. These districts on the right and left of River Indus pose a severe threat owing to passing of River Indus. Heavy rains are also a major cause flooding in the district.

Vulnerable points of Shikarpur to the floods are Hamayoon Jaggan, Sultan Kot, Jahanwah, Lodra, Karan, Jano, Khanpur except town, Garhi Dakho, Rahim Abad, Mian Sahib, Zarkhail, Thanhrio, Shabirabad, Garhi Tegho, Pir Bux Shujra, Mahmood-A-Bag, Taib, Wazirabad, Rustam, Sehwani, Chak, Bhirkan, Mungrani, Bhanbhihar, Nim Sharif, Jindo Dero, Mirzapur, Amrote Sharifam.

Along with the aforementioned disasters epidemics, casualties from accidents and environmental degradation occur on yearly basis. In 2010, District Shikarpur was severely hit by floods and a population of 778,000 persons was affected.

[10] Map data sources: Alhasan Systems Pvt Ltd, PMD, GSP, Pakistan Engineering Council.

History of disaster in the district, including floods and rains are shown in table below;

Table 4.1: Hazard history of District Shikarpur including Floods[11]				
Hazard	**Frequency**	**Area affected**	**Severity/Force**	**Year**
Floods	Monsoon	Entire district	High	2003, '05, '10, '11, '12
Heavy rains	Seasonal/monsoon	Entire district	High	2011, 2010, 2003
Earthquake	-	Entire district	Low	2001
Epidemics	Seasonal	Entire district	Low	Every year
Env degradation	Through out	Entire district	Low	Every year

In September 2012, there were 102 villages out of total 259 under flood water due to heavy monsoon rains. During 2011 floods, 14 villages were directly inundated besides the affected union councils. Out of 259 villages 136 villages were inundated by floods 2010 declared affected union councils. 79 out of 259 villages were under water in floods 2010. 145 villages of 259 villages were within the range of 10 kilometers from rivers.

Flood Risk Analysis Map of District Shikarpur, based on floods of 2012, 2011 and 2010 and possible safe locations in the district are depicted below;

[11] Pakistan Emergency Situation Analysis (PESA) – A Profile of District Shikarpur (September 2012).

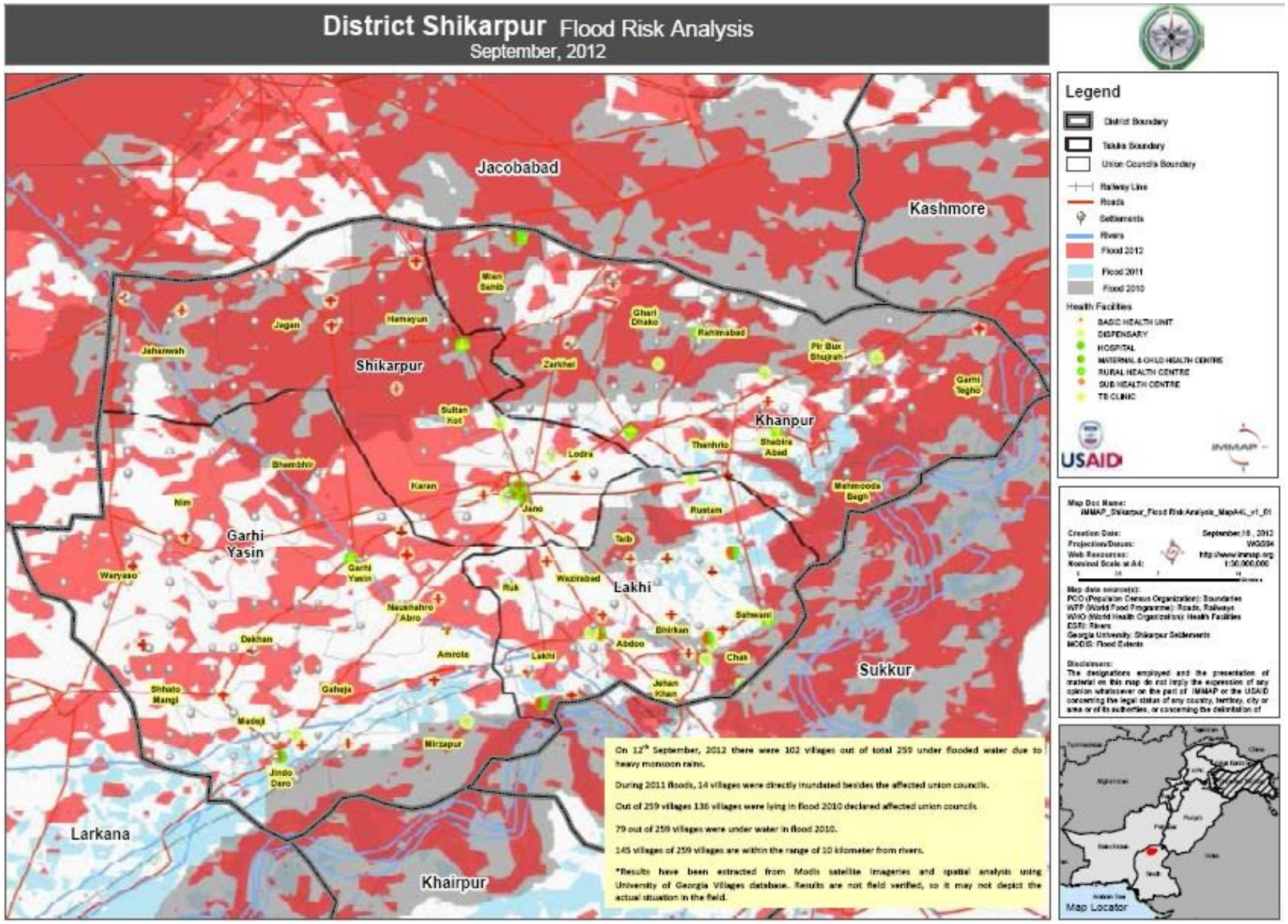

Figure 4.9: Flood Risk Analysis Map of District Shikarpur

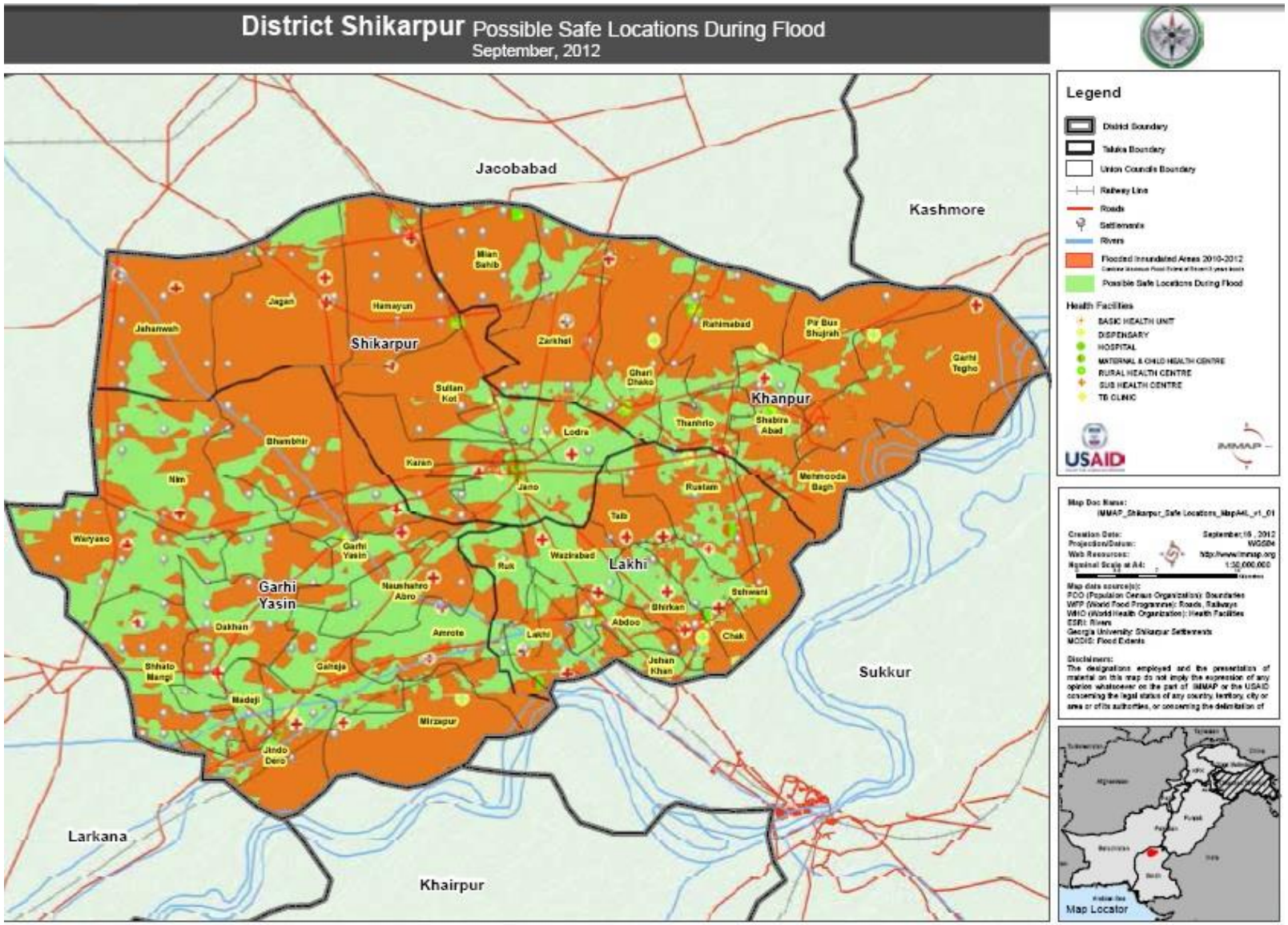

Figure 4.10: Possible safe locations in District Shikarpur

In 2010 floods, all 1,359 villages were affected and in total 401,831 acre of land were inundated. 110,189 acres of crop area were inundated. A population of 778,000 persons was affected and there were 13 casualties and 77 injuries. 838 cattle head perished. Total 117,879 houses were affected out of which 94,303 were kacha houses and 23,756 were pakka houses. In the year 2011 floods have affected Shikarpur district to a lesser extent and as compared to 2010 only 4 UCs were affected. Total 3 casualties and 4 injuries were reported during floods 2011. Population of about 75 people was affected and 30 houses were destroyed. 28 cattle head perished and 20,218 acres of crop area were damaged.

Table 4.2: Summary of Losses and Damages during Floods[12]

Attribute	Figure 2011	Figure 2010	Source
Total Households 2010	202,580		Estimated
Affected Households	12	67,850	
Total UCs	-	47	PDMA
UC Affected	4	31	NDMA/OCHA
Total Revenue Villages	240		DCR 1998
Villages Affected	7	1,359	NDMA
Total Houses Affected	30	117,879	NDMA
Partially Damaged	0	n/a	
Destroyed	30	n/a	
Kacha	n/a	94,303	UNOCHA
Pakka	n/a	23,756	
Total Population	1,182,407		Estimated
Affected Population	75	400,317	UNOCHA
Death	3	13	NDMA
Injuries	4	77	
Total Area (acre)	620,728.72	-	Calculated
Total Affected Area (acre)	2,500	280,563	NDMA/OCHA
Crop Area Affected	20,218	110,189	

Table 4.3: Summary of Losses and Damages by Taluka for 2010

Taluka	Total Population	Affected Population	Total Area (km2)	Affected Area (km2)	Total UCs	Affected UCs
Lakhi	202,312	87,243	679	486	11	8
Garhi Ya Sin	312,747	70,954	581	348	11	6
Khanpur	303,015	87,243	387	114	10	11
Shikarpur	364,333	154,877	941	187	15	7
Total	1,182,407	400,317	2,589	1,135	47	32

Table 4.4: Crop Area Affected in District Shikarpur (000 acres)

Crop type	Floods 2010		Floods 2011	
	Baseline	**Damage**	**Baseline**	**Damage**
	Standing crop	**Standing crop**	**Standing crop**	**Standing crop**
Cotton	N/A	N/A	82	12 (8% crop damage)

[12] Pakistan Emergency Situation Analysis (PESA) – A Profile of District Shikarpur (September 2012).

Rice	110	109.7 (100% crop damage)	102,000	8,160 (8% crop damage)
Sugarcane	16.6	13.3 (80% crop damage)	29	0
Fodder	5.5	4.4 (80% crop damage)	N/A	N/A
Total	N/A	110,189	252,356	20,218 (8% crop damage)

4.7.4 Climate

The Shikarpur lies at about 69m above sea level. Shikarpur's climate is a classified as desert with very little rainfall. This climate is considered to be BWh according to the Köppen-Geiger climate classification. The average annual temperature is 27.1 °C in Shikarpur. Precipitation here averages 124 mm.

Weather data is available from Jacobabad, the nearest weather station of PMD from Shikarpur District.

4.7.4.1 Temperature

Mean monthly maximum and temperatures are available from the nearest PMD weather station in Jacobabad. Table below shows highest mean monthly maximum temperatures in May and June. Lowest mean monthly maximum temperatures are recorded in January. Highest mean monthly minimum temperatures are recorded for May and July and lowest are recorded for January. In last 5 years, 2016 was hottest year with 35.0°C annual average maximum temperature and 20.9°C annual average minimum temperature.

Table 4.5: Mean Monthly Maximum Temperature in Jacobabad (°C)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2014	22.6	25.2	29.7	37.9	41.9	45.4	41.1	38.0	36.9	34.9	30.1	23.8	34.0
2015	21.0	25.7	29.2	39.3	44.1	42.5	38.4	36.7	36.0	32.6	28.4	23.8	33.1
2016	22.0	26.7	30.8	39.0	45.6	44.9	40.7	38.4	37.0	36.5	31.3	26.9	35.0
2017	20.2	26.8	33.5	42.4	45.3	43.6	40.4	38.5	37.4	36.4	28.6	23.8	34.7
2018	23.5	26.8	34.7	41.1	44.3	45.6	28.6	38.7	36.9	35.1	29.8	23.8	34.1

Source: Pakistan Meteorological Department

Table 4.6: Mean Monthly Minimum Temperature in Jacobabad (°C)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2014	6.5	9.7	14.8	21.5	25.9	28.8	29.1	26.9	25.4	20.0	12.9	7.4	19.1
2015	6.5	11.7	14.9	23.2	28.1	29.1	27.4	27.0	24.4	20.4	13.6	7.5	19.5
2016	8.7	9.8	16.6	22.9	29.0	30.9	29.6	29.1	26.9	21.0	15.1	11.6	20.9
2017	8.4	11.7	17.3	23.3	27.9	29.1	29.5	28.8	26.0	20.9	14.2	8.0	20.4
2018	8.0	12.3	17.9	23.1	27.7	29.1	31.3	27.2	25.6	20.0	14.9	9.2	21.4

Source: Pakistan Meteorological Department

4.7.4.2 Precipitation

Monthly precipitation data is available from PMD weather station in Jacobabad. During last 5 years, the driest month is October while the wettest month has been July. The year 2015 saw the annual rainfall of about 155mm.

Table 4.7: Monthly Amount of Precipitation (mm) in Jacobabad

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2014	Trace	3.0	8.1	2.0	1.0	3.2	0.0	4.0	0.0	0.0	0.0	0.0	21.3
2015	0.0	1.0	53.0	35.0	1.5	13.0	52.0	0.0	0.0	0.0	Trace	0.0	155.5
2016	0.0	0.0	10.0	4.0	3.0	0.0	7.0	3.4	18.6	0.0	0.0	0.0	46.0
2017	24.0	5.0	Trace	0.0	13.0	6.0	15.0	0.0	Trace	0.0	6.0	10.0	79.0
2018	0.0	6.0	8.0	1.2	Trace	5.0	0.0	0.0	0.0	0.0	0.0	0.0	20.2

Source: Pakistan Meteorological Department

4.7.4.3 Humidity

The data for relative humidity is available for Jacobabad and is shown in table below. High humidity is measured for August while lowest is in May. In last 5 years, highest mean annual relative humidity was 46.8% in 2015 while lowest was 40.3% in 2018.

Table 4.8: Mean Monthly Relative Humidity (Mean) at 1200 UTC in Jacobabad (%)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2014	40.0	44.0	46.0	34.0	30.0	27.0	45.0	54.0	57.0	49.0	41.0	45.0	42.7
2015	54.0	48.0	44.0	28.0	24.0	35.0	55.0	60.0	57.0	65.0	52.0	39.0	46.8
2016	52.0	31.0	44.0	25.0	23.0	28.0	49.0	54.0	57.0	45.0	37.0	48.0	41.1
2017	64.0	39.0	33.0	26.0	27.0	33.0	49.0	54.0	54.0	45.0	51.0	42.0	43.1
2018	43.0	41.0	35.0	26.0	19.0	35.0	44.0	53.0	56.0	40.0	43.0	49.0	40.3

Source: Pakistan Meteorological Department

4.7.4.4 Wind Speed and Direction

Wind speed and direction for Jacobabad have been given in tables below.

Table 4.9: Mean Monthly Wind Speed at 1200 UTC in Jacobabad (Knots)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2014	1.2	1.5	1.9	2.3	3.0	2.3	2.9	2.4	2.2	1.2	0.2	0.3	1.8
2015	0.8	1.1	1.6	0.9	2.1	2.7	1.4	2.3	1.2	0.3	0.1	0.4	1.2
2016	0.3	0.3	0.9	1.7	2.0	2.3	1.9	2.0	1.1	0.0	0.1	0.4	1.1
2017	0.1	0.6	0.6	1.3	0.8	1.5	2.4	2.3	0.3	0.0	0.1	0.1	0.8
2018	0.6	0.7	0.2	0.5	1.3	1.0	1.7	1.5	0.4	0.3	0.0	0.1	0.7

Source: Pakistan Meteorological Department

Table 4.10: Mean Monthly Wind Direction at 1200 UTC in Jacobabad

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2014	N34E	N22E	S81E	S11E	S65E	S43E	N72E	N86E	N72E	N59E	N22E	N55E
2015	N84E	S79E	N67E	N74E	N48E	N87E	N76E	N56E	N82E	N45E	N45W	N71W
2016	N27E	N34E	N32E	N56E	N18E	S72E	N56E	N63E	N67E	Calm	N45W	N72W
2017	N	N3W	N45E	N27E	N59E	N87E	N73E	N78E	E	Calm	N	N45W
2018	N13E	N50E	N71E	N45E	N56E	S48E	N43E	N47E	N45E	N45E	Calm	N45E

Source: Pakistan Meteorological Department

4.7.4.5 Recent Changes in Monsoon Pattern

Monsoon history of recent and distant past suggests that excessive sunshine results in high input of solar energy over the heat zone on Pakistan that extends from Nokundi-Sibi-Mianwali to Gilgit. Accordingly, the temperatures from the third week of April to second week of May all along the heat belt and the plains eastward into India are 45ºC and above. Historically, these are indications of above normal rainfall in the monsoon season.

The monsoon system that has been bringing rains to Pakistan comprises two systems, one that travels over the tip of the Indian Peninsula into the Bay of Bengal in the east and the other that operates from the Gulf of Oman in the west Arabian Sea and travels into Baluchistan, the Khyber Pakhtunkhwa (KP) and Kashmir. It is initiated every year by input of solar radiation over the heat zone which covers a vast area from Nokundi-Sibi-Jacobabad-Multan-Mianwali and over to Gilgit. The year 2007 was however witness to 10% above normal total duration of bright sunshine in Pakistan. It ranged for 6 to 9 hours/day with increasing intensity of radiation ranging from 19 MJ/m² to 23 MJ/m²/day and had an increasing trend from North to South.

For reasons just stated, it seems that the New Theory on Climate Change postulated by the author more appropriately explains the position. The Theory holds that high evaporation rate induced by high

temperatures on the hinterland of the Arabian Sea have led to hyper-salinity of the seawater. The high temperature on vast territory in the hinterland of the Arabian Sea has:

i. Turned large territory of Pakistan into an extensive heat zone,

ii. Raised the temperature of the North Arabian Sea by 1ºC to 1.5ºC, and

iii. Evaporated correspondingly larger volumes of seawater.

The heat zone formation over land serves as the main heat engine that drives the monsoon from the tip of the Indian Peninsula to the Bay of Bengal and along the foothills of the Himalayas to Kashmir, Punjab and Sindh. The significant rise in temperature of the Arabian Sea raises the surface salinity and induces salinity steep gradient on the sea; the impact of the two factors can trigger cyclones in the Arabian Sea, while the correspondingly large volume of water vapor is cause for heavy monsoon rains all over the Indo-Pakistan region.

The above average evaporation leads to correspondingly high amount of condensation. Since the latent heat of evaporation is the same as latent heat of condensation, there would be increase in the warmth of the surrounding when condensation takes place. The air in the atmosphere would gain the thermal energy during nucleation of the clouds while the snow-covered mountain peaks will on receiving the latent heat be induced to melt. The above average evaporation will thus entail above average snowmelt and the drainage basins will receive cloud burst.

This then is the main reason for Pakistan facing anomalies in weather and extremes of climatic variations. There have been floods for three consecutive years because of excessive moisture in the atmosphere.

4.8 Ambient Air and Noise Monitoring

Ambient Air and Noise monitoring was conducted in the microenvironment. Monitoring Parameters for ambient air were SO2, NO, NO2, CO, O2, SPM, PM10, PM2.5 and Lead.

Results of 8-hr monitoring are depicted in the table below along with selected meteorological parameters;

Table 4.11: Ambient Air Monitoring – Microenvironment

Date	Time	SO2 µg/m³	NO µg/m³	NO_2 µg/m³	CO mg/m³	O_3 µg/m³	SPM µg/m³	PM 10 µg/m³	PM 2.5 µg/m³	Lead µg/m³	Air Temp °C	Humidity %	Wind speed Km/h	Wind direction degree	Pressure mbar
SEQS Limits		**120**	**40**	**80**	**5**	**130**	**500**	**150**	**75**	**1.5**	**NA**	**NA**	**NA**	**NA**	**NA**
7/1/2020	10:00	64.2	23.5	42.8	1.1						14.0	64	1.6	342	1005
7/1/2020	10:30	58.3	16.6	34.6	1.0						14.0	67	1.2	312	1006
7/1/2020	11:00	55.5	17.9	32.2	1.2						14.1	66	1.9	267	1004
7/1/2020	11:30	52.2	21.5	31.9	1.1						14.3	65	2.1	278	1005
7/1/2020	12:00	48.7	24.4	30.8	1.0						14.4	63	1.3	281	1005
7/1/2020	12:30	49.9	22.9	33.7	1.0						14.5	68	2.2	293	1007
7/1/2020	13.00	51.1	16.7	36.5	0.9						14.6	70	1.6	313	1004
7/1/2020	13:30	38.6	18.9	37.8	0.8						14.9	65	1.3	327	1005
7/1/2020	14:00	33.7	17.4	29.3	0.6						15.0	67	1.6	311	1005
7/1/2020	14:30	32.1	13.3	26.8	0.7	16.8	374	138	61	ND	15.1	66	1.0	279	1006
7/1/2020	15:00	30.3	15.8	26.9	0.9						15.0	64	1.3	270	1006
7/1/2020	15:30	33.4	18.3	32.2	1.0						14.9	66	2.1	223	1005
7/1/2020	16:00	37.5	14.4	30.5	1.1						14.6	68	2.5	245	1005
7/1/2020	16:30	38.2	13.7	31.8	1.0						14.3	69	1.5	249	1004
7/1/2020	17:00	29.2	16.2	34.7	1.1						14.2	66	1.0	267	1005
7/1/2020	17:30	31.0	18.4	35.2	1.0						14.1	67	1.1	269	1005
7/1/2020	18:00	33.3	19.2	31.7	0.9						14.0	68	1.4	251	1005
Minimum Conc.		29.2	13.3	26.8	0.6						14.0	63	1.0	223	1004
Maximum Conc.		64.2	24.4	42.8	1.2						15.1	70	2.5	342	1006
Average Conc.		42.1	18.1	32.9	0.9	16.8	374	138	61	*ND	14.4	66.4	1.57	281	1005.1

4.8.1 Noise

Noise monitoring was conducted at various points in and outside the terminal area. Results are shown below;

NOISE LEVEL TEST REPORT						
S.NO.	Location	Noise Level Readings				
		1	2	3	Mean	Limits
1	Front Side Left Corner Boundary	59	58	56	57.6	SEQS-Limits : 75dB(A)
2	Front Side Right Corner Boundary	55	57	54	55.3	
3	Back Side Left Corner Boundary	59	60	61	60.0	
4	Back Side Right Corner Boundary	62	63	61	62.0	
5	Near Generator Operation Area	65	66	64	65.0	
6	Near Existing Gantry Area	60	61	60	60.3	

Ambient Air and Noise Monitoring




4.9 Hydrology

The major surface water feature in the area is the Indus River. River Indus flows along the southeastern and southern boundary of the Shikarpur district. The Indus drains an area of about 950,000 km2, which generates a mean annual discharge of 6,682 m3/s. The hydrograph of the river is strongly seasonal with a long low water season between October and March and a high water season between April and September – driven primarily by snowmelt in the upper catchment and monsoon rainfall. The river usually peaks in mid-August or early September.

Irrigation canals namely Dadu Canal, Rice Canal and Kirthar Canal from Sukkur Barrage enter the district, with Dadu and Rice canals exiting to Larkana district and Kirthar Canal exiting to Jacobabad district, north of district Shikarpur.

Sweet groundwater is found in ample quantity in areas along the canal network and river Indus. However, communities reported a relative decline from previous years. This has mainly been due to over abstraction through deep tube wells installed for supplementing canal irrigation. Groundwater remains an important source of water as it is used to supplement canal irrigation and supply water for domestic consumption. Communities prefer groundwater for domestic consumption as it is cleaner and safer compared to the canal and Indus water and is also easily accessible through shallow hand pumps.

4.10 Water Supply

According to Food Security Analysis (FSA) 2009, access to improved drinking water is reasonable in this district. Seventy nine (79%) of the HH use hand pumps and 17% use motor pumps as source of drinking water.

Shikarpur	Water Delivery System				
	Tap water	Hand pump	Motor pump	Dug well	Other
Total	4	79	17	0	0
Urban	1	37	62	0	1
Rural	5	91	4	0	0

4.11 Ecological Resources in Macro environment[13]

4.11.1 Flora

Ecologically the project area is a part of the tropical thorn forest ecozone. The area is characterised by low rainfall, high summer temperatures, high velocity winds, poor soil and low diversity of plant species. Most of this region has been cleared for cultivation and last remnants of the forest are heavily degraded due to over grazing and felling of trees. Plant communities in the project area are also faced with the threats of livestock grazing. The micro environment in particular, is predominantly irrigated agricultural land, and does not support rare or threatened plant species and is also waterlogged.

Tree species including *Acacia nilotica*, *Dalbergia sisso*, *Albizia lebbeck*, *Eucalyptus camaldulensis*, *Zizyphus numularia* are planted along the margins of agricultural fields. These plants are mostly used by the local for fodder and fuel wood purposes. Some natural vegetation is present along the Indus. Major plant species include *Prosopis Sp.*, *Acacia nilotica*, *Tamarix sp.*, *Zizyphus numularia*, *Arundo donax*, *Saccharum spontenium*, *Aerva javanica*, *Tribulus sp.*, and *Calotropis procera*.

Exotic species like *Prosopis juliflora* and *Eucalyptus camaldulensis* are present in uncultivated land along the road side and around the settlements in the project area. These exotic species are fast spreading and covering most of the bare land of the area.

No endemic or rare species exist within the project area. All species have a wide range of distribution. The species found in the project area which are of importance in terms of medicinal and economical use

[13] General details on the ecology of the area taken from Initial Environmental Examination Sub-Project 4: Construction of new 220 kV Guddu-Shikarpur-Uch-Sibbi Transmission Line July 2017, Prepared by National Transmission & Despatch Company Limited (NTDC) for the Asian Development Bank (ADB)

include *Aerva javanica*, *Capparis decidua*, *Desmostachya bipinnata*, *Salvadora oleoides* and *Typha elephantina*.

4.11.2 Fauna

There are no areas of wildlife significance near the project area. The common birds of the project area are Cattle (small) egret, Common babbler, Common moorhen, Common and Bank myna, House crow, House sparrow, Indian roller; Sindh pied kingfisher, Rose-ringed parakeet, Red-wattled lapwing, Black-winged stilt, Pond heron, Collared dove and little brown dove.

Small mammals mainly gerbils, jirds and rats are abundant as was noticed by their burrow system. These small mammals are a main source of food for raptors and carnivore species and have a role in the food chain.

Mostly the domestic livestock graze and browse the natural vegetation in this area.

4.12 Archaeological and Historical Sites

There is no gazette heritage / archeological /cultural site located inside of within 200 ft radius of project site.

4.13 Human Settlement

The nearest informal human settlement from the terminal is at distance of about 160 meters in south. Others settlements in the area are at a distance of 500m to 1km from the terminal area.

4.14 Socioeconomic Environment

The social baseline section helps in understanding the existing socioeconomic conditions of the project area as well as the larger macro-environment under which the project is falling. The social baseline chapter in an integral part of the EIA report because it is used to assess the existing socio-economic trends in the area and identify the potential impacts arising from the project. This will help in development of Social Management Plan in order to mitigate or improve the social impacts arising from the proposed development.

The social baseline is divided into macro and micro environment of the project area. Macro environment encompasses District Shikarpur under which the project area is falling. The discussion on macro environment covers the administrative setup, demography, education and health profile of the area. The immediate neighborhood of the project area is considered to be the micro-environment of the project and covers land use, education, health and utilities profile of the area.

This socio-economic profile is based on a literature review and several primary data gathering activities including site visits, sample socio-economic survey of stakeholders in the area and consultations with primary and secondary stakeholders.

4.14.1 Macro environment

Administrative Context

Shikarpur is a historically significant district and used to be the main cultural and business hub for the people coming from Kabul, Qandhaar, Tashkent, and Bukhara. The city of Shikarpur also had trade contacts with Baghdad, Bombay, Kolkata and China. Before the British rule, Sindh had three major

districts - Hyderabad, Shikarpur, and Karachi. Shikarpur was announced as a district in 1843. During this period Reserve Bank of India was also established in Shikarpur city.

Present-day Shikarpur district covers an area of 2,577 sq.km and shares boundary with Jacobabad, Thul and Kandhkot of district Jacobabad on its north, River Indus and Khairpur on its South, district Larkana on its west and Indus River and Sukkur district on its East. District Shikarpur has four (04) Sub-Divisions, locally called (Taluka) namely, Lakhi Ghulam Shah, Garhi Yasin, Khanpur and Shikarpur itself. The following table shows the administrative divisions of Shikarpur.

S.NO	Name of Taluka	No. of Mauza/Deh
1	*Garhi Yasin*	*88*
2	*Khanpur*	*52*
3	*Lakhi*	*52*
4	*Shikarpur*	*49*
Total		***241***

Demography

According to the Provisional Census Results of 2017, Shikarpur district has a population of 1,231,481 (634,985 males, 596,477 females and 19 tr) with an average annual growth rate of 1.78% between 1998 and 2017. The overall gender ratio is 106.46 indicating approximately 106 males for 100 females. Proportionally, 52 percent are male while 48 percent are females. Similar to most other districts of Sindh, district Shikarpur is mostly rural with some urban centers. Around 76 percent of the population resides in rural area as compared to the 24 percent that resides in the urban areas. The following table shows the district population according to 2017 census.

District Population by Sex and Rural/Urban							
Administrative units	**Households**	**Population – 2017**				**Sex ratio 2017**	**1998-2017 average annual growth rate**
		Male	**Female**	**Transgender**	**All sexes**		
Shikarpur	207,555	634,985	596,477	19	1,231,481	106.46	1.78
Rural	155,902	479,419	448,803	10	928,232	106.82	1.74
Urban	51,653	155,566	147,674	9	303,249	105.34	1.90
Source: PBS (Provisional Results of Census - 2017)							

Ethnicity

Shikarpur has been the seat of civilization, culture, trade and commerce. It acquired political and economic importance because of its strategic location on the map of Sindh, being directly accessible to those who came from Central and West Asia through the Bolan Pass. According to PESA report 2014, Sindhis are the largest ethnic group in the area while Sindhi is the most commonly spoken language in the district as it is spoken by 95.7% of the population. Other ethnic groups include Baloch, Punjabi, and Pathan.

Education

The education condition of Shikarpur district is very poor. The total enrollment of students in government schools of district Shikarpur is 146,143 (boys 93,015 and Girls 53,128). The girls' education ratio is very low because of tribal system in the area. The drop-out ratio is also high due to poverty because students discontinue their education after primary and secondary education and engage in livelihood activities at

the age of 13 to 15 years. Shikarpur district is ranked 10 among 23 districts in education literacy. (ASER annual status of education report-2011)

According to Pakistan Social and Living Standards Measurement (PSLM) Survey 2014-15 the adult literacy rate in Shikarpur District (for the population of 15 years and above) is 42% with 59% for males and 25% for females. For the urban and rural comparison, urban literacy rate is higher than the rural, which is 59% (male: 72% and female: 46%). Below exhibit shows details of literacy rates by rural, urban and gender levels.

Numbers of Government Schools in District Shikarpur 2016-17				
District	***No. of Schools***			
	Boys	***Girls***	***Mixed***	***Total***
Shikarpur	163	128	810	1,101
Source: SEMIS Census 2016 – 2017				

Class wise Enrollment Data of Shikarpur District 2016-17						
District	**Pre-Primary/Kachi**	**Primary Classes (I-V)**	**Middle Classes (VI-VIII)**	**Secondary Classes (IX-X)**	**Higher Secondary Classes (XI-XII)**	**Grand Total**
Shikarpur	16,972	90,496	21,767	12,047	4,861	146,143
Source: SEMIS Census 2016 – 2017 (Sindh Education Management Information System)						

Adult Literacy Ratio – Pop.15 years & older in Shikarpur District								
Urban			***Rural***			***Total***		
Male	*Female*	*Total*	*Male*	*Female*	*Total*	*Male*	*Female*	*Total*
72%	46%	59%	53%	16%	35%	**59%**	**25%**	**42%**
Source: Pakistan Social & Living Standards Measurement (PSLM) Survey 2014-15								

Health

The health facilities in the district are not adequate to fulfill the needs of the population of the entire district. According to the Health Profile of Sindh 2017 (BOS-Sindh) Shikarpur District has 29 hospitals, 102 Dispensaries, 36 Basic Health Units (BHU), 9 Rural Health Centers (RHC), 14 T.B Clinics, and 7 Mother and Child Health Centers. There is only one doctor to serve 3,624 people, one nurse for 38,314 people and one bed for 1,812 people in the district.

No. of Health Facilities (Govt./Private) in District Shikarpur 2016							
District	***Hospitals***	***Dispensaries***	***Basic Health Units***	***R.H. Centers***	***T.B Clinics***	***M.C.H.C.***	***Total***
Shikarpur	*29*	*102*	*36*	*9*	*14*	*7*	*197*
Source: Health Profile of Sindh-2017 (BOS Sindh)							

Agriculture

According to the most recent agricultural statistics, 40% (113,000 ha) of the land is cultivated. The remaining 60% of the total reported area is uncultivated; out of which 19,000 hectares are not available for cultivation and 126,000 hectares are cultivable waste. The lands which cannot be cultivated suffer

from high levels of salinity and water logging. The irrigation water is not easily accessible so it has become difficult to cultivate the lands. The following table shows the area of land under cultivation in the district.

Land Utilization-2016-17 (Area in "000" Hectares)						
District	Geographical Area (3+7)	Cultivated Area	Un-Cultivated Area			
			Forest	Cultivable Waste	Not available for cultivation	Total (4+5+6)
1	2	3	4	5	6	7
Shikarpur	284	113	27	126	19	171
Source: Sindh Bureau of Statistics (Govt. of Sindh						

Area Sown (Un-Irrigated & Irrigated) & Mode of Irrigation 2016-17 (In Hectares)						
District	Total Area Sown	Un-Irrigated	Irrigated			
			Total	Canal	Well	Tube well
Shikarpur	98,091	45,273	52,818	50,669	-	2,149
Source: Crop Reporting Service center (C. R. S .C) Government of Sindh, Hyderabad						

Road Network Infrastructure

According to PESA district report 2014, the existing road network in Shikarpur district is fairly good. The district headquarter of Shikarpur is connected with its taluka headquarters of Khanpur, Garhi Yasin and Lakhi through metaled roads. Shikarpur is connected through railway line with Jacobabad in the North, Larkana in the southwest and Sukkur in the southeast. Two National Highways (N-65 & N-55) intersect in the city of Shikarpur, so it can well be termed as, one of the junction points of the four provinces. The district has a total road length of 920.0 kilometers, including 125 kilometers of National Highways and 195 kilometers of Provincial Highways.

4.14.2 Microenvironment

During the site visit, a total of three major villages were identified near the project area which included Haji Khan Kalhoro, Brohi village and Qadir Bux Pahor. Major socio-economic findings regarding the three villages was obtained from village elders or 'gate-keepers' of the villages and from the shop owners of one small market at stop. These villages and commercial entities fell under the 2 km radius of the project site. The information collected from these villagers provided the socio-economic overview of the project area.

The socio-economic observations of the villages have been collated in the sections below.

Livelihood

The people of project area are mostly dependent on agriculture for their livelihood while livestock rearing is their secondary source of income. The major crops grown include sugarcane, wheat, rice and cotton. The majority of villagers are tenant farmers working on crop sharing basis. Agricultural land of the area is mostly irrigated by Canals. However, other modes of irrigation like pumps and tube wells are also available. Livestock are an important asset for the villagers as they provide dairy products which they can both consume and sell. Goats and buffaloes are most common in the area, while sheep and cows are also kept by villagers in limited quantity.

Many people are also engaged in labor work within city as well as in other cities. Majority of people live hand to mouth and poverty is high in the area. Poverty is prevalent in the villages due to scarcity of irrigation water which results in low agricultural yield.

Education Facilities

Since the small villages do not have any primary schools, they go to nearby villages for acquiring education. There are primary and middle schools as well as numerous Madrasas in the larger villages where children acquire religious education. There are no separate schools for girls due to which girls' education ratio is very low in the area. The infrastructure of these schools is very poor and most school buildings are in a very dilapidated condition.

Healthcare Facilities

There are no major medical facilities at any of the villages, except Haji Khan Kalhoro, which has a dispensary that caters to the medical needs of the villagers from nearby settlements. However, this dispensary is open for only 4 hours daily and does not deal with patients in emergency. The medical facilities in the village are extremely limited with no ambulance services in the area and unavailability of quality medicines. The villagers go to Taluka Headquarter (THQ) Khanpur to avail better medical facilities in emergency. They also prefer to go to nearby civil hospital and private clinics for their treatment.

Utilities

The main source of drinking water is hand pump (boring water). These hand pumps are installed at household level as well as community level. The quality of the water is satisfactory. Only the larger villages have access to gas connections while the smaller villages do not have access to gas. The smaller villages have electricity connections but frequency of load-shedding is high (12 to 15 hours daily). Those who can afford to install solar panel have installed it in their houses as an alternative. Since there is no gas connection in the villages, people use wood for cooking purpose.

There is no proper waste disposal service in the area so the villagers dispose waste in an open/vacant area and burn it. There is no proper public transportation in the area except for few rickshaws. Almost every household in the area owns a bike while some even own cars.

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Chapter 5 STAKEHOLDER CONSULTATION

5.1 Stakeholder Engagement

Stakeholder engagement is a process that involves project relevant stakeholders in decision-making and uses the input from stakeholders to make better decisions. Stakeholder Consultation is conducted when the participation of individuals and groups is important in attaining the success of a project. It is also most important where there are vulnerable groups. These are people who are already so marginalized that without support they may not benefit from the development project. The Project identifies them to ensure that their needs are met in project planning and implementation.

5.2 Stakeholder Consultation in EIA Study

The participation of stakeholders in project planning, design and implementation is now universally recognized as an integral part of environmental and social impact assessment. Local communities, government level stakeholders, national and international NGOs and the civil society representatives may be able to contribute to, and benefit from, the dialogue directed at identifying and resolving key project-related issues. Stakeholder consultation presents an opportunity for mutual information-sharing and dialogue between the project proponent and stakeholders. An effective public consultation process provides concrete suggestions that can help improve project design resolve conflicts at an early stage, identify management solutions to mitigate potentially adverse consequences and enhance positive impacts, and develop guidelines for effective monitoring and reporting of project activities throughout the project cycle.

Providing the public with adequate reliable information of the planned project is of significant importance in creating public trust and acceptance. Moreover, experience reveals that unexpected project impacts on the local community generally give rise to significant issues and concerns. Such problems can be avoided if people are properly informed and consulted about the project and given the opportunity to raise their concerns.

This chapter provides an overview of the public consultation process adopted for Total Parco Pakistan Limited (TPPL) terminal project and presents the findings of the stakeholder consultations. The key aspects, including consultation objectives, consultation approach, stakeholders and their concerns have been outlined in the following sections.

5.3 Objectives of Stakeholder Consultation

The stakeholder consultation process followed for the proposed project is in line with the key objectives of stakeholder consultation identified below:

- Provide information related to proposed project activities;
- Identify stakeholder interests and issues;
- Identify mitigation measure for these concerns and integrating them into project design, operations, and management;

5.4 Primary and Secondary Stakeholders

Stakeholders are individuals, groups, or institutions that may be affected by and can significantly influence the project activities, or are integral to the achievement of the objectives of a project. Stakeholders can be divided into 2 broad categories; primary and secondary; Tables 5.1(a) and (b).

Primary stakeholders are those who have a direct interest in the project which includes residents, commercial entities and institutions falling in the project area. Secondary stakeholders include the relevant government agencies and public interest groups which may indirectly influence or be influenced by the project. The concerns and input from both primary and secondary stakeholders are important to identify the issues arising from the construction and/or operation phase of the project and propose mitigation measures that minimize the negative project impacts and enhance the positive ones.

Table 5.1(a): Primary Stakeholders for TPPL Terminal Project

S. No.	Stakeholder Groups	Stakeholders
1	*Settlements near the project area*	Village Haji Khan Kalhoro, Village Brohi, and Village Qadir Bux Pahor
2	*Commercial entities*	Grocery Shop, Transport Agent, Local restaurant

Table 5.1(b): Secondary Stakeholders for TPPL Terminal Project

S. No.	Stakeholder Groups	Stakeholders
1	*Government Departments*	Sindh Environmental Protection Agency (SEPA) Sindh Forest & Wildlife Department Social Welfare Department, Govt. of Sindh Sindh Irrigation & Drainage Authority (SIDA) Culture, Tourism, & Antiquities Department Office of Deputy Commissioner, Shikarpur
2	*Academia*	Shah Abdul Latif University, Khairpur Mehran University of Engg & Technology
3	*Environmental Non-Governmental Organizations*	WWF-Pakistan IUCN-Pakistan

5.5 Consultation Approach

The main purpose of the consultation exercise was to disseminate project information to relevant stakeholders so that any feedback received could be used to address the issues at an early stage. Identification of stakeholders is one of the major steps for designing an effective consultation process. For this purpose a site visit was carried out by EMC social team to identify the villages and the relevant stakeholders for consultation. A total of 3 villages, falling within a distance of 1.5 km from the project site, were selected for the consultation.

Consultation meetings were conducted with the identified stakeholders residing or working in the villages near the project area by the social team. The stakeholders were briefed about background and scope of the Total Parco Pakistan Limited (TPPL) terminal project at the beginning of the meeting sessions. Concerns and suggestions of the respondents were noted down by the team and pictures of the session were taken with the consent of the villagers. If the villagers had any queries regarding the project, the team responded to their queries during the session.

5.6 Stakeholders' Feedback

The following table shows the list of primary stakeholders who were part of the consultation process for this project.

Table 5.2: List of Primary Stakeholders			
S. No	**Stakeholders**	**Date**	**GPS Coordinates**
1	PARCO Management Shikarpur	07-01 2020	28 2 04.41N, 68 50 16.89E
2	Village Haji Khan Kalhoro	07-01 2020	28 1 26.99N, 68 50 31.8E
3	Brohi Village	07-01 2020	28 1 57.37N, 68 50 19.82E
4	Qadir Bux Pahore village	07-01 2020	28 2 37.15N, 68 50 12.69E
5	Commercial Entities (Truck Lorry agents, Grocery shop owners, cabin owners, hotel owners)	07-01 2020	28 2 8.78N, 68 50 20.94E

The discussion with stakeholder groups during consultation sessions has been given below along with brief village profiles.

1. Village Haji Khan Kalhoro, UC Shabeerabad, Tehsil Khanpur

The major caste settled in the village is Kalhoro while few households belong to Shaikh and Soomro. They have been settled here since last 100 years. The village has approximately 300 households having population of around 2000. The villagers shared that their main source of income is agriculture while secondary sources include livestock rearing, daily wages labor and government service. Shortage of water has affected agricultural activities significantly therefore poverty has risen in past few years. Due to shortage of water, the crops yield and variety has reduced. As a result, many locals have moved to nearest cities including Shikarpur and Sukkur in search of better job opportunities.

The villagers had no reservations regarding the proposed project activities in their area. However, they want employment opportunities both for skilled and unskilled labor to be provided to the local people. They further shared that there is need for development work in the project area. There is need to develop schools, hospitals and roads in the area.

2. Brohi village, UC Shabeerabad, Tehsil Khanpur

This village is composed of 8-10 households having a population of 90 people. The only ethnic group settled in this village is Brohi-Baloch. People mainly depend upon agriculture as a source of income while livestock rearing and labor work is secondary source of income for the villagers. Poverty is prevalent in the village due to scarcity of water which results in low yield.

There is no health facility in the village so the villagers travel to Dispensary- Haji Khan Kalhoro or BHU to avail healthcare facility. Major diseases among the villagers are Hepatitis, Flu and Fever. There is no school in the village however few children go to school in nearby village. Electricity and gas supply is not available in village.

The villagers said there is need for development work in the project area especially schools, hospitals and roads. They did not have any major reservation against the project and said they welcomed it as long as it benefits the area in terms of development and creation of job opportunities.

3. Village Qadir Bux Pahor, UC Shabeerabad, Tehsil Khanpur

Pahor is the dominant caste in the village while some households belong to Chachar, Lashari, and Bhaya castes. Agriculture is the major source of income generation while some work as laborers for private companies in the nearby cities.

The villagers want the area to be developed as they do not have access to basic facilities. There is no health facility in the village and they do not have access to gas connections. Electricity is available in village but the frequency of load shedding is high. The villagers said that all companies in the area should take efforts to establish a good school and hospital in the area where everyone would be able to acquire quality education and better medical facilities. They were of the view that proposed project will have positive impact on the economy of the area as job opportunities will be created.

4. Consultation with Commercial Entities

The locals shared that business activities have increased after various oil companies started operating in the area. They shared few years back there was only one small grocery store but in the recent years, a number of shops have opened including grocery stores, motor bike mechanic shops, sweet shops and barber shops. Property value has also increased in the area. They suggested that private companies in the area should employ the local people on daily wages. They were concerned that since road is narrow accidents may increase due to movement of heavy vehicles.

Key Findings

The agricultural land in the area has become uncultivable due to water logging in surrounding areas so people have lost an important source of livelihood. Private companies operating in the area have engaged the local persons in labor work in their companies. This has improved the economic conditions of local people of area because they have been able to earn decent amount on regular basis and support their families .

The villagers had positive sentiments regarding the new development in the area because they are hopeful it will bring prosperity to their area. The project proponent should invest in developing well-equipped education and health facilities in the area. Electricity and gas supply is unavailable in villages falling within project area.

Photographs of Consultations

Consultation with teachers and villagers of Haji Khan Kalhoro Village

Consultation with elders of Brohi Village

Consultation with villagers of Qadir Bux Pahore Village


Consultation with Mushtaq Ahmed – Cabin shop at Haji Khan Kalhoro Village


Consultation with Allah Bux - Transporter Agent


Consultation with Grocery Store shopkeepers along Indus Highway (N55)

Chapter 6 SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS & THEIR MITIGATION MEASURES

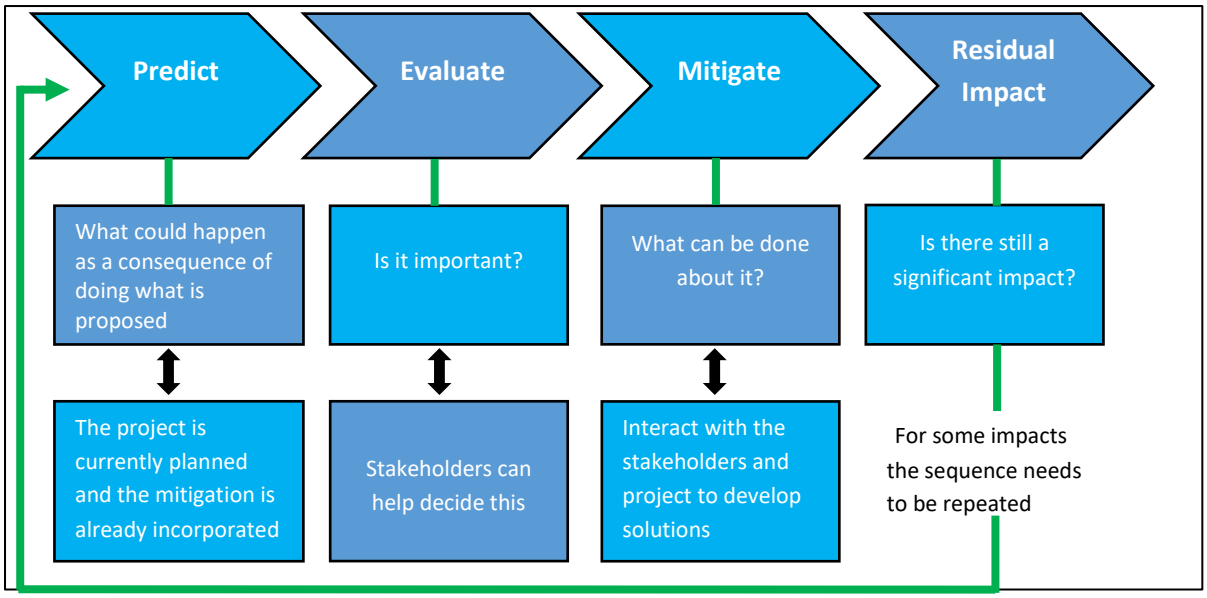
This section of the report screens the potential impacts imposed upon the physical, biological and socio-economic environment due to the waste generated by the project. The screening process has, through review of literature, primary as well as secondary baseline data, and expert judgment, made assessment of the potential impacts of said activities on the physical, biological, and socioeconomic environment of the Project.

Guidelines have been reviewed for classification of polluted and unpolluted sites with respect to their airshed, watershed and land use; sensitivity of ecosystem including flora, fauna, wildlife, historical and archeological sites and their values, and the sensitivity of the site.

The review / screening provides the assessment of impacts of different activities before the start of construction, during construction as well as installation of machinery and the resulting emission of noise and gases, and wastewater discharges during operation of the project. The impacts considered are those, which may occur at regional and local level or the macroenvironment and at the site or the microenvironment.

The earlier description in Section-4 of this report has already provided a classification of macro environment and microenvironment of the site, based on assessment of impacts using both primary and secondary data on emissions of pollutants, noise levels and wastewater discharges and other impacts from operation of terminal capacity enhancement project on its microenvironment. The hazards encountered during the implementation of the proposed project will prove to be guideline for proposing appropriate mitigation measures. Mitigation measures have been proposed to reduce, minimize or compensate for the identified potential negative impacts and their adoption has been recommended. Enforcement of the recommended mitigation measures would minimize and eradicate the negative impacts, in all such cases where the levels of emission and discharges exceed the Sindh Environmental Quality Standards (SEQS), while enhancing in the positive outcome i.e. sustainable development.

The sources of pollution are first identified and then their impacts are noticed at each stages of the proposed project i.e. pre-construction, construction, post-construction and operational phase. Impacts of the project can be of short or long-term, temporary or permanent, acute or chronic, positive or negative in nature.



6.1 Impact Assessment Methodology

Potential environmental impacts of the proposed "Enhancement of Storage Capacity of Shikarpur Terminal" Project on different features of micro and macro environment pertain to construction and operation of the project.

The screening process proceeds by identifying the potential environmental aspects of siting the project, identifying the potential environmental impacts at pre-construction, construction and operational stages of the project and identifying the residual impacts after adoption of mitigation measures that may be needed at the outset of activities. The impacts on environmental resources from the proposed project will be short-term and temporary in nature.

A systematic strategy was developed to provide an assessment of the likely impacts on the micro and macro environment of the Project site. The strategy included:

- Review of General Guidelines;
- Identification of potential environmental impacts by conducting survey, public consultation;
- Assessment of the intensity and significance of potential impacts by obtaining expert opinion and carrying out environment analysis;
- Defining mitigation measures to reduce impacts to as low as practicable;

Guidelines and checklists were used for the verification of permissible levels of environmental parameters during project operation and classification of the site with respect to its pollution status, soil, and ecology including fauna, flora and wildlife, historical and archaeological sites.

The environmental aspects of the project were identified by situation analysis related to present land use, damage to vegetation, noise and other forms of nuisance during construction at site, air pollution due to fugitive dust emission and operation of equipment during construction, air pollution due to burning of wastes.

Site visits have been carried out prior to proceeding with impact assessment and objective are important in carrying out impact assessment based on following:

- To assess environmental, social and safety status of site. This will involve walking the site.
- To develop an understanding of the history of the site, the facility, and the surrounding properties to understand whether there might be historic contamination, permitting issues, or community issues.
- To check history of the site age, surrounding properties and the kinds of activities that occur on them.
- To check the current status of environmental permits and land use permits, and any restrictions placed on the facility, signs of spills, soil subsidence, or stressed vegetation.
- To check the type of pollution control equipment and the maintenance schedule, types of waste produced and where and how disposed.
- To identify types of liquid effluents, where and how disposed and develop an understanding of the facility's health and safety regime.
- To check the availability and use of personnel protective equipment such as goggles, hard hats, safety gloves etc.

Assessment of impact of different activities, and of the resulting emission of noise and gases, and wastewater discharges during construction and subsequent operation of the proposed capacity enhancement project are addressed in this section. The entire screening procedure was designed in such a way so as to provide a complete assessment of the impacts on the macro-environment and Assessment of impact of different activities, and of the resulting emission of noise and gases, and wastewater discharges during construction and subsequent operation of the proposed project are addressed in this section. The entire screening procedure was designed in such a way so as to provide a complete assessment of the impacts on the macro-environment and microenvironment of the project. The project site has no protected area such as game reserve, wildlife sanctuary, national parks, archaeological sites or cultural heritage in its neighborhoods. Impacts may arise during different stages of project phases which are summarized below.

A range of sources of pollution regarding air pollution, soil erosion, hazardous waste and noise generation and others related to petroleum products bulk storage terminal along with their qualitative and quantitative analysis as well as actions taken to control them are discussed in this section. The process for identification of potential impact involves understanding of source of effect in relationship between an activity and environmental parameters. The impact assessment criteria are summarized in table 6.1, which is as follows:

Table 6.1: Impact Assessment Criteria

Nature of Impact	Adverse or Beneficial
Mitigation	What measures could be applied to reduce negative impacts or enhance positive impacts
Extent	Localized or Regional
Significance	The Significance of the impact is determined as a synthesis of the above assessment criteria where; **Low significance**-That the impact would not have an effect on the decision to approve the project (or a particular project alternative), **Medium significance**- The assessed impact should have an effect on the decision unless it is effectively mitigated.

Table 6.1: Impact Assessment Criteria	
	High significance- The decision would be influenced regardless of any mitigation.
Further investigation or monitoring	A recommendation for further investigation (prior to the commencement of the activity) or monitoring (prior to commencement and/or during operations or even post closure).

6.2 Screening of Potential Impact during Pre-Construction Phase

6.2.1 Siting and Layout

Nature of Impact: *Low,* ***Extent:*** *Localized,* ***Significance:*** *Low*

Capacity enhancement will be achieved through installation of oil storage tanks within the existing terminal facility and as per the approved layout.

Mitigation Measures

General layout of the facility:

- Secondary and tertiary Containment considerations;
- HDPE Membrane will be laid under all fuel tanks to avoid contamination of land and will be connected to slope tanks in case of spillage
- Emergency access and Response Support Access for Emergency Response Teams (Fire Brigade, Police, Ambulance Services);
- Power supplies: The need for emergency equipment such as lighting, fire pumps, sprinkler system to operate when the main power source is impaired;
- The consideration of location of occupied buildings to minimize risk for the occupants in an emergency situation such as fire or explosion

  i. Location (e.g. remote from the source of hazard, consideration of prevailing wind direction);
  ii. Construction (e.g. resistance to effects of fire (thermal radiation) and or explosion (overpressure));
  iii. In the case of Control rooms – provided with uninterruptible power supplies to control systems in the event of power failure.

- Provision of Fire water and Fire Protection systems. These may be provided via specific systems within the storage terminal. Capacity should be related to the fire water requirements (flow and total available volume) to fight the fire event. Vulnerability to disruption during an emergency needs to be considered e.g. damage from fire or explosion causing the fire protection to fail.

6.2.2 Safe Design

Nature of Impact: *Adverse,* ***Extent:*** *Localized,* ***Significance:*** *High*

National standards for equipment design and operation where they exist should be implemented and be the subject of inspection by the proponent. Wherever possible, the design of equipment within storage terminal should be to industry good accepted practice and incorporate learning from relevant incidents.

The following key aspects for the design and operation of equipment related to hazard / detection / control and response have to be taken into account at three levels of protection:

6.2.3.1 Primary Safety Considerations

- Tank design to meet appropriate local legal codes or industry standards
- Piping, valve, pumps and fitting design according to requirements for piping design to meet appropriate local legal codes or industry standards
- Choosing construction material according to the mechanical, thermal, chemical and biological stress of service;
- Automatic Tank Gauging (ATG) System
- Fire Detection will be provisioned inside MS Tanks and Gantry
- Level measurements devices should be installed, which include Low and High level alarms;
- Overfill protection devices – Level detection linked through a "logic solver" (hardware or software) to interrupt flow in the event of a hazardous level occurring in a tank;
- Provision of equipment designed and managed

  i. Electrical Systems (motors, instrumentation);
  ii. Hot surfaces (pumps, gearboxes etc.);
  iii. Electrostatic charge;
  iv. Control of hot work.

6.2.3.2 Secondary Safety Considerations

- Storage tanks are normally located inside a retaining wall on a solid foundation.
- Underground pipelines should be double-walled or laid in cemented trench
- Any detachable installed connections and valves should be installed in a monitored, leak proof inspection chambers;
- The containment should have total volume appropriate to 110% of the largest tank or 25% of all the Tank volumes;
- Additional tertiary containment volume for fire water retention, which must be leak proof and resistant to the fire-fighting water and foam needs to be considered.
- Overflow detection devices, which act when a release has started. These could be situated inside the secondary containment or in a piped overflow from a tank.

6.3 Screening of Potential Impact during Construction Phase

The activities that take place during the construction phase of the project are leveling of site, construction and construction of tanks and its foundations, dyke walls and associated structures and laying of pipeline. The potential primary and secondary impacts on the environment due to these activities and their mitigation measures are discussed as under:

6.3.1 Soil Erosion

Nature of Impact: *Moderate,* ***Extent:*** *Localized,* ***Significance:*** *Medium*

Excavation works for tanks and for construction of associated structures may expose soils in the affected areas, leaving them vulnerable to erosion by surface run-off during heavy rainfall. However, it is important to conserve the "topsoil" wherever possible for later restoration.

Mitigation Measures

To minimize the impacts that could arise during the construction phase following measures will be adopted;

- The contractor must minimize the area of exposed soil at any given time and to wet, compact and resurface the disturbed areas during the construction phase.
- Removal of topsoil with vegetation in it (rather than cutting off the vegetation) so that the vegetation helps to hold and enrich the soil.
- Exposed surface will be regularly wetted to effectively keep airborne dust levels to minimum
- Stockpiles of fine material will be wetted or covered with tarpaulin especially during windy conditions until concreting and landscaping is complete.
- Site workers will be required to wear dust masks especially during dry and windy weather conditions.

6.3.2 Land Contamination

Nature of Impact: *Adverse,* ***Extent:*** *Localized,* ***Significance:*** *Low*

During the construction stage, the contamination of land occurs due to spillage of chemical and/or fuel through their improper handling, transportation and storage.

The sources of spills are:

- During refuelling, the transfer of fuel from one container to the other
- Maintenance of vehicle and machinery
- Leakage from the container

Mitigation Measures

Actions necessary to manage the risk from contaminated land will depend on factors such as the level and location of contamination, the type and risks of the contaminated media, and the intended land use. However, a basic management strategy will include:

- Washing of vehicles will be carried out in the designated areas.
- Vehicles and equipment maintenance will take place at specified site.
- Construction vehicles and machinery will be examined on a regular basis for leakage.
- Removal of oil and contaminated soil around the fuel and oil storage areas will be made possible by the availability of appropriate tools i.e. shovels, plastic bags and absorbent materials.
- Contaminated medium will be managed with the objective of protecting the safety and health of labourer at the site, the surrounding residents, and the environment.
- The historical use of the land will be understood with regard to the potential presence of hazardous materials or oil prior to initiation of construction activities.

- Plans and procedures will be prepared, to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety and the environment.

6.3.3 Construction Waste

Nature of Impact: *Moderate,* ***Extent:*** *Localized,* ***Significance:*** *Low*

Noticeable amount of construction waste will be generated during construction phase which include metal cuttings, rejected materials and debris, surplus materials, excavated materials, paper bags, empty cartons, empty paints and solvent containers, broken glass, steel, wooden scaffolding, cement bags etc. This waste will pose a threat to the drainage and dumping sites, chocking of water bodies as well as to the labors working in the facility.

Some of the waste materials including metal cuttings and plastic containers are non-biodegradable and can have long-term and cumulative effects on the environment.

Mitigation Measures

The mitigation measures laid down as under will help to mitigate the impacts posed due to the constructional phase of the proposed project:

- A comprehensive waste disposal plan will be developed to effectively manage these waste;
- The construction waste like damaged pipes, left over steel, wooden and plastic pieces, will be sent for recycling. While, the rest of the left over waste will then be taken away to the dumping sites for disposal;
- The construction material will be kept in a covered place, especially during the precipitation season;
- The excavated soil should be reused where possible;
- Containers marked for different types of waste will be deployed, in order to treat the waste according to its nature,
- The project area will contain the sewage and litter facility to overcome the problem of unchecked dumping of waste.
- Use of building materials that have minimal packaging will be preferred to avoid the generation of excessive packaging waste;
- Use of durable, long-lasting materials that will not need to be replaced as often, thereby reducing the amount of construction waste generated over time.

6.3.4 Impact on Water Quality, Consumption & Conservation

Nature of Impact: *Adverse,* ***Extent:*** *Localized,* ***Significance:*** *High*

Water is used in numerous construction activities such as concrete mixing, curing, plastering, domestic etc. Water requirement for construction phase will be met by water tankers to fulfill the requirement. Construction activities for the proposed development can have insignificant impact on hydrology and ground water quality of the area if the construction waste leaches into ground.

Potential sources of impacts on the hydrology and ground water quality during the construction phase are as follows:

- Soil runoff from the site leading to off-site contamination (particularly during rainy season).
- Improper disposal of construction debris leading to off-site contamination of water resources.

- Spillage of oil and grease from the vehicles and wastewater stream generated from onsite activities such as vehicles washing, workshop etc.

Mitigation Measures

To mitigate these impacts precautions and preventive measure shall be taken at the site during construction to avoid any ground and surface water contamination. Following mitigation measures shall be adopted as conservation.

- Not letting the water to leave the construction site.
- Construction of storm water diversion channels to divert storm runoff from flowing over the construction areas.
- Monitoring and keeping record of water consumption.
- Monitoring of drinking water quality.
- Use of leak proof storage tanks.

6.3.5 Particulate Matter

Nature of Impact: *Moderate,* ***Extent:*** *Localized,* ***Significance:*** *Medium*

The principle potential source of dust that may arise from construction activity is fugitive type. Temporary dust nuisance, measurable as Total Suspended Particulates (TSP) and Respirable Suspended Particles (RSP), may be generated as a result of construction activities.

Mitigation Measure

In order to cater above impacts, following mitigation measures have potential to reduce the dust generation:

- Sprinkle water when and where necessary.
- Regular servicing, frequent check-ups and monitoring for vehicles may also incorporate less formation of dust.
- Safe driving speed will be advised to drivers as well as monitored by respective department.
- Develop schedule for movement of dump trucks that may be used for material transport.
- Use of paved roads for transportation during construction work.
- Sprinkle water on roads and tracks to reduce dust generation.
- Stockpiles of fine material should be wetted or covered with tarpaulin especially during windy weather conditions.
- Site workers and drivers should wear dust mask and safety goggles especially during dry and windy weather conditions to avoid injuries and health risk due to dust.
- Good housekeeping practices will also reduce dust emission.

6.3.6 Exhaust Emission

Nature of Impact: *Moderate,* ***Extent:*** *Localized,* ***Significance:*** *Medium*

Major sources of exhaust emissions are generators, transport vehicles and construction machinery/earth moving equipment. Exhaust emissions contain CO, CO_2, SO_X, NO_X and PM_{10}.

These emissions are injurious to human health if in high concentration and also cause vegetation damage by clogging the photosynthesis process in plants. Number of adverse environmental effects, such as

photochemical smog, acid rain, adverse impact on forests, or reduced atmospheric visibility occur due to exhaust gases. Emissions of greenhouse gases from combustion of fossil fuels are associated with the global warming.

Mitigation Measures

Controlling the exhaust emissions by adopting preventive measures is the best possible way to reduce these emissions in the ambient air. The measures given below may assist TPPL and construction contractor in the reduction of exhaust emission during construction work:

- Where possible, use of new generators to reduce the emissions.
- Generators shall be kept away from walking areas and at safe place where the probability of human intervention are very limited.
- Generators should be properly serviced kept in good working conditions and monitored on regular basis.
- Ensure that the vent of the generator exhaust is at adequate height.
- Fuel with low emission content will be utilized for generators.

6.3.7 Wastewater Generation

Nature of Impact: *Moderate,* ***Extent:*** *Localized,* ***Significance:*** *Low*

During the construction phase, the wastewater generated from the domestic, run-off from the project site during the season of precipitation, washing of vehicle and leakage of fuel from the construction vehicles etc. Construction activities of the project may include the generation of sanitary wastewater discharges in varying quantities depending on the number of workers involved.

The untreated wastewater disposal will deteriorate the water quality of the surface and groundwater resources near the project site. The impacts which will be imposed upon due to the construction activities include the disturbance of flora and fauna of the area.

Mitigation Measures

The following are the recommendations to reduce and control the wastewater generated during the constructional activities:

- Washing of vehicles and construction machinery will be restricted to a designated area;
- Wastewater will not be disposed of directly into the water bodies without treatment;
- Wastewater generation will be minimized by controlling the pollutant at the source;
- Regular monitoring of the wastewater generation will be taken into consideration;
- Adequate portable or permanent sanitation facilities serving all workers will be provided at all construction sites;
- Sanitary wastewater will be collected in septic tank.

6.3.8 Noise

Nature of Impact: *Moderate,* ***Extent:*** *Localized,* ***Significance:*** *Low*

Noise is also one of the aspects which may cause health impacts on workers associated with construction activities. It is anticipated that construction will be of short period therefore; the impacts associated with the noise are of low significance. Following are major activities which may generate noise:

- Construction and excavation work which use earth moving equipment, welding, cuttings, drilling, grinding etc.
- Generators used for power supply during construction works.
- Material loading/unloading vehicles and other transport used by employees within the terminal.
- Use of pressure horns.

Noise level during construction phase may pose health issues to the workers if proper PPE are not worn. Exposure to high noise or low noise for longer period, may result in hearing impairment or hypertension.

Mitigation Measures

The following measures are adopted in order to keep the noise within the prescribed limits of SEQS:

- Noise control devices such as temporary noise barriers and deflectors, will be employed for high noise generating equipment/machinery;
- Transport associated with the construction of the project will be avoided or minimized through already existing residential areas.
- Noise and vibration will be minimized in the projects site and surrounding areas through sensitization of the truck drivers to switch off vehicle engines while offloading material.
- Construction machinery will be kept in good condition to reduce noise generation.
- Generator and other noisy equipment will be regularly monitored.
- Carry out noise monitoring on regular basis during construction phase.
- Site labour working in high noise area such as where noise level exceeds 90 dB (A), will be enforced to wear earplugs.

6.3.9 Traffic Flow

Nature of Impact: *Moderate,* ***Extent:*** *Localized,* ***Significance:*** *Low*

There is a likelihood of increase in traffic on N55 during construction. The trucks used to transport various construction materials from their sources to the project site will contribute to increase in exhaust emissions (dust, SO_2, CO_2, NO_X and fine particles) and decrease in traffic flow.

Mitigation Measures

- The proponent will put in place measures to address traffic congestion concerns by ensuring that construction vehicles preferably deliver materials during off-peak hours when traffic volume is low.
- There will also be provision for warning signs on the access road to aware users of construction activities in progress in order to prevent occurrence of accidents.
- Truck drivers will be sensitized to avoid unnecessary revving of vehicle engines during loading/offloading and to switch off engines.

6.3.10 Occupational Health & Safety Issues

Nature of Impact: *Adverse,* ***Duration:*** *Long-term,* ***Significance:*** *High*

6.3.12.1 Over-Exertion

Over-exertion, and ergonomic injuries and illnesses, such as repetitive motion, overexertion, and manual handling, are among the most common causes of injuries at construction site.

Overexertion is a major cause of the inflammation of joints and ligaments that results from excessive physical effort. Excessive physical effort affects people differently: for some people it may cause little or no pain or discomfort and for some it may be debilitating.

Mitigation Measures

Recommendations for their prevention and control include:

- Workers will be trained with lifting and materials handling techniques before the commencement of construction activities.
- Define weight limits above which mechanical assistance or two person lifts are necessary.
- Work site layout will be planned to minimize the need for manual transfer of heavy loads.
- Tools will be selected and work stations would be designed to reduce force requirements and holding times, which promote improved ergonomics.
- Administrative controls, such as job rotations and rest or stretch breaks will be implemented into the work regime.

6.3.12.2 Slip and fall

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction site.

Mitigation Measures

Recommended methods for the prevention of slips and falls from, or on, the same elevation include:

- Good house-keeping practices, such as the sorting and placing loose construction materials in established areas away from passage, would be implemented.
- Excessive waste debris and liquid spills will be cleaned up regularly.
- Electrical cords and ropes will be located in common areas and marked corridors.
- Slip retardant footwear will be used.

6.3.12.3 Work at Height

Falls from elevation associated with working with ladders and scaffolding are among the most common cause of fatal or permanent disabling injury at construction site. If fall hazards exist, a fall protection plan will be in place which includes one or more of the following aspects, depending on the nature of the fall hazard.

Many work activities during construction phase involve working at height. Working from ladders, scaffolds and platforms are common examples, but there are many more activities where people are required to work at height such as roof work, working over tanks and pits, at the edge of elevated structures, or on top of vehicles or trailers.

Mitigation Measures

Training and use of temporary fall prevention devices, such as rails or other barriers able to support a weight of 200 pounds, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface.

- Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards as well as fall rescue procedures to deal with workers whose fall has been successfully arrested.
- Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labelling covers for openings in floors, roofs, or walking surfaces.

6.3.12.4 Struck by Objects

Construction activities of the project may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes and extremities.

Mitigation Measures

Techniques for the prevention and control of these hazards include:

- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap.
- Temporary fall protection measures, such as hand rails and toe boards in scaffolds and elevated work platforms would be used to prevent materials from being falling;
- Appropriate PPE such as safety glasses with side shields, face shields, hard hats, and safety shoes, would be wore.

6.3.12.5 Moving Machinery

Vehicle and lifting equipment used for the movement of machinery and materials at a construction site may pose temporary hazards, such as physical contact, spills, dust, emissions, and noise.

Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Center-articulated vehicles create a significant impact or crush hazard zone on the outboard side of a turn while moving.

Mitigation Measures

Techniques for the prevention and control of these impacts include:

- The location of vehicle traffic, machine operation, walking areas, and controlling vehicle traffic inside the terminal will be planned and segregated through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic.
- The visibility of personnel will be ensured through the use of high visibility vests when working in or walking through heavy equipment operating areas
- Train workers to establish eye contact with vehicle/machinery operators before approaching it.
- Inspected and well-maintained lifting devices will be used that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

6.3.12.6 Other Site Hazards

Construction of site may pose a risk of exposure to dust, chemicals, hazardous or flammable materials, and wastes in a combination of liquid, solid, or gaseous forms.

Mitigation Measures

It can be prevented through the implementation of project specific plans and other applicable management practices, including:

- Use of waste-specific PPE based on the results of an occupational health and safety assessment, including respirators, clothing/protective suits, gloves and eye protection.

6.3.11 Impacts from construction of pipeline

A MOGAS pipeline between the PARCO Terminal (opposite the project site) and the project site will be laid. The pipeline will be laid under the N-55 highway passing between the two terminals through Horizontal Directional Drilling (HDD). The distance between the two terminals (boundary wall to boundary wall) is approximately 20 meters. A pipeline (for HSD) already exists. The proposed pipeline will be laid along the existing pipeline therefore additional ROW will not be required. The following potential environmental impacts that may arise from the construction of pipeline have been identified below:

6.3.12.7 Noise

Nature of impact: *Adverse,* ***Extent:*** *Localized,* ***Significance:*** *Low*

Due to pipeline laying related activities noise may be generated, however, the impact would be of limited duration and extent. The activities may include stringing and assembly of pipeline which involve the use of crane.

6.3.12.8 Trench dewatering

Nature of impact: *Adverse,* ***Extent:*** *Localized,* ***Significance:*** *Low*

The land at the project area is water logged. If the trench dewatering is deemed necessary, the contractor must ensure that the water is disposed-off in an acceptable manner and that that the disposal procedure has been discussed with local/town authority and permission acquired. The dewatering process is carried out by pumping or evaporation and is usually done before excavation or to lower the water table that might be causing problems.

6.3.12.9 Impact on traffic

Nature of impact: *Adverse,* ***Extent:*** *Localized,* ***Significance:*** *Low*

The pipeline will pass under the N-55 highway. It will be laid through HDD. Therefore, traffic disruption is not envisaged. Nevertheless, following mitigation measures will be adopted.

- Pipe laying activities will be scheduled to reduce the chances of traffic jams;
- Adequate and appropriate road signs will be erected to warn road users near the project site;
- Banksmen would be deployed for safe movement of crane and vehicles and pipe lowering activities;
- The movement of equipment during the activity of the proposed task will be managed.

6.4 Impact Associated with the Operational Phase of Project

The most focusable area in the impact study is operation of storage facility as the impacts that arise have long term and continuous effects. It has already been discussed earlier that proposed storage tanks will not

have major impacts due to their siting. Probable impacts have been evaluated in this EIA study. Those impacts are given below one-by-one along with their appropriate mitigation measures:

During the operation phase of the storage facility, fuel products will be transported via underground pipeline to the aboveground storage tanks within the terminal.

6.4.1 Fire Hazard & Explosion

Nature of Impact: *Adverse,* ***Extent:*** *Localized,* ***Significance:*** *High*

Hydrocarbons are volatile under certain conditions and their vapors in specific concentrations are flammable. If precautions are not taken to prevent their ignition, fire and subsequent safety risks may arise.

It is very important to take public safety into account when locating fuel storage facilities, as the public can be at risk from potential spills, vapor emissions and fires. Risks from these can be minimized through implementation of buffer zones. Different types of developments may be located within specified distance from these facilities.

A detail firefighting systems layout plan is there for the terminal. TPPL will follow "OGRA Technical Standards of Depots for the Storage of Petroleum Products" for design, construction, testing and layout for the implementation of firefighting system at the project site.

Other than that the proponent will follow the Environmental Management Plan (EMP) for the prevention from any hazard cause through fire.

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

Mitigation Measures

Risks involve 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 the 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.
- Standard fire and smoke detection and protection devices such as alarms, fire hoses and hydrants to be provided in all critical areas.
- The facility will possess a detailed emergency and evacuation plan that will be regularly drilled to make sure that the responsible staff remains trained at all times.
- Firefighting equipment such as fire extinguishers and hydrant systems will be maintained at strategic locations within the premises.
- Regular inspection and servicing of the extinguishers will be undertaken by a reputable service provider and record of such inspections should be maintained.
- NFPA 30 (2012), Flammable and Combustible Liquid Codes will be strictly followed during both construction and operational stages.
- As required by NFPA 30 and to minimize impacts to personnel and facilities, Impoundment areas (secondary containment) will be provided.
- The terminal will be operated according to international standards for the prevention and control of fire and explosion hazards, including provisions for distances between tanks in the facility and

between the facility and adjacent buildings, provision of additional cooling water capacity for adjacent tanks, or other risk based management approaches.

- Implementing safety procedures for loading and unloading of product to transport systems (e.g. rail and tanker trucks, and vessels).
- Prevention of potential ignition sources such as:
  - Proper grounding to avoid static electricity build-up and lightning hazards (including formal procedures for the use and maintenance of grounding connections)
  - Use of intrinsically safe electrical installations and non-sparking tools
  - Implementation of permit systems and formal procedures for conducting any hot work during maintenance activities, including proper tank cleaning and venting.

Safety Consideration

- According to the NFPA 30 all above-ground tanks storing gasoline, diesel and kerosene must be constructed of steel.
- Tanks storing flammable or combustible liquids must have secondary containment capable of holding 110 per cent of the tanks' volume according to UL142.
- The tank must have a normal vent, which must be at least a 1-1/4" diameter steel pipe for tanks up to 2,000 Imperial gallons. If the tank contains gasoline the vent cap shall be no less than 12 feet above ground level.
- Tanks are to be placed on steel or concrete supports, and anchored if its elevation is below the flood stage.
- All tanks storing flammable or combustible liquids shall be fitted with an emergency vent in case of exposure to fire.
- The tank's capacity must be labelled on the tank, and a level gauge should be visible to the operator filling the tank.
- A 20-pound ABC fire extinguisher must be installed no closer than 20 feet, but no farther than 100 feet, from the tank, which shall be maintained and tagged at quarterly intervals.
- The NFPA 30's minimum safe distances for placing tanks from property lines or public ways must be followed, depending on the tank capacity.

Table 6.2: Fire Hazard Safety

Responsibility	Measure
Driver / Guard / GW / Whoever sees the fire first	• Immediately shout 'FIRE'… and raise the alarm (manual/electric). • Inform security guard room. • Try to put-off fire with available Fire extinguishers, if possible. • Cordon off area • Inform Respective Manager
Security Guard	• Immediately shut-off all electrical systems. • Inform Local fire brigade and local administration / area elders or police for assistance. • Control flow of traffic and allow ample space for emergency services to pass.
Terminal Executive	• Provide support to ground staff. • Inform Installation Manager and respective TPPL Staff depending on the situation at hand. • Handle medical emergencies. • Coordinate with local administration.

	• Stand-by all supporting team e.g. coordinate nearest hospital, product retrieval team, crane etc. • Investigate incident; immediate cause • Log incident in chronological order. • Clean-up site, dispose waste as per the guideline. • Conduct Head count for all the individuals and match with gate register.
Terminal Executive	• Send notification by email with Actual / Potential severities of the incident to respective line manager. • Send initial incident notification report. • Formulate incident investigation team, and mutually investigate the incident. • Get support from HSSE Team. • Share incident learnings within network
Manager Operation	• Inform GM. • Escalate emergency to crisis if required

6.4.2 Air Quality

Nature of Impact: *Adverse,* ***Extent:*** *Localized,* ***Significance:*** *Low*

It is anticipated that following are the main sources of the deterioration of air during the operational phase.

- In terms of air quality, hydrocarbon vapours will normally be released during delivery as liquid displaces the gaseous mixture in the tanks.
- Standby generators,
- loading of Tank trucks,
- Use of broken and un-metalled road for transportation means.
- Air emissions other than dust such as Volatile Organic Compound (VOC),
- Hydrocarbons (HC), CO_2, NO_X, SO_X and PM_{10} may also take part to pollute the ambient air. Major sources of these emissions are:
  - Exhaust of transport vehicles and standby generators. It is anticipated that this increase will be negligible and at very low scale.
  - Vapours emissions i.e. VOC and HC through valves, tank roofs, etc. in the ambient air which may deteriorate air quality.
- In case of accidental fire, release of greenhouse gases in the atmosphere such as CO_2 as well as release of SO_X.

Mitigation Measures

Impacts associated with operations with regards to dust and air emissions are not significant due to proper siting of storage tanks and also the emission level will be very low. In case of emergency, mitigation measures are recommended to adopt.

Preventive measures will be considered by TPPL in the design stage to avoid risk of air quality deterioration due to escape of VOC and HC in form of fumes and vapors. Those mitigations along with additional supporting mitigations for exhaust emissions are given below to reduce or keep the emission level within the limits:

- NFPA 30 should be followed in design, construction and operations of the facility in order to prevent from adverse effects of accidents.

- Leak and Gas detection system will be installed in order to detect accidental release of harmful emissions.
- Use of personnel protective equipment (PPE) such as safety goggles, dust mask, earmuffs/ear plugs and other stuff.
- VOC emission control may be positively influenced by keeping storage temperature as low as possible also frequent inspections and painting light shade on all tanks may effect on VOC formation.
- Generator and transport vehicles will be serviced regularly and any problem that may arise should be handled promptly.
- Safe driving speed will be advised to drivers.
- Emission sources will be tested regularly as per requirement of Self-Monitoring & Reporting Regulations.
- Maintaining stable tank pressure and vapour space by coordinating filling and withdrawal schedules, and implementing vapor balancing between tanks (a process whereby vapor displaced during filling activity is transferred to the vapor space of the tank being emptied or to other containment in preparation for vapor recovery)
- Where vapor emissions contribute or result in ambient air quality deterioration at levels in excess of health-based standards, installation of secondary emissions controls such as vapour condensing and recovery units, catalytic oxidizers, vapour combustion units, or gas adsorption media.
- Use of gasoline supply and return systems, vapor recovery hoses, and vapor tight trucks during loading and unloading of transport vehicles.
- Use of bottom loading truck filling systems
- Minimizing storage and working losses through installation of internal floating roof and seals
- Further minimizing working losses during filling and emptying through vapor balancing and vapor recovery techniques as described above,
- Tank cleaning and degassing can generate significant quantities of VOCs. Tank degassing vapor should be routed to an appropriate emissions control device. Other practices include restricting activities to a season when the potential for ozone formation is reduced or to a time of the day when the potential for ozone formation is less;
- Tanks should be periodically inspected internally, and establishing an inspection frequency based on the condition of the tank at the previous internal inspection (typically 10 years or less).

6.4.3 Noise Impact

Nature of Impact: *Low,* ***Extent:*** *Localized,* ***Significance:*** *Low*

The sources of noise that have been identified in the proposed storage terminal include the frequent movement of tank trucks for filling and decanting purposes, pumps and operations of standby generators. Due to strict HSE policy, all vehicles will be maintained and exhaust noise will be kept within the limits.

Noise level, if high, during operation phase may pose health issues to the workers if not wearing proper PPE. Regular exposure to high noise may result in hearing impairment or hypertension. However, noise impact during operational phase will be minimum and insignificant as the operation of oil terminal does not involve any such operation which will pose significant noise impact.

Mitigation Measures

Preferred mitigation measures to avoid or minimize impacts of high noise are given below:

- In the design, pumps will be adjusted to positions where lesser impact of noise is expected.
- Pump operators will wear earmuffs/earplugs while operating or working near pumps.
- Pumps will be regularly tested for any engineering fault. Engineering faults or unmaintained pumps generally generate high noise.
- Standby generators will be serviced and maintained regularly.
- Truck drivers will be advised to turn off the engines when vehicle is in idle state.
- Truck drivers will be restricted to strict procedures for proper maintenance of vehicles.
- Steps will be taken to reduce the noise at the source.

6.4.4 Solid Waste

Nature of Impact: *Moderate,* ***Extent:*** *Localized,* ***Significance:*** *High*

In general, there is no source of solid waste due to operations of storage tanks as like all the waste in liquid. However, if considered it on broader spectrum, depot operations will increase the number of employees and wastewater generation that will cause indirect generation of solid waste in shape of general domestic waste in area and wastewater sludge waste.

Wastes generated at terminals also include tank bottom sludge, which must be periodically removed to maintain product quality or tank storage capacity, as well as spill clean-up materials and soils contaminated with oil. Typically, sludge is composed of water, residual product, and various solids including sand, scale, and rust.

Impacts anticipated due to improper management of solid waste and its disposal may cause following impacts:

- The first and major impact may arise due to unsatisfactory management of solid waste is that percolation of unmanaged leachate may cause damage to underground water; soil quality may persist for longer time.
- Indirectly, groundwater quality deterioration may affect human health. Use of contaminated groundwater may enter the food chain as a source of drinking water and irrigation for poor community.
- Improper solid waste handling and storage will create aesthetic problems and issues.
- Accumulation of solid wastes especially sludge and its unplanned removal from storage and may cause nuisance in the surrounding area due to its bad smell.

Mitigation Measures

Preventive measures which need to be adopted for solid waste management are given below:

- Proponent will allocate an area in the facility for the storage of sludge and other waste.
- The capacity will be increased keeping in view the estimated amount of solid waste generation from proposed tankage areas and other sources.
- Solid waste storage facilities will be properly lined with impervious material.

- Third party contractor will be hired for the disposal of solid waste and required, recyclable waste will be sold out frequently, as is the current practice with terminal operations (attached as Annex-VI a waste disposal certificate for hazardous materials for current terminal operations)
- All areas of solid waste storage will be monitored on regular basis.
- It is important to designate and maintain collection areas/drums of domestic waste such as plastic, paper, glass etc.
- Tank sludge and spill clean-up materials should be managed via re-processing for product recovery or as a waste at a facility licensed to handle this type of material in an environmentally sound manner.
- Small quantities of oil contaminated soils should be managed via land treatment or as a waste at a facility licensed to handle this type of material.

6.4.5 Natural Disaster (Earthquake)

The Geological Survey of Pakistan has placed the area of District Shikarpur, where the site under study is located, in Seismic Zone 2A region.

Mitigation Measure

In order to avoid the disastrous situation due to earthquake, it is anticipated that management of TPPL may consider the resistant material for building the storage tanks and associated structures. It is desired that all project structures should be constructed keeping in view the structural and material requirements of Zone 2A projects.

6.4.6 Wastewater

Domestic wastewater of the terminal mainly includes sewerage and process wastewater. Process wastewater consists mainly of tank bottom draining and contaminated storm water runoff, including water from tank leaks and spills that collects in hydrocarbon contaminated secondary containment areas. Other possible sources of wastewater include oil contaminated water from washing tanker trucks.

Rainwater infiltration, condensation of moisture from tank vapor space, and water present in the product itself prior to delivery may all contribute to the presence of water inside product storage tanks. Water that separates and settles to the tank bottom should be periodically drained from the bottom of the tank, resulting in a liquid effluent of oily water.

Mitigation Measures

Measures to minimize generation of oil contaminated storm water runoff primarily include:

- Application of effective spill prevention and control
- Implementation of secondary containment procedures that avoid accidental or intentional releases of contaminated containment fluids
- Installation of storm water channels and collection ponds with subsequent treatment through oil / water separators oil / water separators should be properly selected, designed, operated, and maintained.

Measures to prevent the accumulation of tank bottom water include:

- Regular maintenance to locate and repair / replace tank roof, seals, or other sources of water infiltration

- Use of domes on floating roof tanks to reduce rainwater penetration
- Use of meters ("sight glasses") to determine water content in tank, as well as vortex eliminators / barriers to minimize product release during draw off.

As the major wastewater sources are tank bottom water and storm water runoff, wastewater flows in this sector typically occur in batches, not lending themselves to on-site biological treatment. These types of effluents may need to be pre-treated via oil / water separators, with further on-site or off-site biological and chemical treatment and activated carbon systems, depending on the volume of contaminants present, and whether the facility is discharging the wastewater into a municipal system or directly to surface waters.

6.4.7 Labour Safety & Occupational Health

Nature of Impact: *Adverse,* ***Extent:*** *Localized,* ***Significance:*** *High*

A planned approach to safety is essential for any facility

- Ambient noise level is expected to increase slightly due to pumping of products.
- Impacts will be short term and within limited area.
- Accidental oil spills/leaks if in contact with workers may be hazardous for the workers' life and lead to mortality to some extent.
- In case of accidental fire, it may cause explosion due to high flammability of oil and if workers are close by, may lead to mortality and severe damage to human life.
- Workers may be at a risk of overexertion which is a major cause of the inflammation of joints and ligaments that results from excessive physical effort. Excessive physical effort affects people differently: for some people it may cause little or no pain or discomfort and for some it may be debilitating.

Mitigation Measures

In order to tackle above health and safety issues, following methodologies will be beneficial:

- Personal Protective Equipment (PPE's) to be supplied to workers such as helmet, earplugs, safety goggles, hand gloves, cover all, safety shoes, gas mask, etc. Workers will be strictly advised to wear PPE's at all time while within the project site and tank farm area.
- Tanks should be inspected frequently. It will help in identifying all spill/leak points.
- In case of an emergency/accident, Emergency Response Plan shall be followed.

Table 6.3: Characteristics of Environmental Impacts from Construction Activities

S #	Environmental Impacts	Impact Characteristics			
		Nature	Duration	Reversibility	Significance
01.	Soil Erosion	Moderate	Short Term	Irreversible	Low Significance (if, Provided measures are effectively implemented)
02.	Land Contamination	Adverse	Long term	Irreversible	Low Significance (if, Provided measures are effectively implemented)
03.	Construction Waste	Moderate	Short Term	Reversible	Low Significance (if, Provided measures are effectively implemented)

04.	Water Quality	Adverse	Short Term	Irreversible	Low Significance (if, Provided measures are effectively implemented)
05.	Dust	Moderate	Short term	Reversible	Low Significance (if, Provided measures are effectively implemented)
06.	Exhaust Emission	Moderate	Short term	Reversible	Low Significance (if, Provided measures are effectively implemented)
07.	Waste Water Generation	Adverse	Short Term	Reversible	Low Significance (if, Provided measures are effectively implemented)
08.	Noise Quality	Moderate	Short term	Reversible	Low Significance (if, Provided measures are effectively implemented)
09.	Biodiversity	Low	Long term	Irreversible	Low Significance (if, Provided measures are effectively implemented)
10.	Traffic Flow	Moderate	Short Term	Reversible	Low Significance (if, Provided measures are effectively implemented)
11.	Occupational Health & Safety	Adverse	Long term	Reversible / Irreversible	Low Significance (if, Provided measures are effectively implemented)

Table 6.5: Characteristics of Environmental Impacts from Operational Phase

S #	Environmental Impacts	Impact Characteristics			
		Nature	Duration	Reversibility	Significance
01.	Fire Hazard & Explosion	Adverse	Short Term	Irreversible	Low Significance (if, Provided measures are effectively implemented)
02.	Air Quality	Adverse	Long Term	Irreversible	Low Significance (if, Provided measures are effectively implemented)
03.	Noise	Low	Long Term	Reversible	Low Significance (if, Provided measures are effectively implemented)
04.	Change in Soil Condition	Adverse	Long Term	Irreversible	Low Significance (if, Provided measures are effectively implemented)
05.	Ground Water	Adverse	Long Term	Irreversible	Low Significance (if, Provided measures are effectively implemented)
06.	Solid Waste	Moderate	Short Term	Reversible	Low Significance (if, Provided measures are effectively implemented)
07.	Natural Disaster	Adverse	Long Term	Reversible	Low Significance (if, Provided measures provided in chapter 8 are effectively implemented)
08.	Labor Safety & Occupational Health	Adverse	Long Term	Reversible / Irreversible	Low Significance (if, Provided measures are effectively implemented)

09.	Safety Consideration in Design Phase	Beneficial	Long Term	N/A	N/A
10.	Socio Economic Impacts	Beneficial	Long Term	N/A	N/A

6.5 Guidelines and Safety Recommendations for Oil Terminal

These general safety guidelines are designed to prevent incidents at oil terminals from occurring and to limit the accidents to protect human health and environment. The operators of oil terminal have the primary responsibility to ensure the operational and process safety of oil terminal's personnel and surrounding environment. Competent persons (i.e. Terminal Manager, HSE Manager, Technical Manager) should introduce and enforce adequate measures to ensure that their team is committed to safety. The potential risks to neighboring communities and environment due to transport, handling and storage of hazardous substances should be mitigated. The information communication about the project and involvement of neighboring communities in the project related activities should be ensured. Regular exchange of the information between the operators of the facility (oil terminal), local authorities and relevant stakeholders must be ensured. This may include information regarding oil terminal safety, past incidents, lessons learned, and good practices.

6.5.1 Responsibilities of Terminal Manager, HSE Manager, Technical Manager

Competent persons (Terminal Manager, HSE Manager, Technical Manager) should maintain the expertise of their team relating to:

1. Accident prevention, emergency preparedness and response
2. Periodic inspections and audits
3. Work permit system for operations of Oil terminal

Competent persons should ensure that the objectives of preventing and limiting the effects of accidents are taken in account, particularly to ensure safety distances between oil terminals and residential areas, areas of public use, buildings, major transport routes and areas of natural sensitivity or interest. They should ensure that the procedures should be designed to ensure that technical information about health, safety and protection of the environment is available. The inspection regime of oil terminal as defined by the competent person should reflect the following:

1. Hazard Potential of the Oil terminal
2. Proximity to sensitive Environment or communities
3. Age of the installation
4. Previous accident and incident at the terminal

6.5.2 Safe Oil Terminal Operations

Oil terminals should be designed, constructed, operated and maintained to ensure high level of protection for Health, Safety and Environment. Adequate consideration should, therefore, be given to various aspects which could affect the safety of an oil terminal, such as safer design and stress factors, safe operability, quality of material, environmental protection and monitoring. The Oil terminal should be designed, constructed and operated at least in accordance with recognized national and international

codes, standards and guidelines. When considering hazard controls and mitigation, considerations shall be given to reduce the associated risks according to the following hierarchy of controls:

1. Elimination of Hazard
2. Engineering Controls
3. Administrative Controls (e.g. procedures, code of conduct, signage, warnings etc.)
4. Personal Protective Equipment

The operator of the facility (oil terminal) should establish and maintain an Oil Terminal Management System (OTMS) that is adequate to manage risks involved in terminal operations and to comply with applicable legal and regulatory requirements. Hazard identification and risk assessments should be undertaken during all stages of the Terminal operations, as appropriate, in order to choose among different options and to assess unusual circumstances.

The operators of the facility should adopt a methodology for the on-going hazards identification, risk assessment and determination of necessary control measures for routine and non-routine activities, and for management of change. A document should be set up in order to make suitable arrangements for major accident prevention. Operator of the facility (Oil terminal) should comprehensively and systematically identify all major accident scenarios relating to all hazardous activities that may be carried out, including impacts on the environment arising from a major accident. The hazard identification, risk assessments and arrangements for major accident prevention should be clearly described and compiled in the report on major hazards. The workers should be consulted at the relevant stages of the preparation of the report on major hazards.

To enable a safe operation, the oil terminal operator should establish and communicate clear management performance standards for all management levels and define roles, responsibilities and accountabilities for all employees. Lines of control and responsibility should be clearly defined and communicated to all parties involved in the operations. The operator of the facility (Oil terminal) should ensure that any person under his jurisdiction (including contractors and third parties) performing high-risk tasks is competent on the basis of appropriate education, training and experience.

6.5.3 Safe Design Considerations

National and International standards for equipment design and operation where they exist should be implemented and be the subject of inspection by the operator of the oil terminal and as well as by the competent third party. The following key aspects for the design and operation of equipment related to hazard identification and mitigation, control and response have to be taken into account:

- Storage tank design to meet appropriate local legal codes and industry standards.
- Piping, valve, pumps and fitting design according to requirements for piping design to meet appropriate local legal codes or industry standards.
- Piping and valve fittings should be “fire safe” as per typical industry standards (e.g. API/ISO).
- Underground containers and pipelines should be provided with a suitable corrosion protection and secured against the force of buoyancy.
- Level measurement devices should be installed, which include low and high level alarms.
- Overfill prevention devices- level detection linked through a hardware or software to interrupt flow in the event of hazardous level occurring in a storage tank.

- Consideration of Natural Hazards such as flood, earthquake, lightning strike etc.
- Storage tanks are normally located inside a retaining wall on a solid foundation.
- Trans-shipment sites should have retention facilities capable of accommodating the volumes of liquid that can escape until suitable measures or automatic safety systems take effect (Secondary containment).
- Underground pipelines should be double-walled or any detachable installed connections and valves should be installed in monitored leak proof inspection chambers.
- Construction of containment should be impermeable; the integrity of sealed systems must be in accordance with the physical-chemical properties of the substances handled. The integrity of the containment should be demonstrated by generally accepted and recognized testing methods.
- Overflow detection devices, which act when a release has started. These could be situated inside the secondary containment or in a piped overflow.

6.5.4 Hazard Identification and Mitigation

The Hazard identification and Risk Assessment (HIRA), risk ranking and further controlling or reducing the risks to acceptable levels. Hazard Management should be taken into account by the operator of the of the facility (Oil terminal) in all stages of the operations. The Oil terminal which have the potential for causing major accidents or prone to potential hazardous activities i.e. transport, handling and storage of hazardous substances must consider following mitigation tools.

Spills or Leaks in the Terminal

Spill and leak detection is one of the primary responsibility of the operators of the facility (oil terminal). This includes terminal site personnel, maintenance personnel, terminal controllers, supervisors and contractors providing services within the respective facility (Oil terminal). The terminal manager and the technical manager has the overall responsibility for their team involved in spill/leak detection in the oil terminal. When a leak is detected, the personnel involved should immediately inform the operation personnel and the emergency response team. Spill responders are to follow the emergency notification and response procedures.

The techniques used to detect and locate spills or leaks are as follows:

1. Visual inspection of the valves, pipelines and tanks for the signs of leakage and spills by terminal operators or site supervisors in regular intervals.
2. Pipelines are to be visually inspected by the site maintenance teams for the signs of potential leakage or spills periodically (as per SOP).
3. All relevant procedures (spill/leak detection and response) are to be contained within the terminal operation and maintenance manuals, and are consulted with the site team at regular intervals.

Mitigation of substantial release:

All relevant procedures addressing abnormal operations for the pipeline must be contained in the operation and maintenance manual of the oil terminal. The abnormal operations identified to mitigate or prevent a substantial release in worst case includes: unintended closure of walls, unintended shutdowns, loss of communications, operation of safety alarm, seal failure or other abnormal operations.

Spill mitigation:

Spill mitigation involves the process of minimizing the quantity of oil released from the pipeline, once a leak is detected. Spill mitigation activities are to commence immediately upon discovery of a spill, since shutdown time may be critical to reduce the quantity of spilled material. Spill mitigation will likely involve operation of pumps, valves, and repair equipment. Any repair work shall also be in accordance with procedures contained in operation and maintenance manual of the oil terminal.

Spill containment:

Spill containment process takes place after or simultaneously with the spill. The purpose of spill containment is to minimize and prevent the spreading of released materials. Spill containment may involve installation of dykes or other flow-restricting devices, and deployment of booms.

Spill recovery:

Recovery of spilled material process takes place after or concurrent of spill containment. Spill recovery may include pumping of spilled hydrocarbon products, or excavation of contaminated soils. Any recovery of spilled materials which is not considered to be associated with the "emergency response" stage of an incident shall be conducted in accordance with respective state and federal environmental laws and regulations.

Fire or Explosion in the Terminal

Immediate Actions:

1. Take lifesaving actions as defined in the (ERP).
2. Notify the terminal supervisor or incident commander (HSE Manager).
3. Initiate necessary measures as defined in the relevant procedures for controlling the release of liquids and other appropriate steps to control the fire.
4. Call for assistance (Fire brigade and ambulance service).
5. If the proper training has been received by the site team of the terminal, commence firefighting procedures to contain and extinguish the fire.

Firefighting:

1. Only personnel with proper training should be used for firefighting.
2. Once the fire fighters have arrived, all the firefighting activities will be coordinated by the local fire department.
3. Site personnel without prior fire-fighting training can be used to assist trained firefighters, to assist with vehicular movement and to man roadblocks.

Hazardous Area Classification in the Terminal

The Hazardous area is mainly identified for the purpose of screening and storage of petroleum products and installation of electrical equipment. An area will be deemed to be Hazardous where petroleum products stored having a flash point below 65^{o}C or any flammable gas or vapor in a concentration capable of ignition is likely to be present and where a petroleum or flammable liquid has a flash point above 65^{o}C is likely to be refined, blended or stored at above its flash point.

Safe Loading and Unloading in the Terminal

Following precautions shall be taken for the hazards associated with the transfer of petroleum products to or from a tank truck;

- Open source of ignition shall not be allowed in the area where product transfer operations are taking place;
- Fire extinguishers shall be placed near the tank trucks during operations in a designated area;
- The double pole master switch shall be put off immediately after parking the truck;
- No electrical switch on the truck shall be turned on or off during the transfer;
- The first operation after positioning the truck shall be to provide proper earthing;
- Earthing shall be disconnected just before the release of truck;
- Hoses shall be handled with the care and inspected periodically as per SOP;
- No repairs shall be made on the truck while it is in the loading or unloading area;
- Personnel shall wear applicable PPE as per SOP.

6.6 Decommissioning Activities

6.6.1 Potential Environmental and Social Risk

The decommissioning and closure phase of the project may include the following environmental and social risks:

- Release of hazardous materials or wastes into the environment
- Release of untreated effluents into the environment
- Physical environmental disturbance as a result of the removal of project infrastructure
- Health and safety risks associated with demolition activities, remaining infrastructure, and /or poor rehabilitation

In addition to that project infrastructure which may remain in situ (flow lines, waste disposal sites etc.), there is the potential ongoing risk of long term liability and environmental risk. The following sections describe how these risks can be eliminated or minimised.

6.6.2 Decommissioning Principles and Procedures

- Carefully consider long term social and environmental liability of all proposed development actions during the lifespan of the project and, where feasible, implement alternatives that minimise long term risks.
- Follow an incremental approach to decommissioning by minimizing the project footprint during the project lifespan and by closing and rehabilitating all areas which are no longer required for the project at the time. Quarries are examples of such areas, which can be fully decommissioned and rehabilitated prior to project closure. This provides the benefit that decommissioned facilities can be monitored over an extended period while the company still has operational capacity on site to manage any deficiencies in the decommissioned facilities.
- Review current legislation that may influence decision making at the time of decommissioning, together with best international practices of the oil and gas sector.
- Update the project Waste Management Plan to include all relevant aspects of waste management during decommissioning.

- Systematically shut down the operating processes in a manner which minimises risks to project personnel, the environment and the surrounding industries.

6.6.3 Contaminated Land Management and Waste Disposal

- Prepare a contaminated land assessment which identifies all areas of contaminated land, the nature of the contamination and the necessary measures to contain and rehabilitate these sites. Specifications are to include in situ bioremediation, where feasible, or other measures to remediate the area in accordance with good industry practice, including the removal of the contamination to a hazardous waste disposal site if no other options are available.
- Contain liquid and solid wastes for treatment and safe disposal, in accordance with SEQS and other appropriate standards and guidelines applicable at the time. This includes any wastewater generated by flushing and cleaning of flow lines and tanks to remove hydrocarbons.
- Prepare an inventory of all hazardous materials and wastes to be disposed of and specify the method of disposal in accordance with the MSDS, Hazardous Substance Rules and best practice industry standards.
- Remove and dispose of demolition waste at District Management designated waste disposal facility.
- Remove and dispose of all litter, parts and equipment at an approved disposal site.
- Disassemble and remove all machinery from the site.

6.6.4 Re-contouring, Reinstatement and Rehabilitation

- Shape, level and compact the final landscape after removal of all project infrastructure.
- Shape all other channels and drains to smooth slopes and integrate into the natural drainage pattern.
- Construct contour banks and energy dissipating structures as necessary to protect disturbed areas from erosion prior to stabilisation.
- Promote re-vegetation through the encouragement of the natural process of secondary succession.
- Remove alien and/or exotic vegetation.

6.6.5 Closure and post-closure monitoring

Prior to decommissioning and rehabilitation activities, a monitoring programme shall be developed and submitted to the SEPA for approval, as a part of the Final Decommissioning and Rehabilitation Plan (DRP). The programme is to include proposed monitoring during and after the closure of the facility.

Monitoring shall include the following:

- Verification that any waste, wastewater or other pollutants generated as a result of decommissioning are appropriately managed, in accordance with the detailed requirements set out in the Final DRP,
- Verification that all de-contaminated sites are free of residual pollution after decommissioning.
- Verification that acceptable cover has been achieved in areas where natural vegetation is being re-established.

Chapter 7 ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

7.1 Introduction

This Section of the EIA Study lays out the Environmental Management Plan (EMP) for the works concerning the Designing, Pre-Construction, Construction and Post-Construction including the Operation stages of the Enhancement of Storage Capacity of Shikarpur Terminal Project of TPPL.

7.2 Need for EMP

The EMP is meant to provide an overall approach for managing and monitoring environment-related issues and to describe the institutional framework for implementing the EMP.

The previous sections identified the environmental impacts of different activities during the designing, pre-construction, construction and operation stages of the terminal capacity enhancement Project and mitigation measures to reduce the severity of the impacts. For successful environmental practices, an essential requirement of the SEP Act 2014 is to develop an Environmental Management Plan (EMP) to guide through the procedures to the management and employees of the organization for continual improvement. This EMP will be implemented by TPPL and it is essential for TPPL to implement this EMP in letter and spirit and to make changes where required, with information to the Responsible Authority. EMP aims to achieve the following objectives:

- Outlining measures to be taken during the implementation and operation of a project to eliminate or offset adverse environmental impacts, or reduce them to acceptable levels.
- The actions needed to implement these measures such as defining roles and responsibilities of the project proponent for the implementation of EMP and identifying areas where these roles and responsibilities can be shared with other stakeholders.
- Defining the requirements for communication, documentation, training & management and implementation of the mitigation measures.
- Actions required assessing the effectiveness of the mitigation measures employed such as guide through the monitoring mechanism and identifying related parameters that will be required for confirming the effective implementation of the mitigation measures.

7.3 EMP Process

The EMP comprises of the following areas & defining the methods and procedures of implementation.

- Organizational structure and roles and responsibilities of project personnel.
- Specific requirements for the implementation of the EMP.
- Mitigation or impact management matrix.
- Monitoring plan with the emphasis on specific parameters to monitor.
- The preparation of this plan has involved an extensive and detailed program of investigation to the processes involved and consultation with TPPL and the issues concerned. Therefore, this network will provide a structure to assist in the implementation of the management plan accordingly.

- The TPPL's health, safety & environment (HSE) department handles the entire environment related concerns and issues. The HSE manager is the incharge of HSE department and liable to report Managing Director. HSE department will appoint HSE officer who will coordinate with the contractor during construction process and also monitor during the operations of Terminal.

7.4 Management Approach

Management will undertake overall responsibility for compliance with the EMP. It will ensure that all the activities that the management executes comply with positive environmental sensitivities as well as it will cooperate with the concerned regulatory agencies such as Sindh Environmental Protection Agency (SEPA). The dynamic approaches that are followed towards successful implementation of the environmental management plan are listed below:

- Compliance with the relevant legislative and regulatory requirements of the project.
- Developing appropriate monitoring indicators to assess the performance as well as magnitude of impact on the environment.
- Regular review of the project activities and assessing their impacts on the environment.
- Setting project's key environmental concerns and addressing issues through public support, awareness and publicly reporting its progress.
- Communicating broadly with internal & external stakeholder on issue of environmental concerns.

7.5 Maintenance of the EMP

EMP needs to be revised on periodic basis to maintain up-to-date environmental management requirements with the changing physical and regulatory constraints. Therefore, outlining and defining the responsibilities of personnel and activities under the project's operation execution, implementation, mining, operation & monitoring and decommissioning phase are integral part of maintenance of the EMP. Dissemination of reviewed and revised EMP needs to be ensured to all stakeholders particularly, relevant government and municipal agencies so that their modified role is also redefined and re-established in the overall environmental management process.

7.6 Health, Safety and Environment Management System

Health, Safety and Environment Management System is essential and integral component of the environmental management system for the safe and secure working environment assuring sustained development, dependent on health associated performance of human resources. EHS issues and aspects are outlined in EMP with mitigation measures based on principles of best management practices. The HSE policy are attached in annexure-IV. HSE management system undertakes carrying out a complete assessment, evaluating, monitoring, identifying and control measures (mitigation) of all potential hazards and risks arising during the mining, construction, operation and decommissioning phases of the proposed project. It needs to ensure that the Health and Safety Plan (HSP) along with the Health and Safety Rules is established, documented and enforced. The plan also outlines roles, responsibilities and expected outcomes of proper implementation with respect to the environment, health and safety management of various phases of the project. These measures should be implemented to ensure that no significant adverse, health and safety impacts occur due to proposed activities associated with the project. TPPL's Health & Safety Environmental Policy is attached in annexure-VIII.

7.7 Risk Assessment

7.7.1 Project Brief

The proposed project activities of storage capacity enhancement will be carried out in the TPPL's Shikarpur Terminal located at plot no. 223 & 224, Deh Ali Murad Village, Kand Kot road (opposite PARCO terminal), District Shikarpur. The project activities include Construction of 3 above ground tanks for the storage of petroleum products, Construction of one tank from the storage of firewater, Firefighting system upgrade, Misc. civil structures, MOGAS receipt line from PARCO installation at Shikarpur, Internal piping for HSD/ Mogas and Area built-up.

Project components include:

- Acquiring the necessary equipment,
- Construction work,
- Installation and commissioning
- Necessary training of personnel to operate the storage terminal, and
- Operations and management of the TPPL's terminal including storage of products and waste management.

7.7.2 Identification of Environmental and Social Aspects of Project

Potential environmental and social aspects from the construction and operation of the terminal project include the following key activities:

- Equipment mobilization and procurement and storage of construction material
- Water consumption and wastewater generation
- Construction waste generation and disposal
- Storage Terminal's operations
- Storage of products
- Handling and management of waste during operations
- Emergency situations

Risk assessment of the abovementioned project activities identifies the following environmental liabilities which would require mitigation/control measures to be implemented to reduce the environmental impacts to an acceptable level.

- Air and noise emissions
- Possible contamination of water, soil and land from discharge of effluents including oily waste and seepage to land and water
- Solid waste including excavated material, hazardous and non-hazardous wastes
- Traffic issues during construction and operation phase
- Resource consumption
- Emergency case scenarios
  - Conditions potentially leading to major release accidents including releases from pipes, flexible connections, filters, valves, pumps, compressors, tanks, stacks etc.;
  - Explosion in storage areas; and
  - Occupational safety hazards

- Socioeconomic impacts

Workers are prone to safety hazards during construction work such as accidents during work at height, poor ergonomic conditions etc. and exposure to hazards and toxic and explosive materials.

Hazards associated with the operational activities of the Terminal can be of the following categories:

1. **Electrical:** Electrocution from live conductors and misuse of power tools, overhead power lines, downward electrical wires, buried cables, and work during electric storms.
2. **Structural:** Potential for falling or strain when working conditions include slippery surfaces, steep grades, narrow stairs, open holes, trip hazards and unstable flooring; potential puncture from objects and potential burial from trench cave-ins or from unstable slopes on material stock-piles.
3. **Mechanical:** Collision accidents with moving equipment, especially when operating in reverse, failed pulleys, snapped cables, and clothes catching in gears or drills.
4. **Temperature:** Heat stress in hot environments or when working in clothing which limits the dissipation of body heat and moisture.
5. **Noise:** Stress and physical damage to the ear when subjected to noise levels exceeding recommended guidelines (e.g. an 8-hour, time-weighted average sound level of 90 dB(A), as per US guidelines, SEQS recommend 85dB (A) as the limiting value for motor vehicle noise- there is no SEQS limitation imposed on noise generated from industrial process).

   In addition, it is possible that if the work areas are not designed properly, they can cause discomfort and mental stress in workers, which can result in loss of efficiency, and thus lessen the worker's ability to respond promptly to any hazard. Also, creation of such conditions can cause monotony and fatigue, thereby increasing the potential for hazards and accidents to occur.

   Chapter 6 of the EIA report has provided a detailed description of the impacts identified above along with recommended mitigation measures to minimize the adverse impacts. These measures include the use of alternative options for siting, management, and physical control and are based on the understanding of sensitivity of environmental receptors in the project area, the legislative controls that apply to the project and a review of good management practices while operating in sensitive environments.

   Mitigation measures for the potential environmental and social impacts have also been made part of the mitigation plan such that they can be effectively implemented and monitored to satisfy the requirements of Sindh Environmental Protection Act 2014 and Environmental IEE/EIA Regulations 2000. These Acts of Law and Regulations outline the objectives, define the responsibilities of the project sponsors/owners and contractor(s), and lay down the required communication, reporting procedures and mechanism through which the proposed measures will be monitored.

7.8 Legislations & Guidelines

The EIA for the proposed Terminal project has discussed in detail the national and international legislation and guidelines that are relevant to the project in Chapter 3 of the EIA report.

The proponent of the project will ensure that the project is conducted in conformance with national legislation and relevant international conventions and that guidance is sought form national and international guidelines. It will also be ensured that key project management of the company and all its assigned contractors are aware of these legislation and guidelines prior to start of the project activities.

7.9 Roles & Responsibilities

Environmental management should become an integral part of policy of the proposed project. Therefore, committing to reduce the environmental impacts will reflect the management approach and believe that good performance in this area is synonymous with running well-managed efficient proposed project operations. During the construction phase, main responsibility of environmental performance will be followed by the HSE officer on the daily basis.

In case of normal operational phase, main responsibility for environmental performance will be supervised by site engineer while the daily management will be performed under the site officer who in turn charges of environmental matters. Under their surveillance, environmental management during operations will be performed as per the mitigation and monitoring plans outlined in this EIA. A brief structure of role and responsibilities is given below:

7.9.1 Top Management of TPPL

Environmental management plan (EMP) will be regulated by the Top Management of TPPL; therefore, will play an important role. Some of the key role & responsibilities are given below:

- To cooperate and consult with relevant environmental agency in order to perform in better way.
- To evaluate the progress of development and implementation of this management plan.
- To approve any change in decision making with the consultation of respective managers, if appropriate.

7.9.2 Project Manager

The role of Project Manager is very important. The success of an EMP will mainly depend upon effective management of the EMP by Project Manager. Following are some of the roles & responsibilities given to the Project Manager:

- Ensure that the contractor is aware of all specifications, legal constraints, standards and procedures pertaining to the project specifically with regards to environment.
- Ensure that all stipulations within the EMP are communicated and adhered to by contractor(s).
- Monitor the implementation of the EMP throughout the project by means of site inspections and meetings. This will be documented as part of the minutes of the site meeting documents.
- Be fully conversant with the Environmental Examination of the project, the conditions of the approval of EIA and all relevant environmental legislations.

7.9.3 Site Manger

The role of site manager is very important. The success of an EMP will mainly depend upon effective management of the EMP by this person. Following are some of the roles and responsibilities given to the site manger

- To ensure that the points of views of staff are considered and placed in the EMP accordingly.
- To identify issues and where possible, propose solutions for inclusion in the management plan review process.
- To improve coordination and exchange of information between top management, employees, contractors, etc.
- To contribute towards the actions to deliver the management plan and ensure its continued development.
- To monitor the progress of development and implementation of this management plan.
- Have overall responsibility for the implementation of EMP.
- Liaise with the Project Manager on his delegate, the HSE Officer and relevant discipline Engineers on matters concerning the environment.

7.9.4 Health, Safety & Environment (HSE) Officer

- Be fully conversant with the Environmental Examination and conditions of its approval.
- Be fully conversant with the Environmental Management Plan.
- Be fully conversant with all relevant environmental legislation, policies and procedures, and ensure compliance with these.
- Convey the contents of this document to the contractor site staff and discuss the contents in detail with the Project Manager and Contractor.
- Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMP.
- Take appropriate action if the specifications contained in the EMP are not followed.
- Monitor and verify that environmental impacts are kept to a minimum, as far as possible.
- Review and approve construction methods, with input from Site Manager, where necessary.
- Ensure that activities on site comply with all relevant environmental legislation.
- Order the removal of person(s) and/or equipment in contravention of the specifications of the EMP.
- Liaise with the Site Engineer regarding the monitoring of the site.
- Report any non-compliance or remedial measures that need to be applied.
- All environmental problems arising on the construction area will be reported to the Project Manager by the Site Manger. Reports on such problems will be submitted to the Project Manager by the Site Manager.
- Prevent actions that will harm or may cause harm to the environment, and take steps to prevent pollution on the site.

7.9.5 Contractor(s) for Construction and Operation

On behalf of contractor, the main responsibilities for all matters pertaining to environment will be that of the chief of the assigned contractor. The role and responsibilities of the contractor will consist of the following basic points:

- To carry out construction/operation activities in environmentally sound manner.
- Shall propose measures to minimize environmental impacts during construction process, and submit them to the Environmental Officer.

- In case of having impacts on the environment, the contractor will inform these to the HSE Officer in time to get instructions and then take next step.
- Comply with the environmental management specifications;
- Submitting and obligatory Method Statements for approval by the HSE Officer before any work is undertaken;
- Submitting a report at each site meeting which will document all incidents that have occurred during the period before the site meeting.
- Maintaining a public complaints register.
- Arrange that all his employees and those of his subcontractors receive training before the commencement of construction.

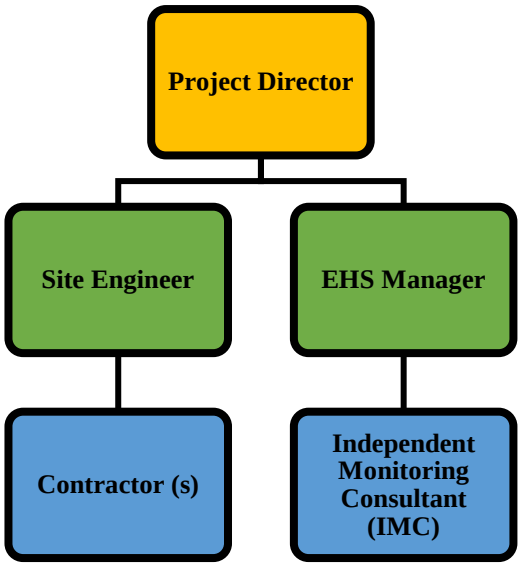


Figure 7.1: Suggested Organogram for Environmental Management for proposed Terminal

7.9.6 Independent Monitoring Consultants

The proponent shall appoint an Independent Monitoring Consultant (IMC) who will monitor to ensure that the construction is in accordance with the EIA approval conditions. The results of the periodic monitoring will be compiled in monitoring reports which will be submitted to the project management for review and necessary action. The consultant will maintain monitoring records and any deviations from or changes to the contract plans.

7.9.7 Environmental Management Program

Current plans for environmental management during development/design, construction, and operation phase of the project are mentioned in sections below.

7.9.8 Design of Facility

It includes the location of proposed project site, extension area, facilities to be installed in given space of project area as well as machines and other related operations. If design parameters need to be change due to any reason after getting environmental approval, proponent will assess the environmental impacts that may arise from such changes. If the impacts are found to be different and in excess of those

mentioned in the report, mitigation measures must be developed to minimize these impacts with respect to the changes.

7.9.9 Approvals

Obtaining NOC from SEPA does not relieve the proponent for other obligations and hence TPPL and the contractor will obtain all relevant clearances and necessary approvals required by the Government of Sindh prior to initiate the proposed operations.

7.9.10 Environmental Trainings

Necessary training on environmental and other safety issues will be provided to the technical and supporting staff before start of activities to ensure that all the staff is well acquainted with the nature of job, inherent risks, hazards, requirements of job safety and EMP. The HSE Manager will determine the training requirements.

During the training, the following areas of knowledge and experience are considered essential:

- Understanding the properties (e.g. flammability, corrosiveness, toxicity, reactivity) of hazardous substances, as well as the levels at which they pose a significant danger requiring protective measures.
- Awareness of early-warning indicators, hazards/risk identification, and ability to recognize potentially hazardous situations.
- Familiarity with engineering controls to avoid occurrence of hazardous situations.
- Familiarity with capabilities and limitations of the facility to respond to hazardous emergencies: ventilation system, plumbing systems, shut-off systems, containment devices, and emergency response procedures.
- Knowledge of the use and maintenance of emergency response equipment, as well as routine equipment for health and safety monitoring and protection.
- Knowledge of methods and procedures for decontaminating equipment, and facility, following potential chemical contamination.

Records of all trainings should be maintained. It is recommended that in case of any undesirable event or emergency situation, a follow-up session should be arranged to review the weaknesses ad gaps in the existing system and possible reasons which caused the event. This would enable the management in keeping such events from recurring by placing additional and more efficient controls.

7.9.11 Communications

For effective management and monitoring of the environmental performance during the construction and operation phase, communication will be maintained by the Site Supervisor and HSE Manager who will coordinate with the project management and regulatory agency on necessary matters.

- **Construction Phase:** Site supervisor will be responsible for coordinating the project progress to the HSE Manager during construction phase. He will supervise the construction work to ensure that provisions of EMP/EIA are not violated at any stage. If any undesirable event such as work related injury, death, or any other emergency situation arises during construction, the Site Supervisor shall

report this to the HSE manager. Any issues that require attention of higher management will be communicated to them for action by the HSE manager. The site supervisor should report to the HSE Manager on weekly basis during the construction phase.

- **Operation Phase:** Following is suggested for an effective communication of project's HSE performance during the operation phase of the project.

- **Kick-off Meeting** to define the environmental responsibilities, awareness of EMP to the managing staff and to streamline the work plan according to the EMP. This meeting is to be arranged prior to commencement of activities.

- **Quarterly Meetings** to review the progress of activities performed and effectiveness of measures in place for pollution control. Deadlines are re-evaluated in it and if necessary, the project program is revised in these meetings. In the end of quarterly meetings, minutes will be issued to include the outcome of the meeting, issues discussed, and decisions. The minutes of meeting will also be provided to the project manager and the contractor for their own record.

- **Peer Review** for professional opinion and evaluation of the project performance, recommendations for innovation such as new available pollution controls, waste minimization strategies etc.

7.9.12 Water Sourcing

Measures will be implemented to maximize water recovery and reduce dependence on the use of fresh water for operations.

7.9.13 Fire Protection System

The following fire-fighting facilities should be provided depending upon the nature and risk of the installation:

- Fire water system (mixed installation)
- Foam generation system
- Fixed fire-fighting equipment
- Mobile fire-fighting equipment
- Fire detection and alarm system
- Communications

Design of the fire-protection system facilities is provided as per the following criteria, and recommendations of the NFPA 30 have generally been followed:

a) Fire-protection facilities are based on the single largest emergency contingency.

b) All the tank farms and other areas of installation are fully covered by hydrant and monitoring systems.

c) Class "A" petroleum storage tanks are equipped with a fixed water spray system, whether floating roof or fixed roof.

d) Class "B" petroleum storage tanks are to be provided with fixed water spray systems required to meet these requirements:

- Floating roof tanks of diameter larger than 30m.
- Fixed roof tanks of diameter larger than 20m.

e) Semi-fixed foam systems will be provided as under:

- Floating roof tanks storing Class "A" and Class "B" petroleum products.
- Fixed roof tanks storing Class "A" and Class "B" petroleum products.
- Tanks storing Class "C" petroleum products with a diameter larger than 40m.

f) Water spray systems will be considered in hazardous locations and equipment in process unit areas. Some of these areas are:

- Un-insulated vessels containing flammable fluid of capacity larger than $10m^3$
- Vessels inaccessible to fire tender/mobile equipment, fire hydrant.
- Pumps handling volatile materials (located under pipe racks).
- Air fin coolers (located above pipe racks).

7.9.14 Construction, installation, and maintenance of storage units

The construction, installation, and maintenance of aboveground petroleum storage tanks shall comply with applicable standards published by the American Petroleum Institute (API), some of which are outlined below:

API Standards 650 – Welded Steel Tanks for Oil Storage;

API 653 – Tank Inspection, Repair, Alteration, and Reconstruction;

API 652 – Lining of Aboveground Storage Tanks Bottoms;

API 620- Design and Construction of Large Welded Low Pressure Storage Tanks

API 2610 – Design, Construction, Maintenance, and Inspection of Terminal and Tank Facilities

7.9.15 Construction Phase

1. Construction Work Management

All construction related work including campsite establishment, operation, and management of waste streams, equipment and material mobilization etc. shall be in compliance with the (1) agreed procedures (if) provided by the proponent to the contractor and (2) provisions of NOC. The contractors will abide by the relevant contractual provisions relating to the environment.

Performance of contractor and subcontractor will be monitored by IMC periodically and site supervisor constantly. All the construction crew particularly the technical staff will be provided with necessary PPEs and other safety equipment as required by their job. Site supervisor and contractor will ensure that each job is being performed in safe and sound manner and in accordance with the safe work procedures.

Solid waste during construction will be removed on daily basis either through a local waste contractor or by the construction contractor himself who will engage some workers for removal of construction waste from site and disposal to a waste collection facility.

Proper drainage will be provided to construction camp and construction site, especially near excavations. The wastewater will be initially treated by sedimentation technique to remove suspended solids and reused if it meets the desired quality. If the effluent cannot be reused, it will be discharged to local sewers after ensuring that it does not contain any solid debris which can choke the sewer lines. Where possible, wastewater may be used for watering the vegetation nearby.

Type of construction material for the storage terminal shall meet the seismic design requirements for buildings located in seismic zone 2A. The design consultant also needs to consider other safety aspects for events like floods.

2. Site Restoration

The Site Supervisor will ensure that the restoration of the site after the end of construction activities is carried out according to the requirements of the EIA and EMP.

3. Construction Monitoring

An Independent monitoring consultant will be hired to monitor the construction work and EMP compliance which would also include monitoring of waste management.

7.9.16 Operation Phase

1. Co-ordination with Stakeholders

The proponent will ensure that co-ordination required with the project stakeholders on environmental and social matters as required by the EMP is maintained throughout the operation of the storage terminal.

2. Control of Air Pollution from Storage Terminal

Air pollution due to the Terminal operations would primarily result from routine activities i.e. loading unloading, movement of tank-lorries carrying the products and emissions from generator, if used.

Air Emissions from storage terminal will comply with the Sindh Environmental Quality Standards (SEQS). At no time will the emission levels be allowed to go beyond the stipulated standards. To ensure this, following measures will be undertaken:

- The Leak Detection and Repair program will be implemented to control HC/VOC emissions. Work zone monitoring should be carried out near the storage tanks besides monitoring of HCs/VOCs in the work zone.
- Confined spaces should be identified and effective measures should be taken for the safety.

3. Monitoring

The proponent will ensure that the mitigation measures mentioned in the EIA are adhered to and organizational HSE Management Systems are implemented during the proposed project.

Ambient air quality will be monitored by IMC in the Terminal.

The Leak Detection and Repair program will be implemented to control HC/VOC emissions. Work zone monitoring will be carried out near the storage tanks besides monitoring of HCs/VOCs in the work zone.

4. Emergency Procedures

The HSE department will prepare contingency plans to deal with any emergency situation that may arise during the operation e.g. fire, major oil spills, medical evacuation and communicate these to the regulatory agencies if required by these agencies.

The HSE department will also implement necessary measures to prevent fire hazards, contain oil spills, and perform soil remediation as needed

a) Fire Contingency Plan

Because flammable materials are present at the site, fire is an ever-present hazard. All personnel and subcontractors are not trained professional fire-fighters. Therefore, if there is any doubt that a fire cannot be quickly contained and extinguished, HSE Engineer will notify by radio and vacate the area. The HSE Engineer will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from where flammable materials are handled or stored.
- The air will be monitored for ignitibility before and during hot work and periodically where flammable materials are present. Hot work permits will be required for all such work.
- “No Smoking" signs will be conspicuously posted in areas where flammable materials are present.
- Fire extinguishers will be placed in all areas where a fire hazard may exist.
- Before workers begin operations in an area, the HSE Engineer will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

The following procedures will be implemented in the event of a fire:

- Anyone who sees a fire will notify the HSE Engineer who will then contact the work crew through radio. The HSE Engineer will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count. When a small fire has been extinguished by a worker, HSE Engineer will be notified.

b) Evacuation Procedures

In an event on-site evacuation is necessary, the following actions will be taken:

- The emergency signal will be activated (one single long blast on the air horn). No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.

- Shut off all machinery if safe to do so.
- All on-site personnel, visitors, and contractors in the support zone will assemble at the entrance to the site for a head count and await further instruction from the HSE Engineer.
- All persons in the exclusion zone and contamination reduction zone will be accounted for by their immediate crew leader (e.g., HSE Engineer). Crew leader will determine the safest exits for employees and will choose an alternate exit if the first choice is inaccessible.
- During exit, the crew leader will try to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.
- Upon completion of the head count, the crew leader will provide the information to the Incharge HSE.
- Contract personnel and visitors will also be accounted for by HSE Engineer.
- The names of emergency response team members involved will be reported to the HSE Engineer.
- A final tally of persons will be made by the HSE Engineer. No attempt will be made to find missing persons as it will involve endangering lives of employees by re-entering the scene of emergency.
- Re-entry into the Site will be made only after clearance is given by the HSE Engineer. At his direction, a signal or other notification will be given for re-entry into the Site.
- In all questions of accountability, immediate crew leader will be held responsible for those persons reporting to them. Visitors will be the responsibility of the employees they are meeting. Contractors and truck drivers are the responsibility of the HSE Engineer. The HSE Engineer will aid in accounting for visitors, contractors, and truckers by referring the Sign-in sheets available at the guard shack.
- Personnel will be assigned by the HSE Engineer to be available at the main gate to direct and brief emergency responders.
- Drills will be held periodically to practice all of these procedures and will be treated with the same seriousness as an actual emergency.

c) Fire Detection and Warning

- Portable Fire extinguishers will be used in buildings and as protection during "Hot Work" activities throughout the site. As construction progresses and systems are commissioned within specific buildings, personnel will be informed of the differential of alarm sounds.
- Large office accommodation will be protected by the use of hard-wired smoke detection devices with battery backup.
- A suitable means of raising the alarm in the event of a fire or other emergency at the Storage and Handling Facility will be established.
- The alarm system will be appropriate to ensure all personnel can be notified immediately of any emergency situation and evacuation, or other actions required. The alarm system will be tested on a regular basis.

d) Material Storage

- The incharge HSE must be informed of all flammable gases and liquids being brought onto site.
- Storage facilities for flammable material will be inspected by the In-charge HSE prior to being used.
- Materials shall be stored in compliance with OSHA and EPA regulations.

5. Material Safety Data Sheets (MSDS)

The requirement of MSDS is to provide the guideline for the proper handling of every chemical present at any facility. It is necessary to provide the staff with MSDS for effective implementation of HSE. MSDS provide the guidance to handle the matter properly in case of any emergency situation such as fire, spills etc.

6. Emergency Response Plan (ERP)

Emergency may be defined as a sudden event causing and has the potential to cause serious human injury and/or environmental degradation of large magnitude. The best "cure" for an emergency is, of course, "prevention".

The probable emergency situation can be:

- Serious fire and explosion;
- Spillage of large quantities of hazardous liquid;
- Natural calamity such as heavy rain, flooding, dust storm, earthquake etc.;
- Bomb threat or any sabotage/terrorist activity/arson;
- Any other incident involving all or large part of the premises and its workers.

A Project-specific ERP has been developed by TPPL (See Section 7.12) which primarily relates to the different construction activities of the project. It supports the EMP and addresses actions and requires responses of proposed Terminal employees and contractors.

Emergency response management will be provided with small teams of senior managers (the control committee) who in turn will direct all response activities through the Emergency response unit, industry security, communications, public relations, environment and safety affairs and material procurement departments. Each of these departments has specific responsibilities to perform in the event of an emergency. (Also see section 7.12)

7. Hazardous spill contingency plan

In the event of an emergency involving hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation.

Emergency contacts provide a quick reference guide to follow in the event of a major spill.

a) Notification Procedures

If an employee discovers a spill or a vapor or material release, he or she will immediately notify the HSE Engineer. The HSE Engineer will obtain information pertaining to the following:

- The material spilled or released.
- Location of the release.
- An estimate of quantity released and the rate at which it is being released.
- The direction in which the spill, vapor or smoke caused by the release is heading.
- Any injuries involved.
- Fire and/or explosion or possibility of these events.
- The area and materials involved and the intensity of the fire or explosion.

This information will help the HSE Engineer to assess the magnitude and potential seriousness of the spill or release.

b) Procedure for Containing/Collecting Spills

The initial response to any hazardous spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If, for some reason, a spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 feet in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 feet in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only response personnel will be allowed within the affected area. If possible, the area will be roped or otherwise cordoned off.

If the spill results in the formation and release of a toxic vapor cloud, further evacuation will be enforced. In general, an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled.

If an incident may threaten the health or safety of the surrounding community, settlement, etc., it will be consulted and determine if the public will be informed and possibly evacuated from the area. The EHS Coordinator will inform the proper agencies in the event of its being necessary.

The designated HSE personnel will take the following measures:

- Avoid breathing vapours of spilled material.
- If possible and safe to do so, turn off any ignition source or gas emergency shutoff valve.
- Make sure all unnecessary persons are evacuated from the hazard area.
- Put on protective clothing and equipment.
- If a flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment for recovery of material.
- Determine the major components in the waste at the time of the spill and remove all surrounding materials that could be reactive with the spilled material.
- If wastes reach a storm sewer; try to dam the out fall by using sand, earth, sand bags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.
- If volatile emissions may occur, spray the spill area with foam, if available.
- Apply appropriate spill control media to absorb discharged liquids.

c) Emergency spill response clean-up materials and equipment

- The supply of appropriate emergency response clean-up and personal protective equipment on hand will be inventoried and visually inspected on a weekly basis.
- The materials listed below will be kept onsite for spill control depending on the types of hazardous materials present. The majority of this material will be located in the support zone, in a supply trailer or storage area.
    - Activated charcoal (carbon) to adsorb organic solvents (hydrocarbons) & to reduce flammable vapours.
    - Appropriate solvents for decontamination of structures or equipment.
- The following equipment will be kept onsite and dedicated for spill clean-up:

- Plastic shovels for recovering corrosive and flammable materials.
- Sausage-shaped absorbent booms for diking liquids pills, drains, or sewers.
- Sorbent sheets for absorbing liquid spills.
- Over pack drums for containerizing leaking drums.
- 55-gallon open-top drums for containerization of waste materials.

- Once a hazard has been recognized, take immediate action to prevent the hazard from becoming an emergency.
- This may be accomplished by the following:
  - Daily safety meeting.
  - Task-specific training prior to commencement of activity.
  - Lock-out/tag-out.
  - Personal protective equipment (PPE) selection/use.
  - Written and approved permits for hot work, confined space.
  - Air monitoring.
  - Following all standard operating procedures.
  - Practice drills for fire, medical emergency and hazardous substances spills.

d) Housekeeping

In order to reduce the possibility of accidental spills and safety hazards, good housekeeping practices will be followed. They include prompt removal of small spills, regular maintenance of walking areas, regular removal of refuse, and staging of similar materials together.

e) Security

All applicable Rules and Regulations will be followed by all personnel on site.

8. Communication and Documentation

For effective monitoring, management and documentation of the environmental performance during the operation, environmental matters will be discussed during regular meetings. Any environmental issue identified at the meeting will be considered and addressed by the HSE department. Issues that require attention of senior management will be communicated to them for action.

9. Occupational health and safety risk management

During routine terminal operations, workers may develop occupational diseases of the lungs, skin, and other organs, depending on the amount and length of time of exposures. Workers exposed to hazardous noise levels may develop noise-induced hearing loss. Other dangers include confined spaces, in which untrained workers may get seriously injured or killed.

In view of the existence of the occupational health and safety risks in the Oil storage terminal, the HSE department needs to develop an Occupational Health and Safety Risk Management Plan for exposure control in situations when workers may be overexposed to chemical hazards. This plan should provide a detailed approach for protecting workers against chemical exposures, including health hazard information, engineering controls, safe work procedures, worker training, and record keeping.

It is recommended that the Occupational Health and Safety Risk Management Plan should necessarily include the following elements:

1. Statement of purpose
2. Responsibilities of employers, supervisors, and workers
3. Risk identification and assessment
4. Risk controls
5. Worker education and training
6. Written safe work procedures
7. Hygiene facilities and decontamination procedures
8. Documentation
9. Health monitoring (may also be required, depending on the nature of the chemicals being used)

10. Waste Streams

To provide guidelines and simplify the process of categorizing, quantifying, managing, and disposing of wastes. Waste management is a critical component of TPPL operating policies. Waste management includes proper handling, accumulation, storage, manifesting, transportation, and disposal/recycling of the waste generated. The procedure is designed to assist in a company wide effort to provide protection for the environment and to comply with TPPL's requirement, environmental laws and regulations regarding proper waste management.

Waste streams generated as part of petrochemical storage and distribution operations. Guidelines for proper handling, categorization, recording, minimization, recycling and disposal of all types of waste associated with the terminal operations and projects are part of this procedure. A Project-specific Waste management procedure has been developed by TPPL which primarily relates to the different activities of the project.

11. Standard Operating Procedures

Contractors, sub-contractors, and contract workers will be made aware of environmental aspects and Emergency Response Plan prior to commencing the work. Prior to leaving the site contractors, sub-contractors and contract workers will ensure that their work area is in safe position. Written procedures or standards will be prepared for all activities, where the absence of such procedures and standards could result in not following HSE policy, the law or the contract.

In addition to Standard Operating Procedures (SOP) for Bulk oil storage terminal operations, the HSE department will also develop safe working procedures for activities that have the potential to create a risk or hazard if not undertaken in safe manner. The safe working procedures will be based on the following four aspects of job safety:

Safe Place: Work site will be designed and controls set up to ensure that working environment provides no significant risk to personnel, property and the environment.

Safe Equipment: All equipment for any job, including tools, machinery, and protective equipment will be specified and/or designed to ensure that it poses no significant risk to personnel, property, or the environment. All equipment will comply with legislative standards for conformity and test.

Safe Procedure: Procedures will be designed for all aspects of the job to facilitate safe use of equipment at the work site to complete tasks with no significant risk to personnel, property, or the environment. Design of procedure will be based on step-by-step analysis of the tasks involved (Job Safety Analysis),

identification of associated hazards and elimination of control of those hazards. Procedures should allow for work in ideal conditions as well as under aggravating conditions e.g. adverse weather.

Trained Personnel: Suitable job-specific, safety skills and supervision training will be provided to personnel involved in construction and operation activities so that they are able to use the procedure and equipment at the worksite with no significant risk to personnel, property, and environment.

Safe Working Procedures will be available to contractors and sub-contractors, technical and relevant nontechnical staff.

12. Transportation of Petroleum Products

HSD is transported to the terminal from an existing pipeline from PARCO terminal just opposite to the TPPL terminal. Mogas is transported through tank trucks.

13. Traffic management

The terminal is located at N55 Indus Highway, providing optimal access to/from Karachi (through M9) and upcountry for petroleum products distribution and transfer.

Following will be undertaken to enable smooth transportation activities during project operation:

- Loading gantry will be provided within the terminal in a designated road-loading terminal area.
- A logistic plan will be implemented to manage the truck/tanker movement.

Besides undertaking necessary measures for traffic management, the proponent will also maintain flexible liaisons with the neighboring industries/stakeholders to address any issue related to project related transportation activities.

14. Engineering Controls

a) Resource Minimization

Recovery and recycling of wastewater generated from storage terminal.

b) Access Control

Limitations of access to those specifically trained in the work conditions present within a potentially hazardous area, including use of personnel identification, double lock, security services, and barriers.

c) Labeling

Complete hazard label on all switches valves, pipelines and containers; complete identification of specific hazardous substances by name and type (e.g. toxic, reactive, ignitable, explosive).

d) Monitoring

Monitoring of the environment in the immediate vicinity of potential hazards, as well as at the fence – line of the installation, provides an early warning of a hazard occurring. For example, air quality monitoring for oxygen levels, combustible gas levels, and/or specific air constituents could be conducted on a regular basis using portable equipment or on a continuous basis with stationary equipment. Smoke detectors, heat monitors, and radiation detectors can be used to signal a hazard occurring –this recommendation is strongly made to the proponent.

e) Secondary Containment

Provision of appropriate systems to contain releases. These could include dikes to contain spills, emergency response equipment to collect spilled material, fire-proofing to limit the spread of fire, absorbents to absorb hazardous substance and buffer zones.

15. Administrative Controls

Administrative controls need to be exercised in situations where it is not possible to reduce hazards through engineering controls. It is recommended that administrative controls should be implemented in the form of rearrangement of work schedules so as to minimize the duration of exposure to hazards and transfer or rotation of personnel who have, over a period of time, reached a maximum allowable exposure limit.

Administrative Controls should also be exercised to ensure the easy access to and availability of personnel protection equipment for use within the vicinity of potential hazards. Such equipment could include chemical resistant gloves, safety shoes, ear protection plugs, safety glasses, etc. Special clothing should be provided as well as basic items for use in emergencies such as portable light, safety belt, two-way radio, etc. should be easily accessible at all times, for 24 hours a day.

16. Training

All employees will receive general firefighting training (i.e. fire extinguisher use). Employees who are members of the fire brigade shall receive at a minimum the following training:

- Use and limitations of the firefighting equipment.
- Firefighting strategies and methods.
- Use of respiratory equipment and its limitations.
- Donning bunker gear/fire kit and its care.
- Care and maintenance of firefighting equipment and hoses.
- Confined space entry and firefighting in a confined space.
- First aid.
- High level rescue (if the site assigns this responsibility to this group).

Table 7.1: Environmental Management Plan (Pre-Construction Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
Pre-Construction Phase						
Facility Siting & Layout	To minimize the risk due to the siting of the project	- An adequate buffer zone (safety distance) between the storage terminal and vulnerable environment/populations and public facilities; which in-case of terminal are not present as the project will be developed in the Industrial Area. - Secondary and tertiary Containment considerations; - Emergency access and Response Support Access for Emergency Response teams (Fire Brigade, Police, Ambulance Services); - Power supplies: The need for emergency equipment such as lighting, fire pumps, sprinkler system to operate when the main power source is impaired; - 'Safe Refuges': Are there safe refuges considered in case of fire and toxic releases; - Occupied Buildings (e.g. Control Rooms, meeting rooms and offices); - The consideration of location of occupied buildings to minimize risk for the occupants in an emergency situation such as fire or explosion - Provision of Fire water and Fire Protection systems. These may be provided via specific systems within the storage terminal. Capacity should be related to the fire water requirements (flow and total available volume) to fight the fire event. Vulnerability to disruption during an emergency needs to be considered e.g. damage from fire or explosion causing the fire protection to fail.	Prior to start	Construction site and its surrounding areas	TPPL	IMC

Table 7.1: Environmental Management Plan (Pre-Construction Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
Safe Designs	The reduce the risk due to unsecure facility and component's designs	**Primary Safety** - Tank design to meet appropriate local legal codes or industry standards - Piping, valve, pumps and fitting design according to requirements for piping design to meet appropriate local legal codes or industry standards - Choosing construction material according to the mechanical, thermal, chemical and biological stress of service; - Level measurements devices should be installed, which include Low and High level alarms; - Overfill prevention devices – Level detection linked through a "logic solver" (hardware or software) to interrupt flow in the event of a hazardous level occurring in a tank; **Secondary Safety** - Storage tanks are normally located inside a retaining wall on a solid foundation. - Underground pipelines should be double-walled or any detachable installed connections and valves should be installed in a monitored leak proof inspection chambers; - The containment should have total volume appropriate to 110% of the largest tank or 25% of all the Tank volumes - Additional tertiary containment volume for fire water retention, which must be leak proof and resistant to the fire-fighting water and foam needs to be considered.	During Construction	Storage site and its surroundings	TPPL	IMC

Table 7.1: Environmental Management Plan (Pre-Construction Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
		- Overflow detection devices, which act when a release has started. These could be situated inside the secondary containment or in a piped overflow from a tank.				

Table 7.2: Environmental Management Plan (Construction Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
Construction Phase						
Soil Erosion	To minimize the impacts arising from the soil erosion	- The contractor must minimize the area of exposed soil at any given time and to wet, compact and resurface the disturbed areas during the construction phase. - The contractor must also construct the drainage system during the very initial stage of the project.	Prior to start and during the construction period	Construction site and its surrounding areas up to 5kms in radius	Contractor	IMC
Spillage from fuel Storage	To prevent contamination of ground	- Fuels, lubricants and chemicals will be stored in covered bunded areas, underlain with impervious lining. - Appropriate arrangements, including shovels, plastic bags and absorbent materials, will be available near fuel and oil storage areas. - Contaminated soil will be removed and properly disposed after treatment such as bioremediation or incineration.	During Construction	Storage site and its surroundings	-	IMC
Contaminated Land	To minimize the contamination of land due to construction related activities like maintenance of vehicle and machinery,	- Removal of oil and contaminated soil around the fuel and oil storage areas will be made possible by the availability of appropriate implements i.e. shovels, plastic bags and absorbent materials. - Contaminated media will be managed with the objective of protecting the safety and health of labourer at the site, the surrounding residents, and the environment.	During Construction Period	Construction site as well as the generators, equipment and the vehicles.	Contractor's should maintain acceptable standard activities	IMC

Table 7.2: Environmental Management Plan (Construction Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
	fueling generators, leakage from containers and etc.	- Plans and procedures will be prepared, to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety and the environment. - Construction vehicles and machinery will be examined on a regular basis for leakage prevention.				
Construction Waste Management	To minimize the impacts associated with construction waste.	- Construction sites generate considerable waste and provision will be made for suitable separation and storage of waste in designated and labeled areas throughout the site. - Construction wastes should be collected on a daily basis and contained in a temporary designated waste storage area on each site. - Designated waste storage areas should not be within 50 m of water ways. - Wastes should be routinely collected from the designated area and disposed at licensed waste disposal facilities approved by local EPA. - Trainings shall be conducted regarding solid waste segregation and housekeeping issues on site. - Segregation of hazardous and non-hazardous waste will be done in accordance with color coding system.	Prior to start and during the construction period	Waste should be disposed-off through proper contractor. The left over waste from recycling should be disposed at proper disposal site.	TPPL should supervise and take action to ensure that contractor completes relevant activities according to EIA/ EMP requirements & SEQS.	IMC

Table 7.2: Environmental Management Plan (Construction Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
Impact on Water Quality, Consumption and Conservation	To minimize the impacts associated with water and its consumption and conversation	-Not allowing water to leave the construction site. -Construction of storm water diversion channels to divert storm runoff from flowing over the construction areas. -Regular monitoring of water consumption. -Regular monitoring of water quality for good quality concreting. -Use of leak proof storage tanks. -Monitoring of the ground water table to evaluate the impact of construction activity on ground water, if possible.	Prior to start and during the construction period	Construction site	TPPL HSE officer/ Contractor	TPPL EHS officer
Dust & Exhaust Emissions	To minimize the dust effectively and avoid complaints due to the airborne particulate matter, the gaseous & vehicular emissions	-Dust generating surfaces should be regularly wetted in a manner that effectively keeps down the dust at the construction site. -Watering of stripped road surfaces along which construction vehicles and trucks travel will control dust emissions by up to 70%. - A fulltime watering truck shall be maintained on site for watering road surfaces as needed to minimize fugitive dust emissions. -Vehicles transporting earth materials shall be covered en-route. -Mixing equipment shall be sealed properly and vibrating equipment shall be equipped with dust removing devices.	During all Construction	Construction Site	Contractor's Should maintain acceptable standard activities & TPPL -EHS	IMC

Table 7.2: Environmental Management Plan (Construction Phase)

Environmental Concern	Objective	Mitigation Measures recommended	Timing to Implement	Locations to Implement	Responsibility	Monitoring
		- Ensure the proper maintenance of vehicles and generators used at the construction site to produce low emission. - Dust masks shall be provided to operators in order to protect them from dust impacts.				
Waste Water Generation	To reduce and control the wastewater generated during the constructional activities:	- Wastewater generation will be minimized by controlling the pollutant at the source. - The oily waste will be contained before disposing the wastewater into the sewer. - Regular monitoring of the wastewater generation will be taken into consideration. - Adequate portable or permanent sanitation facilities serving all workers will be provided at all construction sites. - Sanitary wastewater at construction and other sites will be managed.	During Construction	Construction Site	Contractor's Should maintain acceptable standard activities & TPPL HSE	IMC
Noise level	To minimize noise during construction activities.	- The noise generating sources shall be enclosed with acoustic proof material to cut down the noise levels. - Construction machinery and vehicles shall be serviced at regular intervals in order to keep noise to minimum level. - Green belt shall be developed in and around the facility.	Prior to start and during the construction period	Construction site as well as the generators, equipment and the vehicles.	Contractor's should maintain acceptable standard activities	IMC

Table 7.2: Environmental Management Plan (Construction Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
		- Noise level in and around the project site shall be measured. - Workers shall be equipped with earplugs or earmuffs. - The working hour regime shall be imposed on construction workers. - Work discipline shall be enforced on site. - Employees shall be trained on noise abatement and PPE's (personal protective equipment) practice. - Workers operating equipment that generates noise should be equipped with the appropriate noise protection gear.				
Traffic Flow	To minimize any impact on the flow of traffic during to project's construction.	- The proponent will put in place measures to address such concerns by ensuring that construction vehicles preferably deliver materials during off-peak hours when traffic volume is low. - There will also be provision for caution signs on the access road to alert users on construction activities in progress in order to prevent occurrence of accidents. - Impacts from the traffic flow will be minimized through proper planning of the transportation of materials to ensure that vehicle fills are	During the construction period	N55 Indus Highway	TPPL	IMC

Table 7.2: Environmental Management Plan (Construction Phase)

Environmental Concern	Objective	Mitigation Measures recommended	Timing to Implement	Locations to Implement	Responsibility	Monitoring
		increased, in order, to reduce the number of trips or the number of vehicles on the road. - Truck drivers will be sensitized to avoid unnecessary revving of vehicle engines at loading/offloading areas and to switch off vehicle engines at construction site.				
Transportation of construction material on site	Dust Emission	- Construction material will be transported only in securely covered trucks to prevent dust emission during transportation. The drivers will be advised to cover the material before starting off. - Other temporary tracks within the site boundary will be compacted and sprinkled with water during the construction work. - Project traffic will maintain a maximum speed limit of 20 km/h on all unpaved roads within the plant site.	Before and during construction	Project site	TPPL, Construction contractor	IMC
Occupational Health and Safety	To mitigate the H & S incident risk	- Provide measures for the management and appropriate disposal of hazardous wastes to ensure protection of the workforce and the prevention and control of releases and accidents; - Provision of appropriate fire extinguishers and fire response plans and appropriately trained first aid response staff; - Provision of appropriately stocked first-aid equipment and stations at work sites including	Prior to start and during the construction period	Construction site	Contractor	TPPL HSE

Table 7.2: Environmental Management Plan (Construction Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
		appropriately trained first-aid staff on site and provision of adequate transport facilities for moving injured persons to the nearest hospital; - Provision of appropriate personal protective equipment (PPE) to minimize risks, such as but not limited to appropriate outerwear (insulated if necessary), boots and gloves; eye protectors; ear plugs safety helmets, etc.; - Provide training for workers, and establish appropriate incentives to use and comply with health and safety procedures and utilize PPE; - Include procedures for documenting and reporting occupational accidents, diseases, and incidents; and - Include emergency prevention, preparedness, and response arrangements in place.				
Water Sourcing	Impact on other water consumers due to source sharing	- Water conservation strategies will be implemented by the contractor to prevent wastage of water and excess wastewater generation.	Construction Phase	Construction Site	Contractor	Construction contractor, Site Supervisor

Table 7.3: Environmental Management Plan (Operation Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
Operation Phase						
Fire Hazard & Explosion	Fires can cause loss of life and property and at the same time it has the potential to severely harm the people in the vicinity and affect the environment.	- Standard fire and smoke detection and protection devices such as alarms, fire hoses and hydrants must be provided and maintained in all critical areas. - The facility must possess a detailed emergency and evacuation plan for which regular drills must be carried out to ensure that the responsible staff remains trained at all times. - Fire-fighting equipment such as fire extinguishers and hydrant systems will be maintained at strategic locations within the premises. - Regular inspection and servicing of the fire extinguishers will be undertaken by a reputable service provider and record of such inspections should be maintained. - A no-smoking policy must strictly be implemented throughout the facility. Strict action must be taken against any offender disregarding the seniority. - All work that is to be carried out other than the routine facility operations must be	During Operations	Throughout the facility. Especially near storage tanks and gantry	TPPL - HSE	TPPL HSE

Table 7.3: Environmental Management Plan (Operation Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
		controlled and specific work permits must be obtained prior to every such job. - Strict security and surveillance measures must be implemented to detect and prevent sabotage activities				
Air Quality	To avoid and minimize risk of air quality deterioration due to escape of VOC in form of fumes/vapors	- NFPA 30 should be followed in design, construction and operations of the facility in order to prevent from adverse effects of accidents. - Leak and Gas detection system will be installed in order to detect accidental release of harmful emissions. - Use of personnel protective equipment (PPE) such as safety goggles, dust mask, mufflers/ear plugs and other stuff. - VOC emission control may be positively influenced by keeping storage temperature as low as possible also frequent inspections and painting light shade on all tanks may affect VOC formation. - Generator and transport vehicles will be serviced regularly and any problem arise will be handled frequently. - Safe driving speed will be advised to drivers.	During Operations	Project Site	TPPL-HSE	IMC

Table 7.3: Environmental Management Plan (Operation Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
		- Emission sources will be tested regularly as per requirement of Self-Monitoring & Reporting Regulations.				
Noise Impact	The frequent movement of heavy oil tankers and trucks for filling and decanting purposes, operation of pumps and standby generators will result in noise generation	- All vehicles and machinery must be maintained as per manufacturer's recommendation and specifications. - Use of pressure horns commonly installed on heavy trucks must not be allowed - Machinery with low base noise must always be preferred during replacements - Generators must be operated with canopies	During Operations	Project Site	TPPL-HSE	IMC
Changes in Soil condition	Spills of any petroleum products or chemical stored at the facility can have very serious impacts on soil quality.	- Secondary containment area should be provided for all storage tanks. All the tanks should be dyke walled in order to restrict the impact of spill only to the containment area. - Storage tanks will be appropriately marked regarding their contents and capacity. - Drain for oil spills/leaks will be designed such that rainwater runoff does not enter into them. - Emergency Response Plans (ERP) is in place to deal with oil spills therefore; TPPL will follow those ERP's. - Cathodic protection will be provided in pipeline to avoid corrosion leading to leakage.	During Operations	Project Site	TPPL-HSE	IMC

Table 7.3: Environmental Management Plan (Operation Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
		- In case of bulk amount of leakage storage tank will be taken out of service for repair and subsequently repair job will be carried out. - Product tanks will have any mixer. In general, sludge formation in the product tanks is very less and requires several years for cleaning. Sludge generated will be extracted and incinerated.				
Solid Waste & Ground Water Contamination	Improper solid waste handling and storage will create aesthetic problems and issues. This will discourage motivation to workers and good working environment. Unsatisfactory management of solid waste may result in percolation of leachate	- All solid waste must be stored in appropriate areas. - All areas of solid waste storage will be properly designed to prevent contamination from escaping the area due to any environmental effects. - All staff meant for solid waste handling must be trained appropriately. - All solid waste will be segregated within the facility premises. All recyclable material will be sold out rather than disposed-off. Hazardous waste will not be mixed with non-hazardous waste and such waste will be treated before disposal.	During Operations	Project Site	TPPL-HSE	IMC
Natural Disaster	To avoid any disastrous situation	- In order to avoid the disastrous situation due to earthquake, it is anticipated that management of TPPL will consider the use of	During Operations	Project Site	TPPL-HSE	TPPL

Table 7.3: Environmental Management Plan (Operation Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
		earthquake resistant material for building the storage tanks and associated structures. It is desired that all project structures should be constructed keeping in view the structural and material requirements of seismic zone 2A projects.				
Wastewater	Untreated wastewater can cause damage to wildlife. Wastewater containing persistent pollutants can also cause long-term damage to ecosystem.	- All wastewater generated at the depot must meet SEQS Environmental Quality Standards prior to discharge into any surface water body. In order to achieve this, the water must be treated and tested before disposal.	During Operations	Project Site	TPPL	IMC
Labor Safety & Occupational Health	Several occupational health and safety hazards exist for workers during the operations phase. These hazards can have acute as well as chronic effects on the health of workers. Some of the operations may pose threat and can even be lethal.	- All employees must get safety trainings before performing work - All new employees must undergo appropriate safety trainings before performing any work - Basic Personal Protective Equipment (PPE's) such as helmets, earplugs, safety goggles, hand gloves, cover all, safety shoes, gas masks, etc. must freely be available to all employees - All employees will be strictly bound to wear PPE's at all time while within storage facility regardless of their seniority.	During Operations	Project Site	TPPL-HSE	TPPL & IMC

Table 7.3: Environmental Management Plan (Operation Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
		- It must be ensured that all visitors always wear the essential PPEs within the facility regardless of their seniority. - In case of an emergency/accident, ERP shall be followed. - Health and Safety of every person shall always be given top priority. - Safety procedures such as for confined space entry, work at height etc. must all be carried out under expert supervision of HSE officials and with appropriate monitoring and warning systems to prevent serious injuries or fatalities. - A health surveillance plan must be in place and all employees' health check-ups must be carried accordingly - Frequent surveillance must also be carried out to ensure safety is being followed by all workers				
1. Tank Bottom draining 2. Storm water runoff management	Potential risk of contamination from wastewater runoff and process wastewater Potential risk of dermal contact and inhalation from spill sand leaks.	- The wastewater generated from the operations and associated activities will be treated in Wastewater treatment plant before discharge. - Where required, an oil-water separator will be used to separate gross amounts of oil and	During Operations	Project Site	TPPL-HSE	IMC

Table 7.3: Environmental Management Plan (Operation Phase)						
Environmental Concern	**Objective**	**Mitigation Measures recommended**	**Timing to Implement**	**Locations to Implement**	**Responsibility**	**Monitoring**
3. Leaks and spills 4. Process wastewater		suspended solids from the wastewater effluents/storm water runoff. - Activities generating wastewater will be carefully conducted and the wastewater will be routed to the ETP.				

7.10 Environmental Monitoring Program

Monitoring of activities during the construction and operation phase will be necessary to assess the impacts of these activities on the environment. For this purpose, the HSE department will engage an Independent Monitoring Consultant (IMC) for implementing a monitoring program to:

- Monitor the:
  - Air Emissions
  - Effluent Quality
  - Solid waste management
  - Occupational Safety performance of the facility
- Follow the monitoring frequency of selected parameters as per the monitoring plan given in the Table 7.4.
- Record all non-conformities observed and report them along with actions to Project Management for further action.
- Report any impact anticipated along with recommendations for further action.

The Contractor shall take note of the recommendations relating to issues identified in the construction monitoring report. Similarly, the HSE department will consider the issues identified by IMC for the operation phase monitoring. Table 7.4 & 7.5 presents a proposed monitoring plan to monitor different environmental Aspects during the Construction and Operations Phases of the Project. This monitoring plan can be improved by the HSE department if found necessary to improve the usefulness of the Plan.

Table 7.4 Environmental Monitoring Plan (Construction Phase)				
Environmental Concern	**Parameters to be Monitored**	**Monitoring Location**	**Frequency**	**Responsibility**
Construction Phase				
Air Quality				
Dust Pollution (Mainly particulate matter) during construction	SPM (Suspended Particulate Matter) PM_{10} (Particulate Matter<10 microns) $PM_{2.5}$ (Particulate Matter <2.5 microns)	Construction site	Once in every six months	-TPPL ensure through Contractor -IMC
	Visible dust	Construction site	Daily during construction period	TPPL and Contractor
Exhaust emissions from generators and other construction equipment	Gaseous emission includes CO_X, NO_X, SO_X and PM from generators and other equipment	All exhaust at construction site	First time equipment use, and once per quarter	-TPPL ensure through Contractor -IMC
Vehicular emissions	Vehicular emissions include Smoke, CO_X and Noise from vehicle exhaust vent.	Vehicle exhaust vent at construction site	Quarterly	-TPPL ensure through Contractor -IMC
Noise level	Continuous Noise level Leq dB(A) monitoring	Construction site as well as the generators, equipment and the vehicles.	Monthly	-TPPL ensure through Contractor -IMC
Solid Waste Management	Record & logging of daily generated waste. Hazardous and non-hazardous waste quantity	Construction site	Daily	TPPL and Contractor
Occupational Health and Safety	HSE compliance	Construction site	Daily	TPPL and Contractor

Table 7.5 Environmental Monitoring Plan (Operational Phase)				
Environmental Concern	**Parameters to be Monitored**	**Monitoring Location**	**Frequency**	**Responsibility**
Operational Phase				
Air Quality	SOx, NOx, CO, SPM, PM_{10}, $PM_{2.5}$,O^3 and lead (Pb)	Project Site	Yearly	-TPPL -IMC
Exhaust emissions	Gaseous emission includes CO_X, NO_X, SO_X and PM from stacks, generators and other equipment	Exhaust at operational site Generators Equipment etc.	Yearly	-TPPL -IMC
Vehicular emissions	Vehicular emissions include Smoke, CO_X and Noise from vehicle exhaust vent.	All Vehicles exhaust vent at operational site	Yearly	-TPPL -IMC
Effluent	Effluent flow, Temperature, pH, COD, TSS, TDS, Oil & Grease, Chloride, BOD5, Phenolic Compounds	Outlet of API Separator	Yearly	-TPPL -IMC
Noise level	Continuous Noise level Leq dB(A) monitoring	Project Site	Quarterly	-TPPL -IMC
Soil Resource	Visual inspection	Project Site	Bi-annually	-TPPL -IMC
Solid Waste Management	-Records of hazardous material used -Inspections of hazardous substances containment facilities, instrumentation and detection systems. -Volume of different wastes types disposed of to landfill or incineration -Volume of different waste types recycled or reused	Waste disposal site	Quarterly	-TPPL
Community	Community grievances or complaints, categorized by type.	Grievance register maintained at project site	Quarterly	-TPPL

7.11 Change Management

Such changes are elaborated below to make them part of EMP.

1) Change in Operations

Any change in the operation of terminal 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. This has, on the basis of nature of process change, been distributed into three categories.

First-Order Change is one that leads to a significant removal of any operation from the project described in the chapter on description of project of this report and consequently requires a reassessment of the environmental impacts associated with the changes. In such an instance, reassessed environmental impacts of the proposed change will be sent to Sindh EPA for approval.

Second-Order Change is one that entails project activities not significantly different from those described in the EIA report, and which may result in project impacts whose overall magnitude would be similar to the assessment made in this report. In case of such changes, the environmental impacts of the activity will be reassessed. Additional mitigation measures if required will be identified and documented for being reported to Sindh EPA for their record.

Third-Order Change is one that is of little consequence to the EIA findings. This type of change does not result in impact levels exceeding those already assessed in the EIA report; rather these may be made onsite to minimize the impact of an activity. The only action required in this regard will be to record the details of process change in the record register.

2) Change in Record Register

A record register will be maintained at project site at the start of construction activity. 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 HSE department, and will be used internally.

3) Change in EMP

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

- A meeting will be held between project management and construction contractor, to discuss and agree upon the proposed change to the EMP.
- Based on the discussion during the meeting, a report will be produced collectively, which will include the additional EMP clauses and the reasons for their addition.
- Additional EMP clauses will be added to the original EMP as a second volume which will be distributed to the relevant project personnel and contractor.

7.12 TPPL's Emergency Response Plan

The purpose of Emergency Response Plan is to mitigate the impacts and consequences of incident and enable normal terminal operations to be resumed. Emergency Response Plan for TPPL Shikarpur has been attached as Annex-VII.

Chapter 8 CONCLUSION

The EIA study for Project has identified potential impacts that are likely to arise during construction and operational phases of the project. Potential environmental impacts are associated with air quality, solid waste, noise, surface and groundwater quality, soil quality, terrestrial biodiversity, resource use, health and safety, landscape and visual intrusion, as well as socio-economic impacts. The project is expected to bring a positive change in the socioeconomic setup of the area through creation of jobs.

Potential Project impacts have been identified related to the project construction and operation phases. Impact predictions are based on the consultants' previous experiences on similar projects; professional judgment; data collected in the field; discussions with local communities, relevant government officials and relevant technical specialists. Predicted impacts relate to all aspects of the petroleum product storage facility. Many of the mitigation measures are related to good design practices, others with good construction and housekeeping practices.

A series of mitigation and monitoring measures have been included to address the concerns for these measures. Assuming effective implementation of the mitigation measures and monitoring requirements as outlined in the Environmental Management Plan, the adverse environmental and social impacts of the proposed Project activities and operations of the storage facility are likely to be within the acceptable limits.

It is confident that every effort has been made by Total Parco Pakistan Limited to accommodate the mitigation measures recommended during the EIA process to the extent that is practically possible, without compromising the economic viability of the Project. The implementation of the mitigation measures, detailed in Chapter 7 and listed in the Environmental Management Plan (EMP) of the EIA Report, including monitoring, will provide a basis for ensuring that the potential positive and negative impacts associated with the establishment of the development are enhanced and mitigated to a level which is deemed adequate for the development to proceed.

In summary, based on the findings of this assessment there is no reason why the facility proposed for the extension should not be authorized, dependent on the mitigations and monitoring for potential environmental and socio-economic impacts as outlined in the Environmental Impact Assessment and EMP being implemented.

ANNEXURES

Annex-I:
Sindh Environmental Protection Act, 2014

EXTRAORDINARY **Registered No. M324**

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PART-IV

PROVINCIAL ASSEMBLY OF SINDH
NOTIFICATION
KARACHI, THE 20TH MARCH, 2014.

NO.PAS/Legis-B-06/2014- The Sindh Environmental Protection Bill, 2014 having been passed by the Provincial Assembly of Sindh on 24th February, 2014 and assented to by the Governor of Sindh on 19th March, 2014 is hereby published as an Act of the Legislature of Sindh.

THE SINDH ENVIRONMENTAL PROTECTION ACT, 2014.

SINDH ACT NO. VIII OF 2014.

AN
ACT

to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development.

Preamble.

WHEREAS it is expedient to provide for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution, promotion of sustainable development, and for matters connected therewith and incidental thereto;

PART-I

It is hereby enacted as follows:-

Short title and commencement.

1. (1) This Act may be called the Sindh Environmental Protection Act, 2014.

(2) It extends to the whole of the Province of Sindh.
(3) It shall come into force at once.

Definitions.

2. In this Act, unless there is anything repugnant in the subject or context-

(i) "adverse environmental effect" means impairment of, or damage to, the environment and includes—

(a) impairment of, or damage to, human health and safety or to biodiversity or property;

(b) pollution; and

(c) any adverse environmental effect as may be specified in the rules or regulations made under this Act;

(ii) "Agency" means the Sindh Environmental Protection Agency established under section 5 of this Act;

(iii) "agricultural waste" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry residues from the use of fertilizers, pesticides and other farm chemicals and agricultural runoff;

(iv) "air pollutant" means any substance that causes pollution of air and includes soot, smoke, dust particles, odor, light, electro-magnetic radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;

(v) "biodiversity" or "biological diversity" means the variability among living organisms from all sources, including inter-alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems;

(vi) "biosafety" means the mechanism developing through policy and procedure to ensure human health and the environmentally safe application of biotechnology;

(vii) "Council" means the Sindh Environmental Protection Council established under section 3 of this Act;

(viii) "discharge" means spilling, leaking, pumping, depositing, seeping, releasing, flowing-out, pouring, emitting, emptying or dumping into the land, water or atmosphere;

(ix) "ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit;

(x) "effluent" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;

(xi) "emission standards" means the permissible standards established by the Agency for emission of air pollutants and noise and for discharge of effluent and waste;

(xii) "environment" means-
(a) air, water, land and natural resources;
(b) all layers of the atmosphere;
(c) all organic and inorganic matters and living organisms;
(d) ecosystems and ecological relationships;
(e) buildings, structures, roads, facilities and works;
(f) all social and economic conditions affecting community life; and
(g) the inter-relationship between any of the factors in sub-clause (a) to (f) made under this Act;

(xiii) "environmental aspect" means an organization's activities or services that can interact with the environment;

(xiv) "environment audit" means a systemic scrutiny of environmental performance of an organization, factory, company or manufacturing and production unit regarding to its operations;

(xv) "environmental impact assessment" means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigation and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed;

(xvi) "Environmental Management Plan" means a site specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with the environmental legislation;

(xvii) "Environmental Protection Order" means an order passed under Section 21 made under this Act.

(xviii) "Environmental Protection Tribunal" means the Environmental Protection Tribunal constituted under section 25 of this Act ;

(xxix) "Environmental Review" means a quantitative and qualitative assessment of documents submitted by proponent, comments from public and Government agencies or organizations;

(xx) "factory" means any premises in which industrial activity is being undertaken;

(xxi) "genetically modified organism" means any organism that possesses a novel combination of genetic material obtained through the use of modern biotechnology and which does not occur naturally through mating and or recombination and includes both living and non-living modified organisms;

(xxii) "Government" means the Government of Sindh;

(xxiii) "Government Agency" includes:-

(a) A department, attached department or any other office of Government; and

(b) A development authority, local authority, company body corporate established or control by Government;

(xxiv) "Court" means the Court of the Judicial Magistrate First Class;

(xxv) "hazardous substance" means-

(a) a substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971 (II of 1971), which, by reason of its chemical activity or toxic, explosive, flammable, corrosive; radioactive or other characteristics, causes, or is likely to cause, directly or in combination with other matters an adverse environmental effect; and

(b) any substance which may be prescribed as a hazardous substance;

(xxvi) "hazardous waste" means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, hospital waste, nuclear waste, obsolete pesticides and persistent organic pollutants;

(xxvii)"hospital waste" means waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics, laboratories and veterinary facilities;

(xxviii) "industrial activity" means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purposes;

(xxix) "industrial waste" means waste resulting from an industrial activity;

(xxx) "initial environmental examination" means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment;

(xxxi) "local authority" means any agency set up or designated by Government, by notification in the official Gazette, to be a local authority for the purposes of this Act;

(xxxii) "local council" means a local council constituted or established under a law relating to local government;

(xxxiii) "motor vehicle" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;

(xxxiv) "municipal waste" includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;

(xxxv) "noise" means the intensity, duration and character of sounds from all sources, and includes vibration;

(xxvi) "non degradable plastic products" means a plastic product which are made from the non-biodegradable substances;

(xxxvii) "nuclear waste" means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive;

(xxxviii) "Oxo-biodegradable Plastic Products" means a plastic product made of a polymer by adding a pro-degrading additive containing a transition metal salt, except cobalt, which cause the plastic to degrade and bio-grade from oxidative and cell mediated phenomena either simultaneously or successfully;

(xxxix) "person" means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, company, corporation, co-operative society, Government Agency, non-governmental organization, community-based organization, village organization, local council or local authority and, in the case of a vessel, the master or other person having for the time being the charge or control of the vessel;

(xl) "pollution" means the contamination of air, land or water by the discharge or emission of effluent or wastes or air pollutants or noise or other matter which either directly or indirectly or in combination with other discharges or substances alters unfavorably the chemical, physical, biological, radiational, thermal or radiological or aesthetic properties of the air, land or water or which may, or is likely to make the air, land or water unclean, noxious or impure or injurious, disagreeable or detrimental to the health, safety, welfare or property of persons or harmful to biodiversity;

(xli) "prescribed" means prescribed by rules made under this Act;

(xlii) "project" means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes-

(a) construction or use of buildings or other works;

(b) construction or use of roads or other transport systems;

(c) construction or operation of factories or other installations;

(d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like;

(e) any change of land use or water use; and

(f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations;

(xliii) "proponent" means the person who proposes or intends to undertake a project;

(xliv) "regulations" means regulations made under this Act;

(xlv) "rules" means rules made under this Act;

(xlvi) "sewage" means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works;

(xlvii) "Schedule Plastic Products" means all types of flexible plastic packaging and disposable plastic products made of Polythene, Polypropylene, Polystyrene and Poly-ethylene Terephthalate (PET), used for food and non-food items, like shopping bags, garbage bags, snacks packs, water and milk packaging, shrink wraps, bubble pellet wraps, films, liners, woven or non-woven bags, mulch films;

(xlviii) "Sindh Environmental Quality Standards" means standards established by the Agency under clause (e) of sub-section(1) of section 6 and approved by the Council under clause (c) of sub-section(1) of section 4 made under this Act;

(xlix) "standards" means qualitative and quantitative standards for discharge of effluent and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the Sindh Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations;

(l) "strategic environmental assessment" mean an analysis of a proposed policy, legislation, plan or programme to determine whether the principles of sustainable development have been integrated therein and to identify its likely environmental effects and such components as require an initial environmental examination or environmental impact assessment;

(li) "sustainable development" means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs;

(lii) "trans-boundary environmental impacts" means environmental impact arising from beyond the boundaries or limits of Sindh province and causing any adverse environmental impact or pollution in the air, land, water and coaster water of Sindh province;

(liii) "waste" means any substance or object which has been, is being or is intended to be, discarded or disposed-of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

(liv) "waters (coastal waters, internal waters, territorial waters and historical waters)" means such limits of the waters adjacent to the land territory as may be specified in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976).

PART-II
THE SINDH ENVIRONMENTAL PROTECTION COUNCIL.

Establishment of the Sindh Environmental Protection Council.

3. (1) The Government of Sindh shall, by notification in the official Gazette, establish a Council to be known as the Sindh Environmental Protection Council consisting of-

(i)	Chief Minister or such other person as the Chief Minister may nominate in this behalf.	**Chairperson**
(ii)	Minister-in-charge of the Environment Protection Department.	**Vice Chairperson**
(iii)	Additional Chief Secretary, Planning and Development Department, Government of Sindh.	**Ex-officio Member**
(iv)	Secretaries of the Environment, Finance, Public Health Engineering, Irrigation, Health, Agriculture, Local Government, Industries, Live Stock and Fisheries, Forest and Wildlife, Energy, Education, Departments of Government of Sindh and the divisional commissioners of Sindh.	**Ex-officio Members**

(v)	Such other persons not exceeding twenty- five as Government may appoint from representatives of the Chambers of Commerce and Industry and industrial associations, representatives of the Chambers of Agriculture, the medical and legal professions, trade unions, non-governmental organizations concerned with the environment and sustainable development, and scientists, technical experts and educationists.	**Non-official Members**
(vi)	Director General, Sindh Environment Protection Agency	Member / Secretary
(vii)	**Two Members of the Provincial Assembly of Sindh amongst the eleven Members of the Standing Committee on Environment nominated by the Speaker**	**Members**

2) The Members of the Council, other than ex-officio members, shall be appointed in accordance with the prescribed procedure.

(3) A non-official member, unless he sooner resigns or is removed, shall hold office for a term of three years and shall be eligible for re-appointment but shall not hold office for more than two terms.

(4)The Council shall frame its own Rules of Procedure.

(5) The Council shall hold meetings, as and when necessary, but not less than two meetings, shall be held in a year.

(6) The Council may constitute committees of its members and entrust them with such functions as it may deem fit, and the recommendations of the committees shall be submitted to the Council for approval.

(7) The Council, or any of its committees, may invite any technical expert or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

Functions and Powers of the Council.

4. (1) The Council shall-

(a) co-ordinate and supervise the enforcement of the provisions of this Act and other laws relating to the environment in the Province;

(b) approve comprehensive provincial environmental and sustainable development policies and ensure their implementation within the framework of a conservation strategy and sustainable development plan as may be approved by Government from time to time;

(c) approve the Sindh Environmental Quality Standards;

(d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general and for the conservation of renewable and non-renewable resources;

(e) coordinate integration of the principles and concerns of sustainable development into socio-economic and development policies, plans and programmes at the provincial, district and local levels;

(f) consider the annual Sindh Environment report and give appropriate directions thereon and cause it to be laid before the Provincial Assembly;

(g) deal with inter-provincial and federal-provincial issues, and liaise and coordinate with other Provinces through appropriate inter-provincial forums regarding formulation and implementation of standards and policies relating to environmental matters with an inter-provincial impact;

(h) provide guidelines for biosafety and for the use of genetically modified organisms; and

(i) assist the Federal Government or Federal Agency in implementation and or administration of various provision of United Nation Convention on Laws on Seas, 1980 (UNCLOS) in coastal waters of the province.

(2) The Council may, either itself or on the request of any person or organization, direct the Agency or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources or to undertake research in any specified aspect of environment.

PART-III
THE SINDH ENVIRONMENTAL PROTECTION AGENCY

Establishment of the Sindh Environmental Protection Agency.

5. (1) Government shall, by notification in the Official Gazette, establish the Sindh Environmental Protection Agency, to exercise the powers and perform the functions assigned to it under the provisions of this Act and the rules and regulations made thereunder.

(2) The Agency shall be headed by a Director General who shall be appointed by Government on such terms and conditions as it may determine.

(3) The Agency shall have such administrative, technical and legal staff as Government may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the Agency shall be exercised and performed by the Director General.

(5) The Director General may, by general or special order, delegate any of these powers and functions to staff appointed under sub-section (3).

(6) For assisting the Agency in the discharge of its functions Government shall establish Advisory Committees for various sectors and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

Functions of the Agency.

6. (1) The Agency shall –

(a) administer and implement the provisions of this Act and the rules and regulations;

(b) prepare, in co-ordination with the appropriate Government Agency or local council and, in consultation with the concerned Advisory Committees where established, environmental policies for the approval of the Council;

(c) take all necessary measures for the implementation of the environmental policies approved by the Council;

(d) prepare and publish an annual Sindh Environment Report on the state of the environment in the province;

(e) prepare or revise and establish the Sindh Environmental Quality Standards with approval of the Council:

Provided that before seeking approval of the Council, the Agency shall publish the proposed Sindh Environmental Quality Standards for public opinion in accordance with the prescribed procedure;

(f) ensure enforcement of the Sindh Environmental Quality Standards;

(g)where the quality of ambient air, water, land or noise so requires, the Agency may, by notification in the Official Gazette establish different standards for discharge or emission from different sources and for different areas and conditions as may be necessary:

Provided that where these standards are less stringent than the Sindh Environmental Quality Standards; prior approval of the Council shall be obtained;

(h) establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;

(i) take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development;

(j) issue licences, approval for the consignment, handling, transport, treatment, disposal of, storage, handling or otherwise dealing with hazardous substances;

(k) certify laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation for the purposes of this Act;

(l) identify the needs for and initiate legislation in various sectors of the environment;

(m) provide assistance to relevant Federal and Provincial Government Agencies in the management of environment accidents and natural and environmental disasters, including conduct of inquiry thereto;

(n) render advice and assistance in environmental matters including such information and data available with it as may be required for carrying out the purposes of this Act:

Provided that the disclosure of such information shall be subject to the restrictions specified in Part XI (Access to Information);

(o) assist Government Agencies, local councils, local authorities and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the Sindh Environmental Quality Standards;

(p) provide information and guidance to the public on environmental matters;

(q) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;

(r) promote public education and awareness of environmental issues through mass media and other means including seminars and workshops;

(s) establish and maintain mechanisms, including its own website, to disseminate information, subject to the provisions of this Act, regarding policies, plans and decisions of the Government, the Council and the Agency, relating to the environment;

(t) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned persons in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;

(u) review and approve mitigation plans and give guidance and directions, where necessary, relating to clean up operations ordered under this Act;

(v) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;

(w) take or cause to be taken all necessary measures for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and

(x) perform any function that the Council may assign to it.

(2) The Agency may -

(a) undertake inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organization;

(b) request any person to furnish any information or data relevant to its functions;

(c) initiate, with the approval of Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings;

(d) recommend to Government and the Council the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including -

(i) taxes, duties, cesses and other levies; and

(ii) incentives, prizes, awards, rewards, subsidies, tax exemptions, rebates and depreciation allowances;

(e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for the establishment of similar laboratories in the private sector;

(f) arrange, in accordance with such procedure as may be prescribed, financial assistance for projects designed to facilitate in discharge of its functions; and

(g) acquire assistance of concerned authorities of district administration and other relevant agencies, departments and police assistance for enforcement of this Act.

Powers of the Agency.

7. Subject to the provisions of this Act, the Agency may-

(a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both moveable and immovable;

(b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;

(c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or its rules and regulations;

(d) enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;

(e) appoint, with the approval of Government and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;

(f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;

(g) Director General may authorize any officer or official to enter and inspect or under a search warrant issued by Environmental Protection Tribunal or a Court, search at any time, any land, building, premises, vehicle or vessel or other place where or in which there are reasonable grounds to believe that an offence under this Act has been, or is being, or likely to be committed;

(h) take samples of any materials, products, articles or substances or of the effluent, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;

(i) arrange for the testing and analysis of samples at a certified laboratory;

(j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time:

Provided that the powers under clauses (f), (g), (h) (i), and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898) or the rules and regulations and under the direction of the Environmental Protection Tribunal or a Court; and

(k) establish the Sindh Environmental Co-ordination Committee comprising the Director-General as its Chairman and such other persons as Government shall appoint as its members to exercise such powers and perform such functions as shall be delegated or assigned to it by Government for carrying out the purposes of this Act and for ensuring coordination among Government Agencies in implementation of environmental policies.

PART-IV
SINDH SUSTAINABLE DEVELOPMENT FUND

Establishment of the Sindh Sustainable Development Fund.

8. (1) There shall be established a Sindh Sustainable Development Fund.

(2) The Sindh Sustainable Development Fund shall be derived from the following sources, namely—

(a) allocations and grants made or loans advanced by the Government of Sindh or by the Federal Government;

(b) aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, national or international agencies, and non-governmental organizations; and

(c) voluntary contributions from private, corporate, multinational organizations and other persons.

(d) Any fees generated under the provision of this act including the fines imposed against contraventions including penalties.

(3)The Sindh Sustainable Development Fund shall be utilized in accordance with such procedures as may be prescribed for -

(a) providing financial assistance to projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any specified aspect of the environment; and

(b) any other purposes which, in the opinion of the Board, will help achieve environment objectives and the purposes of this Act.

Management of the Sindh Sustainable Development Fund.

9. (1)The Sindh Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of—

(i)	Additional Chief Secretary, Planning and Development Department, Government of Sindh,	**Chairperson**
(ii)	Such officers of Government, not exceeding five (05), as Government may appoint including Secretaries of the Environment, Finance, Industries and Local Government Departments, Government of Sindh.	**Ex-officio Members**
(iii)	Such non-official persons, not exceeding five(05), as Government may appoint, including representatives of the Chambers of Commerce and Industry, non-governmental organizations and major donors.	**Non-official Members**
(iv)	Director General, Sindh Environmental Protection Agency.	**Secretary/ Member**

(2) The members of the Board, other than ex-officio members, shall be appointed in accordance with the prescribed procedure.

(3) A non-official member of the Board, unless he sooner resigns or is removed, shall hold office for a term of three years and shall be eligible for re-nomination, but shall not hold office for more than two terms.

(4) The Board shall frame its own rules of procedure with the approval of Government.

(5) In accordance with such procedures and such criteria as may be prescribed, the Board shall have the power to —

(a) sanction financial assistance for eligible projects;

(b) invest moneys held in the Sindh Sustainable Development Fund in such profit-bearing Government bonds, saving schemes and securities as it may deem suitable; and

(c) take such measures and exercise such powers as may be necessary for utilization of the Sindh Sustainable Development Fund for the purposes specified in sub-section (3) of section 8.

(6) The Board shall constitute committees of its members to undertake regular monitoring of projects financed from the Sindh Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts and performance evaluation based on the progress reports.

Accounts.

10. (1) The Agency shall maintain proper accounts of the Sindh Sustainable Development Fund and other relevant records and prepare annual statement of accounts in such form as may be prescribed.

(2) The accounts of the Sindh Sustainable Development Fund shall be audited annually by the Auditor General of Pakistan.

PART-V
PROHIBITIONS AND ENFORCEMENT

Prohibition of certain discharges or emissions and compliance with standards.

11. (1) Subject to the provisions of this Act and the rules and regulations, no person shall discharge or emit or allow the discharge or emission of any effluent, waste, pollutant, noise or any other matter that may cause or likely to cause pollution or adverse environmental effects, as defined in section 2 of this Act, in an amount, concentration or level which is in excess to that specified in Sindh Environmental Quality Standards; or, where applicable, the standards established under Section 6(1)(g)(i); or direction issued under Section 17, 19, 20 and 21 of this Act; or any other direction issued, in general or particular, by the Agency.

(2) All persons, in industrial or commercial or other operations, shall ensure compliance with the Environmental Quality Standards for ambient air, drinking water, noise or any other Standards established under section 6(1)(g)(i); shall maintain monitoring records for such compliances; shall make available these records to the authorized person for inspection; and shall report or communicate the record to the Agency as required under any directions issued, notified or required under any rules and regulations.

(3) Monitoring and analysis under sub-section (1) and (2), shall be acceptable only when carried out by the Environmental Laboratory certified by the Agency as prescribed in the rules.

Prohibition of import of hazardous waste.

12. No person shall import hazardous waste into Sindh province or its coastal, internal, territorial or historical waters, except acquiring prior approval of the Agency.

Handling of hazardous substances.

13. Subject to the provisions of this Act, no person shall import, generate, collect, consign, transport, treat, dispose of, store, handle or otherwise use or deal with any hazardous substance except-

(a) under a licence issued by the Agency; or

(b) in accordance with the provisions of any other law, rule, regulation or notification for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Government is a party.

Prohibition of action adversely affecting Environment.

14. (1) Subject to the provisions of this Act and the rules and regulations, no person shall cause any act, deed or any activity, including-

(a) recycling or reuse of hospital waste and infectious waste;

(b) disposal of solid and hazardous wastes at unauthorized places as prescribed;

(c) dumping of wastes or hazardous substances into coastal waters and inland water bodies;

(d) release of emissions or discharges from industrial or commercial operations as prescribed;

(e) recycling or reuse or recovery of hazardous wastes or industrial by-products in an unauthorized or non-prescribed manner or procedure; and

(f) any activity which may cause adverse environmental affect due to trans boundary projects of Province of Sindh.

which lead to pollution or impairment of or damage to biodiversity, ecosystem, aesthetics or any damage to environment and natural resources as defined in section 2 (xxxvi) of this Act.

(2) No person shall generate, handle, transport, dispose of or handle the hospital waste and infections waste except in accordance with the Hospital Waste Management Rules and in such manner as may be prescribed.

(3) No person shall import, manufacture, stockpile, trade, supply, distribute or sell any scheduled plastic product which is non-degradable. The scheduled plastic products must be oxo-biodegradable and the pro-degradant used must be approved by the Agency or any other department or agency and in such manner as prescribed.

Regulation of motor vehicles.

15. (1) Subject to the provisions of this Act, no person shall operate or manufacture a motor vehicle or class of vehicles from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the Sindh Environmental Quality Standards or, where applicable, the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6.

(2) For ensuring compliance with the standards mentioned in sub-section (1), the Agency may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as prescribed.

(3) For ensuring compliance with the standards mentioned in sub-section (1), the Agency may direct that any manufacturer of motor vehicle or class of vehicles shall use such manufacturing standard or design or pollution control devices or other equipment or undergo such testing as may be prescribed.

(4) Where a direction has been issued by the Agency under sub-section (2) and (3) in respect of any motor vehicles or class of motor vehicles, no person shall operate or manufacture any such vehicle till such direction has been complied with.

Certified Environmental Laboratory.

16. (1) The monitoring, testing and analysis carried out in compliance or for the enforcement of any provisions of this Act

(2) The laboratory or organization having any facility for environmental monitoring, testing and analysis and intend to perform under sub-section (1) shall register with the Agency in accordance with the Environmental Laboratory Certification Rules as prescribed.

PART-VI
ENVIRONMENTAL EXAMINATIONS AND ASSESSMENTS

Initial environmental examination and environmental impact assessment.

17. (1) No proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment, and has obtained from the Agency approval in respect thereof.

(2) The Agency shall –

(a) review the initial environmental examination and accord its approval, subject to such terms and conditions as it may prescribe, or require submission of an environmental impact assessment by the proponent; or

(b) review the environmental impact assessment and accord its approval subject to such terms and conditions as it may deem fit to impose or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or decline approval of the environmental impact assessment as being contrary to environmental objectives.

(3) Every review of an environment impact assessment shall be carried out with public participation and, subject to the provisions of this Act, after full disclosure of the particulars of the project.

(4) The Agency shall communicate its approval or otherwise within a period of two months from the date that the initial environmental examination is filed, and within a period of four months from the date that the environmental impact assessment is filed complete in all respects in accordance with the regulations, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations:

(5) The provisions of sub-sections (1), (2), (3) and (4) shall apply to such categories of projects and in such manner as prescribed:

(6) The Agency shall maintain separate registers for initial environmental examination and environmental impact assessment projects, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open for inspection to the public during office hours.

Strategic environmental assessment.

18. (1) All provincial government agencies, departments, authorities, local councils and local authorities responsible for formulating policies, legislation, plans and programmes to be implemented in Sindh province which may cause any environmental impact in the jurisdiction of the province shall, before submitting the same to the competent authority for approval, forward to the Sindh Environmental Protection Agency a strategic environment assessment containing —

(a) description of the objectives and features of the proposed policy, legislation, plan or programme that are in consonance with the principles of sustainable development;

(b) assessment of the adverse environmental effects, if any, likely to be caused during implementation of the policy, legislation, plan or programme alongwith proposed preventive, mitigation and compensatory measures;

(c) analysis of possible alternatives; and

(d) identification of those components of the policy, legislation, plan or programme, if any, in respect of which specific environmental impact assessment need to be carried out in due course.

(2) The Agency shall, in consultation with the concerned Government Agencies and Advisory Committees where established, review the strategic environment assessment, within sixty (60) days of its filing, and prepare a report containing its comments and recommendations in respect thereof which shall be forwarded to the initiating Government Agency, authority, local council or local authority and duly considered by it and the competent authority before approval or otherwise of the proposed policy, legislation, plan or programme.

(3) The provisions of sub-sections (1), and (2) shall apply to such categories of policies, plans and programmes and in such manner as may be prescribed.

Environmental monitoring.

19. (1) The Agency shall carry out or arrange environmental monitoring of all projects in respect of which it has approved an initial environmental examination or environmental impact assessment to determine whether the actual environmental impact exceeds the level predicted in the assessment and whether the conditions of the approval are being complied with.

(2) For purposes of sub-section (1), the Agency may require the person in charge of a project to furnish such information as it may specify pertaining to the environmental impact of the project, including quantitative and qualitative analysis of -

(a) discharge of effluents, wastes, emissions of air pollutants, noise and any other matter or action that may be found offensive under section 14 from the project on daily, weekly, monthly or annual basis;

(b) ambient quality of the air, water, noise and soil before, during and after construction and during operation of the project.

(3) On review of the data collected by it and information provided, the Agency may issue such directions to the person in charge as it may consider necessary to ensure compliance with the conditions of the approval.

Environmental Audit and Review.

20. (1) The Agency shall from time to time require the person in charge of a project to furnish, within such period as may be specified, an environmental audit or environmental review report or environmental management plan containing a comprehensive appraisal of the environmental aspects of the project.

(2) The report of a project prepared under sub-section (1) shall include -

(a) analysis of the predicted qualitative and quantitative impact of the project as compared to the actual impact;

(b) evaluation of the efficacy of the preventive, mitigation and compensatory measures taken with respect to the project; and

(c) recommendations for further minimizing or mitigating the adverse environmental impact of the project.

(3) Based on its review of the environmental audit report, the Agency may, after giving the person in charge of the project an opportunity of being heard, direct that specified mitigation and compensatory measures be adopted within a specified time period and may also, where necessary, modify the approval granted by it under section 17.

PART-VII
ENVIRONMENTAL PROTECTION ORDER

Environmental Protection Order.

21. (1) Where the Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of any provision of this Act, the rules or regulations or of the conditions of a licence, or is likely to cause, or is causing or has caused an adverse environmental effect, the Agency may, after giving the person responsible for such

discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures as the Agency may consider necessary within such period as may be specified in the order.

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include —

(a) immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;

(b) installation, replacement or alteration of any equipment or thing to eliminate, control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;

(c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances;

(d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Agency; and

(e) impose a penalty as prescribed.

(3) Notwithstanding the provisions of sub-section (1), in an emergency situation where, for reasons to be recorded, the Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of the provisions of this Act and that circumstances of the case warrant immediate action in the public interest, it may pass an ad-interim order of the nature described in sub-sections (1) and (2) by providing reasonable opportunity of hearing.

PART-VIII
OFFENCES AND PENALTIES

Penalties.

22. (1) Whoever contravenes or fails to comply with the provisions of sections 11, 17, 18 and 21 or any order issued there under shall be punishable with a fine which may extend to five million rupees, to the damage caused to environment and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues:

Provided that if the contravention of the provisions of section 11 also constitutes a contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2).

(2) Whoever contravenes or fails to comply with the provisions of sections 13, 14, 15 and 16 or any rule or regulation or conditions of any license, any order or direction, issued by the Agency, shall be punished with a fine, and in case of continuing contravention or failure with an additional fine which may extend to ten thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-sections (1) and (2), the Environmental Protection Tribunal and Court shall, as the case may be, in passing sentence, take into account the extent and duration of the contravention or failure constituting the offence and the attendant circumstances.

(4) Where an accused has been convicted of an offence under sub-sections (1) or (2), the Environmental Protection Tribunal or Court, as the case may be, shall endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of Commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry.

(5) Where a person convicted under sub-sections (1) and (2) had been previously convicted for any contravention of this Act and its rules or regulations, the Environmental Protection Tribunal, as the case may be, may, in addition to the punishment awarded thereunder-

(a) sentence him to imprisonment for a term that may extend up to three years;

(b) order the closure of the factory;

(c) order confiscation of the facility, machinery and equipment, vehicle or substance, record, document or other object used or involved in contravention of the provisions of this Act;

(d) order such person to restore the environment at his own cost, to conditions existing prior to the contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Agency; and

(e) order that compensation be paid to any person or persons for any loss, or damage to their health or property suffered by such contravention.

(6) The Director General or an officer generally or specially authorised by him in this behalf may, on the application of the accused, compound an offence under this Act with the permission of the Environmental Protection Tribunal or Court in accordance with such procedure as prescribed.

(7) Where the Director General is of the opinion that a person had contravened any provision of this Act, he may, subject to the rules, by notice in writing to that person require him to pay to the Agency a penalty in the amount set out in the notice for each day the contravention continues.

Offences by body corporate.

23. Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance of, or is attributed to any negligence on the part of, any director, partner, manager, secretary or other officer of the body corporate, such director, partner, manager, secretary or other officer of the body corporate, shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly:

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XLVII of 1984), only the Chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation.— For the purposes of this Section, "body corporate" includes a firm, association of persons and a society registered under the Societies Registration Act, 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

Offences by Government Agencies, local authorities or local councils.

24. Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of, the Head or any other officer of Government Agency, local authority or local council, such Head or other officer shall also be deemed guilty of such contravention along with the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

PART-IX
ENVIRONMENTAL PROTECTION TRIBUNALS AND COURTS

Environmental Protection Tribunals.

25. (1) Government may, by Notification in the Official Gazette, establish as many Environmental Protection Tribunals as it considers necessary and, where it establishes more than one Environmental Protection Tribunal, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.

(2) An Environmental Protection Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as a Judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by Government, of which at least one shall be a technical member nominated from amongst the officers of the Agency with suitable professional qualifications and experience in the environmental field.

(3) For every sitting of the Environmental Protection Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.

(4) A decision of an Environmental Protection Tribunal shall be expressed in terms of the opinion of the majority of its members, including the Chairperson, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision of the Environmental Protection Tribunal shall be expressed in terms of the opinion of the Chairperson.

(5) An Environmental Protection Tribunal shall not, merely by reason of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who has given evidence, and may act on the evidence already recorded by, or produced, before it.

(6) An Environmental Protection Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.

(7) No act or proceeding of an Environmental Protection Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution, of, the Environmental Protection Tribunal.

(8) The terms and conditions of service of the Chairperson and members of the Environmental Protection Tribunal shall be such as may be prescribed.

Jurisdiction and powers of Environmental Protection Tribunals.

26. (1) An Environmental Protection Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act or the rules and regulations.

(2) All contraventions punishable under sub-section (1) of section 22 shall exclusively be triable by an Environmental Protection Tribunal.

(3) An Environmental Protection Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by—

(a) the Agency or any Government Agency or Local Council; and

(b) any aggrieved person, who has given notice of not less than thirty days to the Agency, of the alleged contravention and of his intention to make a complaint to the Environment Protection Tribunal.

(4) In exercise of its criminal jurisdiction, the Environmental Protection Tribunal shall have the same powers as are vested under the Code of Criminal Procedure, 1898 (Act V of 1898).

(5) In exercise of the appellate jurisdiction under section 27 the Environmental Protection Tribunal shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).

(6) In all matters with respect to which no procedure has been provided for in this Act, the Environmental Protection Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

(7) An Environmental Protection Tribunal may, on application filed by any officer duly authorised in this behalf by the Director General, issue bailable warrant for the arrest of any person against whom reasonable suspicion exists, of his having been involved in contravention punishable under sub-section (1) of section 22:

Provided that such warrant shall be applied for, issued and executed in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898):

Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant he shall be released from custody, failing which he shall be taken or sent without delay to the officer in-charge of the nearest jurisdiction police station.

(8) All proceedings before the Environmental Protection Tribunal shall be deemed to be judicial proceedings within the meaning of sections 193 and 228 of the Pakistan Penal Code (Act XLV of 1860), and the Environmental Protection Tribunal shall be deemed to be a court for the purpose of sections 480 and 482 of the Code of Criminal Procedure, 1898 (Act V of 1898).

(9) No court other than an Environmental Protection Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Protection Tribunal extends under this Act and the rules and regulations.

(10) Where the Environmental Protection Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

Appeals to the Environmental Protection Tribunal.

27. (1) Any person aggrieved by any order or direction of the Agency under any provision of this Act or the rules or regulations may prefer an appeal with the Environmental Protection Tribunal within thirty days of the date of communication of the impugned order or direction to such person.

(2) An appeal to the Environmental Protection Tribunal shall be in such form, contain such particulars and be accompanied by such fees as prescribed.

Appeals from orders of the Environmental Protection Tribunal.

28. (1) Any person aggrieved by any final order or by any sentence of the Environmental Protection Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.

(2) An appeal under sub-section (1) shall lie before the High Court of Sindh.

Jurisdiction of Judicial Magistrate.

29. (1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contraventions punishable under sub-section (2) of section 22 shall exclusively be triable by the Court of Judicial Magistrate of First Class having of First Class having jurisdiction.

(2) A Judicial Magistrate shall be competent to impose any punishment specified in sub-sections (2) and (4) of section 22.

(3) A Judicial Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by—

(a) the Agency; and

(b) any aggrieved person.

Appeals from orders of the Judicial Magistrate.

30. Any person aggrieved by any final order or sentence passed by a Judicial Magistrate under section 28 may, within thirty days from the date of the communication of such order or sentence, appeal to the Court of the District and Sessions Judge defined as Green Court under this Act, whose decision thereon shall be final.

PART-X
PUBLIC PARTICIPATION

Public participation.

31.(1)The Agency shall cause relevant details of any proposed project regarding which an Environmental Impact Assessment has been received to be published, alongwith an invitation to the public to furnish their comments thereon within a specified period.

(2) In accordance with such procedure as may be prescribed, the Agency shall hold public hearings to receive additional comments and hear oral submissions.

(3) All comments received under sub-sections (1) and (2) shall be duly considered by the Agency while reviewing the environmental impact assessment or strategic impact assessment, and decision or action taken thereon shall be communicated to the persons who have furnished the said comments.

PART-XI
GENERAL

Power to make and amend schedule.

32. The Agency may, by notification in the official Gazette, make and amend the schedule.

Indemnity

33. No suit, prosecution or other legal proceedings shall lie against Government, the Council, the Agency, the Director General of the Agency, members, officers, employees, experts, advisors, committees or consultants of the Agency or Environmental Protection Tribunal or Court or any other person for anything which is done or intended to be done in good faith under this Act or rules or regulations.

Dues recoverable as arrears of land revenue.

34. Any dues recoverable by the Agency under this Act and rules or regulations shall be recoverable as arrears of land revenue.

Act to override other laws.

35. The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force.

Power to make rules.

36. The Sindh Environment Protection Agency may, by notification in the Official Gazette, make rules for carrying out the purposes not in consistence of this Act with the approval of Government.

Power to make regulations.

37. (1) For carrying out the purposes of this Act, the Agency may, by Notification in the Official Gazette and with the approval of Government, make regulations not inconsistent with the provisions of this Act or the rules.

(2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for —

(a) submission of periodical reports, data or information by any Government Agency, local authority or local council in respect of environmental matters;

(b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;

(c) appointment of officers, advisors, experts, consultants and employees **as per prescribed rules**;

(d) levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented;

(e) monitoring and measurement of discharges and emissions;

(f) categorization of projects to which, and the manner in which sections 17, 18 and 20 applies;

(g) laying down of guidelines for preparation of initial environmental examination, environmental impact assessment and strategic environmental assessment, and development of procedures of their filing, reviews and approval.

(h) laying down standard operating procedures for environmental sampling, examination of water, waste water, gaseous emissions, solid waste and noise;

(i) providing procedures for handling hazardous substances; and

(j) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

BY ORDER OF THE SPEAKER
PROVINCIAL ASSEMBLY OF SINDH

G.M.UMAR FAROOQ
SECRETARY
PROVINCIAL ASSEMBLY OF SINDH

Karachi: Printed at the Sindh Government Press
20-3-2014

Annex-II:
Sindh EPA (Review of IEE/EIA) Regulations, 2014

Karachi dated the 16th December, 2014.

NOTIFICATION

NO.EPA/TECH/739/2014:- In exercise of the powers conferred by section 37 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency, with the approval of Government, is pleased to make the following regulations, namely:-

1. Short title and commencement

(1) These regulations may be called the Sindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2014.

(2) They shall come into force at once.

2. Definitions.-

(1) In these regulations, unless there is anything repugnant in the subject or context -

(a) "Act" means the Sindh Environmental Protection Act, 2014 (VIII of 2014);

(b) "Agency" means the Sindh Environmental Protection Agency as defined under section 2(ii);

(c) "Committee" means the Environmental Assessment Advisory Committee constituted under regulation 24;

(d) "Director General" means the Director General of the Agency;

(e) "EIA" means an environmental impact assessment as defined in section 2(xv);

(f) "IEE" means an initial environmental examination as defined in section 2(xxx);

(g) "section" means a section of the Act.

(h) "Firm" means the Environmental Consulting Firm certified by the Agency;

(i) "Environmental Sensitive areas" means the area which falls under sensitive sites like protected areas, or the sites which may have crucial and growing importance;

(j) "protected area" means any area which safeguards the earths precious bio-diversity protect outstanding areas of natural beauty and conservation of cultural significance;

(k) "Schedule" means the Schedule to these regulations;

(l) "urban area" means an area within the limits of a town, municipality or city and includes any area declared as such by Government by notification in the official gazette;

(2) All other words and expressions used but not defined in these regulations shall have the same meaning as are assigned to them in the Act.

3. Projects requiring an IEE

A proponent of a project falling in any category listed in Schedule-I shall file an IEE with the Agency, and the provisions of section 17 shall apply to such projects.

4. Projects requiring an EIA

A proponent of a project falling in any category listed in Schedule-II shall file an EIA with the Agency, and the provisions of section 17 shall apply to such projects.

5. **Projects requiring checklist**

A proponent of a project falling in any category listed in Schedule-III shall file environmental checklist with the Agency and the provisions of section 17 shall apply to such projects.

6. Projects not requiring an IEE or EIA

(1) A proponent of a project not falling in any category listed in Schedules-I, II and III shall not be required to file an IEE or EIA:

Provided that the proponent shall file -

(a) an EIA, if the project is likely to cause an adverse environmental effects;

(b) an application for projects not listed in Schedules-I, II and III in respect of which the Agency has issued guidelines for construction and operation for approval accompanied by an undertaking and an affidavit that the aforesaid guidelines shall be fully complied with.

(2) Notwithstanding anything contained in sub-regulation (1), the Agency may direct the proponent of a project, whether or not listed in Schedule I or II or III, to file an IEE or EIA or environmental check list, for reasons to be recorded in such direction:

Provided that no such direction shall be issued without the recommendations in writing of the Committee.

(3) The provisions of section 17 shall apply to a project in respect of which an IEE or EIA or environmental checklist is filed under sub-regulation (1) or (2).

7. Preparation of IEE/EIA and environmental checklist

(1) The Agency may issue guidelines for preparation of an IEE or an EIA or an environmental checklist, including guidelines of general applicability, and sectoral guidelines indicating specific assessment requirements for planning, construction and operation of projects relating to particular sector.

(2) Where guidelines have been issued under sub-regulation (1), an IEE or EIA or environmental checklist shall be prepared, to the extent practicable, in accordance therewith and the proponent shall justify in the IEE or EIA or in environmental checklist any departure therefrom.

8. Review Fees

The proponent shall pay, at the time of submission of an IEE or EIA or environmental checklist, a non-refundable review fee to the Agency as per rates shown in Schedule-IV

9. Filing of IEE, EIA and environmental check list.

(1) Ten hard copies and two electronic copies for an IEE and EIA reports shall be filed with the Agency prepared by Firm.

(2) Every IEE and EIA shall be accompanied by -

(a) an application, in the form prescribed in Schedule-V;

(b) copy of receipt showing payment of the Review Fee.

(c) no objection certificates from the relevant departments in case of EIA shall be the part of reports;

(d) the environmental check list as per its guidelines.

10. Preliminary scrutiny

(1) Within fifteen working days of filing of the IEE or EIA or environmental check

list, the Agency shall –

(a) confirm that the IEE or EIA or environmental check list is complete for purposes of initiation of the review process; or

(b) require the proponent to submit such additional information as may be specified; or

(c) return the IEE or EIA or environmental checklist to the proponent for revision, clearly listing the points requiring further study and discussion.

(2) Notwithstanding anything contained in sub-regulation (1), the Agency may require the proponent to submit an additional information at any stage during the review process.

11. Public participation

(1) In the case of an EIA, the Agency shall simultaneously with issue of confirmation of completeness under sub-regulation (2) of regulation 9, cause to be published in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of project, its exact location, the name and address of the proponent and the places at which the EIA of the project can, subject to the restrictions in sub-section (3) of section 17, be accessed.

(2) The notice issued under sub-regulation (1) shall fix a date, time and place of public hearing for any comments on the project or its EIA.

(3) The date fixed under sub-regulation (2) shall not be earlier than fifteen days from the date of publication of the notice.

(4) The Agency shall also ensure the circulation of the EIA to the concerned Government Agencies and solicit their comments thereon.

(5) All comments received by the Agency from the public or any Government Agency shall be collated, tabulated and duly considered by it before decision on the EIA.

(6) The Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement and participation in EIA assessment.

12. Review

(1) The Agency shall make every effort to carry out its review of the environmental checklist within thirty days, IEE within sixty days, and of the EIA within four months of issue of confirmation of completeness under regulation 9.

(2) In reviewing the EIA, the Agency shall consult such Committee of Experts be constituted for the purpose by the Director General, and may also solicit views of concerned Advisory Committee, if any, constituted by the Agency.

(3) The Director-General may, where he considers it necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified.

(4) In reviewing the IEE, the Director General may constitute a committee of the officers from within the Agency on case to case basis in view of the jurisdiction and location of the project for the purpose to extend final recommendation about the approval or rejection of the IEE.

(5) In reviewing of the IEE, the Director General may direct the proponent and Firm to present the report before the committee as given under sub-regulation (4) and the Director General may also invite environmental experts from outside the Agency for the purpose of assistance.

(6) The review of the IEE or EIA by the Agency shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under regulation 10, and views of the committees mentioned in sub-regulations (2) and (3) above.

(7) The environmental check list shall be reviewed as per guidelines issued by the Agency.

13. Decision

(1) Subject to regulation 9 and 11, the documentary evidence in the form of videos (soft copies) of public hearing shall be submitted by the proponent at the time of environmental approval or at any stage of review process, to the Agency.

(2) On completion of the review, the decision of the Agency shall be communicated to the proponent in the form prescribed in Schedule-VI in the case of an IEE and environmental check list, and in the form prescribed in Schedule-VII in the case of an EIA and for environmental checklist.

14. Conditions of approval

(1) Every approval of an IEE or EIA or check list shall, in addition to such conditions as may be imposed by the Agency, be subject to the condition that the project shall be designed and constructed, and mitigatory and other measures adopted, strictly in accordance with the IEE or EIA or environmental check list, unless any variations thereto have been specified in

the approval by the Agency.

(2) Where the Agency accords its approval subject to certain conditions, the proponent shall -

(a) before commencing construction of the project, acknowledge acceptance of the stipulated conditions by executing an undertaking in the form prescribed in Schedule-VIII;

(b) before commencing operation of the project, obtain from the Agency written confirmation that the conditions of approval, and the requirements in the IEE or EIA or environmental check list relating to design and construction, adoption of mitigatory and other measures and other relevant matters, have been duly complied with.

15. Confirmation of compliance

(1) The request for confirmation of compliance under clause (b) of sub-regulation (2) of Regulation 13 shall be accompanied by an Environmental Management Plan indicating the measures and procedures proposed to be taken to manage or mitigate the environmental impacts for the life of the project, including provisions for monitoring, reporting and auditing.

(2) Where a request for confirmation of compliance is received from a proponent, the Agency may carry out such inspection of the site and plant and machinery and seek such additional information from the proponent as it may deem fit:

Provided that every effort shall be made by the Agency to provide the requisite confirmation or otherwise within twenty days of receipt of the request, with complete information, from the proponent.

(3) The Agency may, while issuing the requisite confirmation of compliance, impose such other conditions as the Environmental Management Plan, and the operation, maintenance and monitoring of the project as it may deem fit, and such conditions shall be deemed to be included in the conditions to which approval of the project is subject.

16. Deemed approval

The period for communication of decision stipulated in sub-section (4) of section 17 shall commence from the date of filing of an IEE or EIA or environmental check list in respect of which confirmation of completeness is issued by the Agency under clause (a) of sub-regulation (1) of regulation 9.

17. Extension in review period

Where the Agency in a particular case extends the period of four months under the provisions of sub-section (4) of section 17, it may extend the further period as it may

deem fit, for the reasons to be recorded in writing thereof.

18. Validity period of approval

(1) The approval accorded by the Agency under section 17 read with regulation 12 shall be valid, for commencement of construction, for a period of three years from the date of issue.

(2) If construction is commenced during the initial three years validity period, the validity of the approval shall stand extended for a further period of three years from the date of issue.

(3) After issue of confirmation of compliance, the approval shall be valid for a period of three years from the date thereof.

(4) The proponent may apply to the Agency for extension in the validity periods mentioned in sub-regulations (1), (2) and (3), which may be granted by the Agency in its discretion for such period not exceeding three years at a time, if the conditions of the approval do not require significant change:

Provided that the Agency may require the proponent to submit a fresh IEE or EIA, if in its opinion changes in location, design, construction and operation of the project so warrant.

19. Entry and inspection

(1) For the purpose of verification of any matter relating to the review or to the conditions of approval of an IEE or EIA or environmental check list prior to, before or during and after commencement of construction or operation of a project, duly authorized staff of the Agency shall be entitled to enter and inspect the project site, factory building and plant and equipment installed therein.

(2) The proponent shall ensure full cooperation of the project staff at site to facilitate the inspection, and shall provide such information as may be required by the Agency for this purpose and pursuant thereto.

20. Monitoring

(1) After issue of approval, the proponent shall submit a report to the Agency on completion of construction of the project.

(2) After issue of confirmation of compliance, the proponent shall submit an annual report summarizing operational performance of the project, with reference to the conditions of approval and maintenance and mitigatory measures adopted by the project.

(3) The proponent shall, in order to enable the Agency to effectively monitor compliance with the conditions of approval, furnish such additional information as the Agency may require.

21. Cancellation of approval

(1) Notwithstanding anything contained in these regulations, if, at any time, on the basis of information or report received or inspection carried out, the Agency is of the opinion that the conditions of an approval have not been complied with, or that the information supplied by a proponent in the approved IEE or EIA or environmental check list is incorrect, it shall issue notice to the proponent for show cause within two weeks of receipt thereof as to why the approval should not be cancelled.

(2) In case no reply is received or if the reply is considered unsatisfactory, the Agency may, after giving the proponent an opportunity of being heard -

(i) require the proponent to take such measures and to comply with such conditions within such period as it may specify, failing which the approval shall stand cancelled; or

(ii) cancel the approval.

(3) On cancellation of the approval, the proponent shall cease construction or operation of the project forthwith.

(4) Any action taken under this regulation shall be without prejudice to any other action that may be taken against the proponent under the Act or rules or regulations or any other law for the time being in force.

22. Registers of IEE,EIA and Check list projects

Separate Registers to be maintained by the Agency for IEE, EIA and environmental check list projects under sub-section (6) of section 17 shall be in the form prescribed in Schedule-IX.

23. Environmentally sensitive areas

(1) The Agency may, by notification in the official Gazette, designate an area to be an environmentally sensitive area.

(2) Notwithstanding anything contained in regulations 3, 4 and 5, the proponent of a project situated in an environmentally sensitive area shall be required to file an EIA with the Agency.

(3) The Agency may from time to time issue guidelines to assist proponents and other persons involved in the environmental assessment process to plan and prepare projects located in environmentally sensitive areas.

(4) Where guidelines have been issued under sub-regulation (3), the projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure therefrom justified in the EIA pertaining to the project.

24. **Environmental Assessment Advisory Committee.-** For the purpose of rendering advice on all aspects of the environmental assessment including guidelines procedure and categorization of projects, the following Advisory Committee shall be constituted:-

(i) Director Technical, Sindh Environmental Protection Agency (EIA/IEE)	**Chairman**
(ii) Chief Environment, Planning and Development Department	**Member**
(iii) Four representative on each of industry, non-Governmental organization, legal and other experts	**Members**

25. Repeal and Savings. (1) The provisions of the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Assessment Impact Regulations 2000, to the extent of the Province of Sindh are hereby repealed.

(2) All orders made, notification issued, actions taken under the repealed Regulations shall remain in force until amended, altered or repealed by the provisions of these Rules.

DIRECTOR GENERAL
SINDH ENVIRONMENTAL PROTECTION AGENCY

SCHEDULE I

(See Regulation 3)

A. Agriculture, Livestock and Fisheries

1. Poultry, livestock, stud and fish farms
2. Projects involving packaging, formulation, cold storage and warehouse of agricultural products.

B. Energy

1. Hydroelectric power generation less than 50 MW
2. Thermal power generation less than 100MW
3. Coal fired power plants with capacity less than 50 MW
4. Transmission lines less than 11 KV, and grid station
5. Waste-to-energy generation projects including bio-mass less than 25 MW
6. Solar project
7. Wind project

C. Oil and Gas projects:

1. Oil and gas 2D/3D Seismic survey and drilling activities
2. Oil and gas extraction projects including exploration and production located outside the environmentally sensitive areas
3. Construction of LPG storage facilities
4. Construction of LPG,CNG filling station and petrol pumps

D. Manufacturing and processing

1. Ceramics and glass units less than 500 million
2. Food processing industries with total cost less than Rs. 200 millions
3. Pharmaceutical units.
4. Marble units

5. Carpet manufacturing units

6. Rice mills, ghee/oil mills ,

7. Brick kilns

8. Stone crushing units

9. Man-made fibers and resin projects with total cost less than Rs. 200 millions

10. Manufacturing of apparel, textile garments unit , including dyeing, bleaching and printing, with total cost less than Rs.50 million

11. Wood products with total cost more than Rs.100 million

12. Steel re-rolling mills

13. Recycling plants

E. Mining and mineral processing

Commercial extraction of sand, gravel, limestone, clay, sulphur and other minerals not included in Schedule II with total cost less than Rs.100 million

1. Crushing, grinding and separation processes

2. Smelting plants with total cost less than Rs100 millions

F. Transport

1. Flyovers, underpasses and bridges having total length less than 500 meters

G. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume less than 25 million cubic meters of surface area less than 4 square kilometers

2. Small-scale irrigation systems and drainage system with total cost less than Rs. 100 million

H. Water supply and filtration

Water supply schemes and **filtration** plants with total cost less than 100 million (Including projects of maintenance, up gradation, reconstruction of existing projects.)

I. Waste disposal and treatment

1. Solid and non-hazardous waste with annual capacity less than 10,000 tons

2. Waste water treatment for sewage treatment facility with total cost less than 200M

3. Industry specific Waste water treatment facility for Industrial effluent (small scale plant)

J. Urban development

1. Housing schemes less than 10 acres

2. Mutli-story buildings having residential and commercial setup on the total plot size is less than 2000 sq.yards

3. Hospitals with capacity of 50 beds, health care unit/laboratories with 500 OPD/day.

4. Construction of Educational, Academic institutions on land less than 10 acres.

K. Other projects

Any other project for which filing of an IEE is required by the Agency under sub-regulation (2) of Regulation 6.

SCHEDULE II

(See Regulation 4)

List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation over 50 MW
2. Thermal power generation over 100MW
3. Coal power projects above 50 MW
4. Transmission lines (11 KV and above) and distribution projects.
5. Nuclear power plants
6. Wind energy projects if falls under any sensitive, protected area.

B. Oil and Gas projects

1. Petroleum refineries.
2. LPG and LNG Projects(including LNG Terminals, re-gasification units) except LPG filling stations
3. Oil and gas transmission systems
4. Oil and gas gathering system, separation and storage.

C. Manufacturing and processing

1. Cement plants
2. Chemical manufacturing industries
3. Fertilizer plants
4. Steel Mills
5. Sugar Mills and Distilleries
6. Food processing industries including beverages, dairy milk and products, slaughter houses and related activities with total cost more than Rs. 200 Million
7. Industrial estates (including export processing zones)
8. Man-made fibers and resin projects with total cost of Rs 200M and above
9. Pesticides (manufacture or formulation)
10. Petrochemicals complex
11. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulping, plastic products, textiles (except apparel),printing and publishing, paints and dyes, oils and fats and vegetable ghee projects, with total cost more than Rs.

10 million
12. Tanning and leather finishing projects
13. Battery manufacturing plant

D. Mining and mineral processing

1. Mining and processing of coal, gold, copper, sulphur and precious stones
2. Mining and processing of major non-ferrous metals, iron and steel rolling
3. Smelting plants with total cost of Rs. 100 million and above

E. Transport

1. Airports
2. Federal or Provincial highways or major roads (including rehabilitation or rebuilding or reconstruction of existing roads)
3. Ports and harbor development
4. Railway works
5. Flyovers, underpasses and bridges having total length of more than 500m

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of 25 million cubic meters and above having surface area of 4 square kilometers and above
2. Irrigation and drainage projects serving 15,000 hectares and above
3. Flood Protection

G. Water supply and filtration

Large Water supply schemes and **filtration** plants.

H. Waste Disposal and treatment

1. Handling, storage or disposal of hazardous or toxic wastes or radioactive waste (including landfill sites, incineration of hospital toxic waste)
2. Waste disposal facilities for municipal or industrial wastes, with total annual capacity of 10,000 tons and above.
3. Waste water treatment facility for industrial or municipal effluents.

I. Urban development and tourism

1. Housing schemes above 10 acres

2. Residential/commercial high rise buildings/apartments from15 stories and above.

3. Land use studies and urban plans (large cities)

4. Large scale public facilities.

~~5.~~ Large-scale tourism development projects

J. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas

K. Other projects

1. Any other project for which filing of an EIA is required by the Agency under sub-regulation (2) of Regulation 5.

2. Any other project likely to cause an adverse environmental effect

SCHEDULE-III

List of projects requiring environmental screening (through check list)

a. Construction of, offices and small commercial buildings (1-6 story),home industrial units, ware houses, marriage / banquet facilities, large scale motor vehicles workshops, restaurants / food outlets ,large baking unit subject to the compliance with existing zoning laws.

b. Reconstruction / rehabilitation of roads (small roads in urban area and farm to market roads more than 2 km.

c. On-farm dams and fish farms.

d. Pulses mills.

e. Flour Mills

f. Projects promoting energy efficiency (small scale).

g. Lining of existing minor canals and /or water courses.

h. Canal cleaning

i. Forest harvesting operations

j. Rain harvesting projects

k. Rural schools (Secondary and Higher Secondary) and rural and basic health units having at least ten beds capacity.

l. BTS Towers

m. Lime Kilns

n. Ice factories and cold storage.

o. Cotton oil mill

p. Warehouses for pesticides and pharmaceuticals

Schedule-IV

(See Regulation 7)

Description	IEE	EIA	Environmental Check list
Projects	Rs.100,000	Rs.200,000	Rs.30,000 except BTS Towers which is Rs.15,000

SCHEDULE V

[See Regulation 8(2)(a)]

Application Form

1.	Name and address of Proponent		Phone: Fax: Telex:	
2.	CNIC No. of proponent			
3.	Description of project			
4.	Location of project			
6.	Objectives of project			
7.	IEE/EIA attached?	IEE/EIA : Yes/No		
8.	Have alternative sites been considered and reported in IEE/EIA?		Yes/No	
9.	No Objection Certificate of relevant stakeholders		Name(s)	
10.	Existing land use		Land requirement	
11.	Is basic site data available, or has it been measured?	(only tick yes if the data is reported in the IEE/EIA)	Available	Measured
		Meterology (including rainfall)	Yes/No	Yes/No
		Ambient air quality	Yes/No	Yes/No
		Ambient water quality	Yes/No	Yes/No
		Ground water quality	Yes/No	Yes/No
12.	Have estimates of the following been reported, especially Quantitative Analysis?		Estimated	Reported
		Water balance	Yes/No	Yes/No
		Solid waste disposal	Yes/No	Yes/No
		Liquid waste treatment	Yes/No	Yes/No
13.	Source of power		Power requirement	
14.	Labour force (number)	Construction: Operation:		
15.	Environmental Consulting Firm			

Verification. I do solemnly affirm and declare that the information given above and contained in the attached IEE/EIA is true and correct to the best of my knowledge and belief.

Date

Signature, name and _____
designation of proponent
(with official stamp/seal)

SCHEDULE VI

[See Regulation 12]

Decision on IEE/Environmental Check List

1. Name and address of proponent _____

   _____

2. Description of project

3. Location of project

4. Date of filing of IEE

5. After careful review of the IEE, the Agency has decided –

   (a) to accord its approval, subject to the following conditions:

   _____
   _____

   or (b) that the proponent should submit an EIA of the project, for the following reasons –

   _____
   _____

   [Delete (a) or (b), whichever is inapplicable]

Dated

Tracking no.___

Director-General
Sindh Environmental Protection Agency
(with official stamp/seal)

SCHEDULE VII

[*See* Regulation 12]

Decision on EIA

1. Name and address of proponent _____

   _____

2. Description of project _____

3. Location of project _____

4. Date of filing of EIA _____

5. After careful review of the EIA, and all comments thereon, the Federation Agency has decided –

   (a) to accord its approval, subject to the following conditions:

   _____
   _____

   or (b) that the proponent should submit an EIA with the following modifications-

   _____
   _____

   or (c) to reject the project, being contrary to environmental objectives, for the following reasons:

   _____
   _____

   [Delete (a)/(b)/(c), whichever is inapplicable]

Dated

Tracking no.___

Director-General
Sindh Environmental Protection Agency
(with official stamp/seal)

SCHEDULE VIII

[See Regulation 13(2)]

Undertaking

I, (full name and address) as proponent for (name, description and location of project) do hereby solemnly affirm and declare that I fully understand and accept the conditions dated , and undertake to design, construct and operate the project strictly in accordance with the said conditions and the IEE/EIA/Environmental Check List.

Signature, name and
designation of proponent
(with official stamp/seal)

Witnesses
(full names and addresses)

_____

_____

SCHEDULE IX

(See Regulation 21)

Form of Registers for IEE and EIA and Environmental Check List projects

S. No.	Description	Relevant Provisions
1	2	3
1.	Tracking number	
2.	Category type (as per Schedules I, II & III)	
3.	Name of proponent	
4.	Name and designation of contact person	
5.	Name of consultant	
6.	Description of project	
7.	Location of project	
8.	Project capital cost	
9.	Date of receipt of IEE/EIA/Environmental Check List	
10.	Date of confirmation of completeness	
11.	Approval granted (Yes/No)	
12.	Date of approval granted or refused	
13.	Conditions of approval/reasons for refusal	
14.	Date of Undertaking	
15.	Date of extension of approval validity	
16.	Period of extension	
17.	Date of commencement of construction	
18.	Date of issue of confirmation of compliance	
19.	Date of commencement of operations	
20.	Dates of filing of monitoring reports	
21.	Date of cancellation, if applicable	

Annex-III :
Sindh Environmental Quality Standards (SEQS)

EXTRAORDINARY Registered No. M324

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KARACHI THURSDAY JANUARY 28, 2016

PART-I

GOVERNMENT OF SINDH
SINDH ENVIRONMENT PROTECTION AGENCY

NOTIFICATION

NO.EPA/TECH/739/2014:- In exercise of the powers conferred under clause (g) of sub-section (1) of section of 6 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency, with the approval of the Sindh Environmental Protection Council, is pleased to establish the following standards:-

1. (1) These Standards may be called the Sindh Environmental Industrial Waste Water, Effluent, Domestic, Sewerage, Industrial Air Emission and Ambient Airs, Noise for Vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards, 2015.

(2) These Standards shall come into force at once.

2. In these Standards, unless there is anything repugnant in the subject or context –

(a) "Government" means the Government of Sindh;

(b) "Standards" means the Sindh Environmental Quality Standards.

SINDH ENVIRONMENTAL QUALITY STANDARDS FOR MUNICIPAL AND LIQUID INDUSTRIAL EFFLUENTS (mg/l, UNLESS OTHERWISE DEFINED)

S. No.	Parameter	Standards		
		Into Inland Waters	Into Sewage Treatment [5]	Into Sea [ ]
1	2	3	4	5
1.	Temperature 40 ^{0}C or Temperature Increase *	≤3^{o}C	≤3^{o}C	≤3^{o}C
2.	pH value (H^+) .	6-9	6-9	6-9
3.	Biochemical Oxygen Demand (BOD)5 at 20^{0}C [1]	80	250	80**
4.	Chemical Oxygen Demand(COD) [1]	150	400	400
5.	Total Suspended Solids (TSS)	200	400	200
6.	Total Dissolved Solids (TDS)	3500	3500	3500
7.	Oil and Grease	10	10	10
8.	Phenolic compounds (as phenol)	0.1	0.3	0.3
9.	Chloride (as Cl^-)	1000	1000	SC***
10.	Fluoride (as F^-)	10	10	10
11.	Cyanide (as CN^-) total .	1.0	1.0	1.0
12.	An-ionic detergents (as MBAS)[2]	20	20	20
13.	Sulphate (SO_4^{2-})	600	1000	SC***
14.	Sulphide (S^{2-})	1.0	1.0	1.0
15.	Ammonia (NH_3)	40	40	40
16.	Pesticides [3]	0.15	0.15	0.15
17.	Cadmium [4] ..	0.1	0.1	0.1
18.	Chromium (trivalent and hexavalent [4] ..	1.0	1.0	1.0
19.	Cooper [4]	1.0	1.0	1.0
20.	Lead [4]	0.5	0.5	0.5
21.	Mercury [4]	0.01	0.01	0.01
22.	Selenium [4]	0.5	0.5	0.5
23.	Nickel [4] ..	1.0	1.0	1.0
24.	Silver [4]	1.0	1.0	1.0
25.	Total toxic metals	2.0	2.0	2.0
26.	Zinc	5.0	5.0	5.0
27.	Arsenic [4]	1.0	1.0	1.0
28.	Barium [4]	1.5	1.5	1.5
29.	Iron	8.0	8.0	8.0
30.	Manganese	1.5	1.5	1.5
31.	Boron [4]	6.0	6.0	6.0
32.	Chlorine	1.0	1.0	1.0

Explanations:

1. Assuming minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Sindh Environmental Protection Agency. By 1:10 dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent.
2. Methylene Blue Active Substances; assuming surfactant as biodegradable.
3. Pesticides include herbicides, fungicides, and insecticides.
4. Subject to total toxic metals discharge should not exceed level given at S. N. 25.
5. Applicable only when and where sewage treatment is operational and BOD5=80mg/l is achieved by the sewage treatment system.
6. Provided discharge is not at shore and not within 10 miles of mangrove or other important estuaries.

* The effluent should not result in temperature increase of more than 3^0C at the edge of the zone where initial mixing and dilution take place in the receiving body. In case zone is not defined, use 100 meters from the point of discharge.

** The value for industry is 200 mg/l

*** Discharge concentration at or below sea concentration (SC).

Note: 1. Dilution of liquid effluents to bring them to the STANDARDS limiting values is not permissible through fresh water mixing with the effluent before discharging into the environment.

2. The concentration of pollutants in water being used will be subtracted from the effluent for calculating the STANDARDS limits".

"SINDH ENVIRONMENTAL QUALITY STANDARDS FOR INDUSTRIAL GASEOUS EMISSION (mg/Nm^3, UNLESS OTHERWISE DEFINED)."

S. No.	Parameter	Source of Emission		Standards
1	2	3		4
1.	Smoke	Smoke opacity not to exceed		40% or 2 Ringleman Scale or equivalent smoke number
2.	Particulate matter	(a) Boilers and Furnaces		
	(1)	(i)	Oil fired	300
		(ii)	Coal fired	500
		(iii)	Cement Kilns	300

		(b) Grinding, crushing, Clinker coolers and Related processes, Metallurgical Processes, converter, blast furnaces and cupolas.	500
3.	Hydrogen Chloride	Any	400
4.	Chlorine	Any	150
5.	Hydrogen Fluoride	Any	150
6.	Hydrogen Sulphide	Any	10
7.	Sulphur Oxides [2] [3]	Sulfuric acid/ Sulphonic acid plants	
		Other Plants except power Plants operating on oil and coal	1700
8.	Carbon Monoxide	Any	800
9.	Lead	Any	50
10.	Mercury	Any	10
11.	Cadmium	Any	20
12.	Arsenic	Any	20
13.	Copper	Any	50
14.	Antimony	Any	20
15.	Zinc	Any	200
16.	Oxides of Nitrogen	Nitric acid Manufacturing unit.	3000
	(3)	Other plants except power plants operating on oil or coal:	
		Gas fired	400
		Oil fired	600
		Coal fired	1200

Explanations:-

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 percent Sulphur content in fuel oil. Higher content of Sulphur will case standards to be pro-rated.
3. In respect of emissions of Sulphur dioxide and Nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to Standards specified above, comply with the following standards:-

A. **Sulphur Dioxide**

Sulphur Dioxide Background levels Micro-gram per cubic meter (ug/m^3) Standards.

Background Air Quality (SO_2 Basis)	Annual Average	Max. 24-hours Interval	Criterion I Max. SO_2 Emission (Tons per Day Per Plant)	Criterion II Max. ground level increment to ambient (One year Average)
Unpolluted	<50	<200	500	50
Moderately Polluted*				
Low	50	200	500	50
High	100	400	100	10
Very Polluted**	>100	>400	100	10

* For intermediate values between 50 and 100 ug/m^3 linear interpolations should be used.
** No projects with Sulphur dioxide emissions will be recommended.

B. Nitrogen Oxide

Ambient air concentrations of Nitrogen oxides, expressed as NO_X should not be exceed the following:-

Annual Arithmetic Mean 100ug/m^3 (0.05 ppm)

Emission level for stationary source discharge before missing with the atmosphere should be maintained as follows:-

For fuel fired steam generators as Nanogram (10^0-gram) per joule of heat input:

Liquid fossil fuel	130
Solid fossil fuel..	300
Lignite fossil fuel	260

Note:- Dilution of gaseous emissions to bring them to the STANDARDS limiting value is not permissible through excess air mixing blowing before emitting into the environment.

Sindh Environmental Quality Standards for Motor Vehicle Exhaust and Noise

(i) For in-use Vehicles

S. No.	Parameter	Standards (maximum permissible limit)	Measuring Method	Applicability
1	2	3	4	5
1.	Smoke	40% or on the Ringleman Scale during engine acceleration mode	To be compared with Ringleman 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 7.5 meter from the source.	

For new Vehicles

EMISSION STANDARDS FOR DIESEL VEHICLES

(a) For passenger Cars and Light Commercial Vehicles (g/Km)

Type of Vehicle	Category/Class	Tiers	CO	HC+ NOx	PM	Measuring Method	Applicability
1	2	3	4	5	6	7	8
Passenger Cars.	M 1: with reference mass (RW).	Pak-II, IDI	1.0	0.7	0.08		All imported and local manufactured
	up to 2500 kg. Cars with RW over 2500 kg. to meet NI Category standards	Pak-II DI	1.0	0.9	0.10	NEDC (ECE 15+ EUDCL)	Diesel vehicles with effect from 01-07-2012
Light Commercial Vehicles	NI-I (RW≤1250 Kg)	Pak-II IDI	1.0	0.70	0.08		
		Pak-II DI	1.0	0.90	0.10		
	NI-II(1250kg< RW < 1700 Kg)	Pak-II IDI	1.25	1.0	0.12		
		Pak-II DI	1.25	1.3	0.14		
	NI-III(RW< 1700 Kg)	Pak-II IDI	1.50	1.2	0.17		
		Pak-II DI	1.50	1.6	0.20		

Parameter Standards (maximum permissible limit) Measuring method

Noise	85 db (A)	Sound-meter at 7.5 meters from the source

(b) For Heavy Duty Diesel Engines and Large Goods Vehicles (g/Kwh)

Type of Vehicle	Catogry/ Class	Tiers	CO	HC	NOx	PM	Measuring Method	Applicability
1	2	3	4	5	6	7	8	9
Heavy Duty Diesel Engines	Turks and Buses	Pak-II	4.0	1.1	7.0	0.15	ECE-R-49	All Imported and local manufactured diesel vehicles with the effect 1-7-2012
Large goods Vehicles	N2(2000 and up	Pak-II	4.0	7.0	1.10	0.15	EDC	

Parameter Standards (maximum permissible limit) Measuring method

Noise 85 db (A) Sound-meter at 7.5 meters from the Source

Emission Standards for Petrol Vehicles (g/km)

Type of Vehicle	Category/ Class	Tier	Co	HC+ NOx	Measuring Method	Applicability
1	2	3	4	5	6	7
Passenger Cars.	M 1: with reference mass (RW). upto 2500 kg. Cars with RW over 2500 kg. to meet N1 Category standards	Pak-II	2.20	0.5	NEDC (ECE 15+ EUDCL)	All imported and new models * locally manufactured petrol vehicles with effect from 1st July, 2009**

Light Commercial Vehicles	NI-I (RW<1250 kg) NI-NI-II (1250kg> kg RW < 1700 Kg)	Pak-II	2.20	0.5	
		Pak-II	4.0	0.65	
		Pak-II	5.0	0.08	
	NI-III(RW> 1700 kg)				
Motor Rickshaws & Motor Cycles	2,4 strokes < 150 cc	Pak-II	5.5	1.5	ECER 40
	2,4 strokes > 150cc	Pak-II	5.5	1.3	

Parameter Standards (maximum permissible limit) Measuring method

Noise source	85 db (A)	Sound-meter at 7.5 meters from the

Explanations:

DI:	Direct Injection.
IDI:	Indirect Injection.
EUDCL:	Extra Urban Driving Cycle.
NEDC:	New European Driving Cycle.
ECE:	Urban Driving Cycle.
M:	Vehicles designed and constructed for the carriage of passenger and Comprising no more than eight seats in addition to the driver's seat:
N:	Motor vehicles with at least four wheels designed and constructed for the carriage of goods.
*	New model means both model and engine type change.
**	The existing models of petrol driven vehicles locally manufactured will immediately switch over to Pak-II emission standards but no late than 30th June, 2012.

SINDH ENVIRONMENTAL QUALITY STANDARDS FOR AMBIENT AIR

Pollutants	Time-weight average	Concentration in Ambient Air	Method of measurement
Sulphur Dioxide(SO2)	Annual Average*	80 µg/m³	Ultraviolet Fluorescence method
	24 hours**	120 µg/m³	
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m³	Gas Phase Chemiluminescence
	24 hours**	40 µg/m³	
Oxides of Nitrogen as (NO2)	Annual Average*	40 µg/m³	Gas Phase Chemiluminescence
	24 hours**	80 µg/m³	
O³	1 hour	130 µg/m³	Non dispersive UV absorption method
Suspended Particulate Matters(SPM)	Annual Average*	360 µg/m³	High Volume Sampling (Average flow rate not less than 1.1 in 3/minutes)
	24 hours**	500 µg/m³	
Respirable Particulate Matter PM10	Annual Average*	120 µg/m³	ß Ray absorption method
	24 hours**	150 µg/m³	
Respirable Particulate Matter PM2.5	Annual Average*	40 µg/m³***	ß Ray absorption method
	24 hours**	75 µg/m³	
Lead Pb	Annual Average*	1 µg/m³	ASS Method after sampling using EPM 2000 or equivalent filter paper
	24 hours**	1.5 µg/m³	
Carbon Monoxide(CO)	8 hours**	5 mg/m³	Non Dispersive Infra Red(NDIR) method
	1 hours**	10 mg/m³	

*Annual arithmetic mean of minimum 104 measurements in a year taken twice a week, 24 hourly and at uniform interval.

** 24 hourly/8 hourly values should be met 98% in a year, 2% of the time. It may exceed but not on two consecutive days.

***Annual Average limit of 40μ/m³ or background annual average concentration plus allowable allowance of 9μg/m³, whichever is lower.

Sindh Standards for Drinking Water Quality

Properties / Parameters	Standard Values for Sindh	WHO Standards	Remarks
Bacterial			
All water intended for drinking (e.Coli or Thermo tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water in the distribution system (E.coli or thermo tolerant coliform and total coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period	Most Asian countries also follow WHO standards
Physical			
Colour	≤ 15 TCU	≤ 15 TCU	
Taste	Non objectionable/Acceptable	Non objectionable/Acceptable	
Odour	Non	Non	

	objectionable/Acceptable	objectionable/Accep table
Turbidity	⟨ 5 NTU	⟨ 5 NTU
Total hardness as $CaCO_3$	< 500 mg/l	---
TDS	⟨ 1000	⟨ 1000
pH	6.5 – 8.5	6.5 – 8.5
Chemical		
Essential Inorganic	***mg/Litre***	***mg/Litre***
Aluminium (Al) mg/l	≤ 0.2	0.2

Properties / Performance	Standard Values for Pakistan	Who Standards	Remarks
Antimony (Sb)	≤ 0.005 (P)	0.02	
Arsenic (As)	≤ 0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
Barium(Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing countries
Chloride (Cl)	< 250	250	
Chromium (Cr)	≤ 0.05	0.05	
Copper (Cu)	2	2	
Toxic Inorganic	***mg/Liter***	***mg/Litre***	
Cyanide (CN)	≤ 0.05	0.07	Standard for Pakistan similar to Asian developing countries
Fluoride (F)*	≤ 1.5	1.5	
Lead (Pb)	≤ 0.05	0.01	Standard for Pakistan similar to most Asian developing countries
Manganese (Mn)	≤ 0.5	0.5	
Mercury (Hg)	≤ 0.001	0.001	
Nickel (Ni)	≤ 0.02	0.02	

Properties / Performance	Standard Values for Pakistan	Who Standards	Remarks
Nitrate (NO_3)	< 0.50	50	
Nitrite (NO_2)	≤ 3 (P)	3	
Selenium (SE)	0.01 (P)	0.01	
Residual chlorine	0.2-0.5 at consumer end 0.5-1.5 at source	---	
Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing countries

Properties / Performance	Standard Values for Pakistan	Who Standards	Remarks
Organic			
Pesticides mg/L		PSQCA No. 4639-2004. Page No. 4 Table No. 3 Serial No. 20-58 may be consulted.***	Annex II
Phenolic compounds (as Phenols) mg/L		< 0.002	
Polynuclear aromatic hydrocarbons (as PAH g/L)		0.01 (By GC/MS method)	
Radioactive			
Alpha Emitters bq/L or pCi	0.1	0.1	
Beta emitters	1	1	

*** PSQCA: Pakistan Standards Quality Control Authority

Proviso:

The existing drinking water treatment infrastructure is not adequate to comply with WHO guidelines. The Arsenic concentrations in some parts of Sindh have been found high then Revised WHO guidelines. It will take some time to control arsenic through treatment process. Lead concentration in the proposed standards is higher than WHO Guidelines. As the piping system for supply of drinking water in urban centers are generally old and will take significant resources and time to get them replaced. In the recent past, Lead was completely phased out from petroleum

products to cut down Lead entering into environment. These steps will enable to achieve WHO guidelines for Arsenic, Lead, Cadmium and Zinc. However, for bottled water, WHO limits for Arsenic, Lead, Cadmium and Zinc will be applicable and PSQCA Standards for all the remaining parameters.

Sindh Environmental Quality Standards for Noise

S. No.	Category of Area / Zone	Effective from 1st Jan, 2015		Effective from 1st January, 2015	
		Limit in dB(A) Leq *			
		Day Time	Night Time	Day Time	Night Time
1.	Residential Area (A)	65	50	55	45
2.	Commercial Area (B)	70	60	65	55
3.	Industrial Area (C)	80	75	75	65
4.	Silence Zone (D)	55	45	50	45

Note: 1. Day time hours: 6:00 a.m to 10:00 p.m

2. Night time hours: 10:00 p.m to 6:00 a.m

3. Silence zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts

4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

* dB(A) Leq: Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

3. **Repeal and Savings.**

(1) The provisions of the Statutory Notification dated 10th August, 2000 and 18th October, 2010, issued by the Ministry of Environment, Government of Pakistan, to the extent of the Province of Sindh are hereby repealed.

(2) All actions taken, proceedings initiated shall be deemed to have been taken and initiated validly under the the provisions of these Rules.

DIRECTOR GENERAL
SINDH ENVIRONMENTAL PROTECTION AGENCY

Karachi: Printed at the Sindh Government Press
28-1-2016

Annex-IV :
Approvals/NOCs from Authorities

CONFIDENTIAL

No.1/17/2018/D-14/N-II
GOVERNMENT OF PAKISTAN
MINISTRY OF DEFENCE

Rawalpindi, the 17th June 2019

From: - SO (D-14)

To: - Ministry of Energy (Petroleum Division)
Director General Oil
Islamabad

Subject: - NOC FROM MINISTRY OF DEFENCE FOR ADDITION OF MOGAS STORAGE TANKS AT TOTAL PARCO SHIKARPUR

I am directed to refer to Ministry of Energy (Petroleum Division's) O.M. No. PL-2(5)/2018-TPPL dated 7th August 2018 on the subject mentioned above and to convey that Ministry of Defence has **No Objection** from Defence & Security point of view for addition of MOGAS Storage Tanks by M/s Total Parco Pakistan Limited at Plot No. 223 & 224 Deh Ali Murad, Village Haji Ali Khan Kalhoro, Taluka Khanpur, Kashmore Road District Shikarpur, subject to strict compliance of following pre-conditions:-

a. Test pits will be made in indicated area of work in presence of SPD representative on site to determine actual alignment / depth of Optical Fiber Cable (OFC) before commencement of work. It should be ensured to supervise entire activity during execution of said work. Contact personnel from SPD are as under:-

(1) Col (Retd) Muhammad Sadiq Khan - 0321-5711155
(2) Lt Col (Retd) Khalid Riffat Rasul Ghumman- 0321-5004603

b. Environmental and Social Impact Assessment (ESIA) is required to be formalized prior issuance of formal NoC.

2. This NOC is non transferable and the Ministry of Defence reserves the right to review / cancel the NoC without any liability, in case of changed security situation / negative report / violation of any of the above conditions.

P.T.O

3. This is issued with the approval of competent authority.

(Raja Amjad Mehmood)
Section officer
Tele: 051-9272474

Copy to: -

The Secretary
Ministry of Energy (Petroleum Division)
Islamabad

GSO-I (M&M)
Joint Log Plans Dte
JSHQ/Chaklala

- With reference to their letter No. JS/M&M/5113/TOTALPARCO/1001499651 dated 29th May 2019.

Through Courier/Fax
OGRA (Oil)-19-3(15)/2015 -III
July 3, 2019

The Managing Director,
M/s Total Parco Pakistan Limited (TPPL),
10 Tariq Block, New Garden Town,
Lahore.

Subject: **DEVELOPMENT OF ADDITIONAL OIL STORAGE TANKS BY M/S TOTAL PARCO PAKISTAN LIMITED AT SHIKARPUR, SINDH**

Dear Sir,

Please refer to your letter no. nil dated April 29, 2019, on the above subject.

2. The Authority under Rule 67 (2) of the Pakistan (Refining, Blending, Transportation, Storage and Marketing) Rules, 2016, is pleased to grant permission for construction of additional oil storage tanks (with capacity of 5000 M. Ton for petrol & 2500 M.Ton for Diesel) at Shikarpur, subject to following conditions:

(i) The oil storage tanks shall be designed and constructed in accordance with the OGRA's notified Technical Standards of Depots for Storage of Petroleum Products.

(ii) Clearance/ NOCs from all the Authorities concerned including Chief Inspector of Explosives, District Govt, EPA & Ministry of Defense shall be obtained prior to construction of the facility under the applicable Laws / Rules / Regulations.

(iii) All requirements of maintaining the applicable HSE standards shall be duly complied with.

(iv) The company shall abide by all requirements of the applicable Rules and any other administrative/ regulatory instructions issued by the Authority from time to time.

(v) The oil storage facility/tanks on completion shall be inspected by 3rd party inspector appointed by OGRA to certify that the facility conforms to the requirements of condition (i) above. The Licensee shall pay the fee of 3rd party inspector as approved by OGRA.

(vi) After successful inspection report, the company shall be required to take permission/approval in writing by the Authority (OGRA) for operation of the storage facility.

Sarmad Aslam.
(Sarmad Aslam)
Senior Executive Director (Oil)
For and on behalf of the
Oil & Gas Regulatory Authority

Cc:
(i) The Chief Secretary Sindh, **Karachi**.
(ii) The Secretary, Ministry of Energy, Petroleum Division, **Islamabad.**
(iii) The Secretary, Ministry of Defence, **Rawalpindi.**
(iv) The Chief Inspector of Explosives, **Rawalpindi**.
(v) The Secretary General, Oil Companies Advisory Council, **Karachi**.

Through Courier/Fax
OGRA (Oil)-19-3(15)/2015 -III
July 3, 2019

The Managing Director,
M/s Total Parco Pakistan Limited (TPPL),
10 Tariq Block, New Garden Town,
Lahore.

Subject: **DEVELOPMENT OF ADDITIONAL OIL STORAGE TANKS BY M/S TOTAL PARCO PAKISTAN LIMITED AT MACHIKE, PUNJAB**

Dear Sir,

Please refer to your letter no. nil dated April 29, 2019, on the above subject.

2. The Authority under Rule 67 (2) of the Pakistan (Refining, Blending, Transportation, Storage and Marketing) Rules, 2016, is pleased to grant permission for construction of additional oil storage tank (with capacity of 7500 M. Ton for petrol) at Machike, subject to following conditions:

(i) The oil storage tank shall be designed and constructed in accordance with the OGRA's notified Technical Standards of Depots for Storage of Petroleum Products.

(ii) Clearance/ NOCs from all the Authorities concerned including Chief Inspector of Explosives, District Govt, EPA & Ministry of Defense shall be obtained prior to construction of the facility under the applicable Laws / Rules / Regulations.

(iii) All requirements of maintaining the applicable HSE standards shall be duly complied with.

(iv) The company shall abide by all requirements of the applicable Rules and any other administrative/ regulatory instructions issued by the Authority from time to time.

(v) The oil storage facility/tank on completion shall be inspected by 3rd party inspector appointed by OGRA to certify that the facility conforms to the requirements of condition (i) above. The Licensee shall pay the fee of 3rd party inspector as approved by OGRA.

(vi) After successful inspection report, the company shall be required to take permission/approval in writing by the Authority (OGRA) for operation of the storage facility.

Sarmad Aslam.

(Sarmad Aslam)
Senior Executive Director (Oil)
For and on behalf of the
Oil & Gas Regulatory Authority

Cc:
(i) The Chief Secretary Punjab, **Lahore**.
(ii) The Secretary, Ministry of Energy, Petroleum Division, **Islamabad.**
(iii) The Secretary, Ministry of Defence, **Rawalpindi.**
(iv) The Chief Inspector of Explosives, **Rawalpindi**.
(v) The Secretary General, Oil Companies Advisory Council, **Karachi**.

Annex-V:
ISO and OHSAS Certificates

BUREAU VERITAS
Certification

TOTAL PARCO PAKISTAN LIMITED
(SHIKARPUR FUEL TERMINAL)

OPPOSITE PARCO PUMPING STATION # 3, SHIKARPUR KANDHKOD ROAD, SHIKARPUR - PAKISTAN

Bureau Veritas Certification Holding SAS –UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the Integrated Management System (IMS) standards detailed below

ISO 9001: 2015
ISO 14001: 2015
OHSAS 18001: 2007

Scope of certification

THE RECEIPT BY PIPELINES AND TANK TRUCKS AT SHIKARPUR TERMINAL OF PETROLEUM PRODUCTS, HANDLING, STORAGE, LOADING AND DISPATCH OF PETROLEUM PRODUCTS

Certificate Validity: 11th March 2021

Certificate Nos.: **MER19.453/UQ**
MER19.453/UE
MER19.453/UOH

UKAS MANAGEMENT SYSTEMS
0008

Certification body address:5th Floor, 66 Prescot Street, LondonE1 8HG, United Kingdom
Local office: Office No. 09 ,Third Floor, Sardar Begum Plaza, Blue Area, Islamabad, Pakistan
Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.
To check this certificate validity please call: **(+9251) 2347275-76-78**

BUREAU VERITAS
Certification

TOTAL PARCO PAKISTAN LIMITED (SHIKARPUR FUEL TERMINAL)

OPPOSITE PARCO PUMPING STATION # 3, SHIKARPUR KANDHKOD ROAD, SHIKARPUR - PAKISTAN

Bureau Veritas Certification Holding SAS –UK Branch certifies that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 9001:2015

THE RECEIPT BY PIPELINES AND TANK TRUCKS AT SHIKARPUR TERMINAL OF PETROLEUM PRODUCTS, HANDLING, STORAGE, LOADING AND DISPATCH OF PETROLEUM PRODUCTS

Original cycle start date:	**31st October 2019**
Expiry date of previous cycle:	**N/A**
Certification /Recertification Audit date:	**17th April 2019**
Certification/ Recertification cycle start date:	**31st October 2019**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **30th October 2022**

Certificate No. MER19.453/UQ Version : **01** Revision date: **31-10-2019**

BUREAU VERITAS Certification

UKAS MANAGEMENT SYSTEMS 0008

Certification body address:5th Floor, 66 Prescot Street, LondonE1 8HG, United Kingdom
Local office: Office No. 09 ,Third Floor, Sardar Begum Plaza, Blue Area, Islamabad, Pakistan
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BUREAU VERITAS
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TOTAL PARCO PAKISTAN LIMITED (SHIKARPUR FUEL TERMINAL)

OPPOSITE PARCO PUMPING STATION # 3, SHIKARPUR KANDHKOD ROAD, SHIKARPUR - PAKISTAN

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ISO 14001:2015

THE RECEIPT BY PIPELINES AND TANK TRUCKS AT SHIKARPUR TERMINAL OF PETROLEUM PRODUCTS, HANDLING, STORAGE, LOADING AND DISPATCH OF PETROLEUM PRODUCTS

Original cycle start date:	**31st October 2019**
Expiry date of previous cycle:	**N/A**
Certification /Recertification Audit date:	**17th April 2019**
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OHSAS 18001:2007

THE RECEIPT BY PIPELINES AND TANK TRUCKS AT SHIKARPUR TERMINAL OF PETROLEUM PRODUCTS, HANDLING, STORAGE, LOADING AND DISPATCH OF PETROLEUM PRODUCTS

Original cycle start date:	**31st October 2019**
Expiry date of previous cycle:	**N/A**
Certification /Recertification Audit date:	**17th April 2019**
Certification/ Recertification cycle start date:	**31st October 2019**

Subject to the continued satisfactory operation of the organization's Management System, this certificate expires on: **11th March 2021**

Certificate No. MER19.453/UOH Version : **01** Revision date: **31-10-2019**

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Further clarifications regarding the scope of this certificate and the applicability of the management system requirements may be obtained by consulting the organisation.
To check this certificate validity please call: **(+9251) 2347275-76-78**

Annex-VI :

Waste Disposal Certificate for Hazardous Waste (Existing Terminal Operations)

Ref. # GEL/WM/L/3/4977

19th February, 2018

CERTIFICATE OF DISPOSAL

Details of the Waste:

1. **Source:** **Total Parco Pakistan Limited.**
2. **Address:** **Shikarpur Terminal.**
3. **Material:** **Approx 100 Liter Waste Oil.**
   As per attached Gate Pass No: 00161 dated: 12/02/2018

Schedule of Incineration		
Date of Receiving	**Quantity**	**Date of Incineration**
12/02/2018	100 Liter	13/02/2018
Total Weight	**100 Liter**	

COMMENTS:

Certified that the above material was disposed off at ***" GLOBAL ENVIRONMENTAL LAB PRIVATE LIMITED"*** *in the incinerator in environmental friendly way and as per laws of the country. The ash was then sent to designated site for final disposal.*

Seal of the Company

For **(M. ZAHID RAZA)**
G.M. Waste Management

Global Environmental Lab (Pvt) Ltd
2nd Floor, Aiwan-e-Sanat, ST-4/2, Sector-23, Korangi Industrial Area, Karachi.
Ph: (92-21) 35113804-5 Fax: (92-21) 35113806 Email:info@gel.com.pk

Annex-VII:

Emergency Response Plan (ERP) – TPPL Shikarpur Terminal

Emergency Response Plan -Shikarpur Terminal

Doc# TPPL-HSEQ-01	Revision # 00	Effective Date: 01-06-2018

1. INTRODUCTION

TPPL responds quickly & effectively to incidents involving personnel, facilities, products or operations that may cause environmental, safety or health hazards to our employees, our neighbors & to our facilities. TPPL shall periodically test response plans to maintain & enhance their integrity. We have made significant investment on its hydrocarbon depot and to safeguard this investment it is necessary to take certain actions to prevent any damage to investment and at same time ensuring safety of personnel working at depot. Fire & spill can be major threats to infrastructure and to personnel working in depot. In order to minimize the risk TPPL shall ensure that all necessary steps are taken to avoid happening of fire/ spills within the depot premises. TPPL has devised the procedures to ensure that minimum damage to infrastructure or personnel working in depot happen in case of fire/ spills etc.

1.1 PURPOSE

The purpose of the ERP is to assist in the management of crisis:

Providing guidelines for using internal & external resources to effectively & quickly respond to emergencies covered within the Scope of the ERP & which involve TPPL personnel, facilities, products or operations in order to:

- Eliminate or minimize injuries to personnel
- Protect the Environment
- Prevent or minimize damage to company assets
- Eliminate or minimize downtime
- Eliminate or minimize downtime
- To ensure communication of all essential information to the appropriate personnel as quickly as possible
- Identify the responsibilities of TPPL personnel in case of an emergency
- To identify training required in order to ensure a high level of preparedness at all times
- Preserve information/records for subsequent investigations of the incident

1.2 SCOPE

This plan is at the third level of the TPPL comprehensive emergency management system as explained in Para 1.6 below. Considering the extent of the associated risk, manpower and material / equipment resources available at the Shikarpur Terminal, response are categorized as:

1.2.1 In-house Response:

1.2.1.1 First Aid Fire Fighting:

The Shikarpur Terminal has portable fire extinguishers and the staff is trained in First Aid Fire Fighting. Therefore, the in-house response will be limited to minor fires like.

- Ordinary combustible office material fire
- Minor PRODUCT spill / leak fires which can be controlled by hand portable fire extinguishers and portable DCP trolleys.

1.2.1.2 Medical First Aid:

The Shikarpur Terminal also has medical first aid kit and the staff is trained in providing medical first aid in case of personnel injuries.

1.2.1.3 Basic PRODUCT Spill Containment:

Spill containment in the form of dike wall has been provided in the tank farm area.

The in-house response resources are given in **Appendix A.** (To be filled in by Location In-charge) (Sample attached)

1.2.2. Externally Resourced Response:

Local Emergency Response Service

Should an emergency occur, the following local emergency response agencies would respond to the Shikarpur Terminal, depending upon the type of emergency:

- Fire Brigade: Equipment would be dispatched from the fire station located in Shikarpur
- Police Station: Fazzu police station / Khanpur police station.
- Ambulances: Edhi ambulance would be dispatched from the nearest Edhi center shikarpur

Appendix B provides a short breakdown of the equipment that would respond from Fire Brigade. ***(THIS APPENDIX SHALL BE COMPLETED BY SHIKARPUR TERMINAL)***

Response times to an emergency at the Shikarpur Terminal will depend upon traffic conditions as well as availability of equipment. Minimum response times are as follows:

Fire Brigade: Minimum 01 hours

Edhi Ambulance: Minimum 01 hours

Police Station: Minimum 30 minutes

Local Mutual Aid

This section shall be applicable incase a mutual aid agreement is finalized or at-least a verbal agreement is in place.

The neighboring companies include the following:

- SHELL PAKISTAN LIMITED
- PAKISTAN STATE OIL
- PARCO PUMPING STATION # 3
- HASCOL
- BAKRI ENERGY LIMITED

A list of the emergency resources available at the outside companies will also be included in the ERP once the Mutual Aid Agreement is developed / finalized. This list will contain description of all the resources available with the companies which will be made available in case of an emergency at Logistics Location.

Local Medical Facilities
If the incident involves a medical emergency, the injured person shall be transported to Civil Hospital Shikarpur by Edhi ambulance. If the ambulance is unavailable, the injured person will be transported using company / personal vehicle by the Incident Commander's permission.

1.3 ERP MAINTENANCE

It is essential that this ERP is reviewed on a regular basis and that drills and exercises are conducted periodically in order to maintain an effective emergency preparedness program. The Shikarpur Terminal Manager Zulfiqar Ali Lashari shall be responsible for ensuring that the ERP is updated at least once a year or when the information contained in the ERP has changed.

1.4 DEFINITION OF AN EMERGENCY

Any event or circumstance occurring or likely to occur at ST that could adversely affect: the health & welfare of Total Parco employees, the health & welfare of members of the general public, the environment, the integrity of Total Parco products, Total Parco or a CC shareholder's reputation, or the ability of ST to effectively conduct business operations. This would include, but is not limited to:

- A fire, explosion, product contamination or other incident leading to the death or injury (requiring hospital admission) of TPPL employees, member of the public, contractors, and/ or substantial loss or destruction of property as well as substantial interference (more than 48 hours).
- Any release of petroleum products into the environment that has substantial environmental or human health impact irrespective of local response capability
- Instances where local, regional, or national governments (or private response entities) activate their crisis or emergency response plans in the wake of or prior to such occurrences.
- Any incident or occurrence in which the performance and reputation of TPPL product is threatened by product quality concerns or product tampering.
- Events receiving local, regional, national, or international media attention that may serve to adversely affect the reputation or the public's perception of TPPL.
- Civil disturbances which place TPPL employees or assets in jeopardy, to include foreign government attempted or actual expropriation of TPPL property.
- Any incident involving the kidnapping of ST personnel or family members, or ransoming of ST facility or equipment.
- A natural disaster, which is threatening the continuation of business activities at ST.
- Any other instance or situation, which is or is likely to escalate beyond the capability of ST response resources, or requires specialized consultation/ resources from CMT.
- Any other instance or situation, which the CMT director declares to be an emergency.

1.5 TPPL CRISIS PRIORITIES

TPPL's key priorities in any emergency situation are:

- The safety and well-being of people
- Minimizing impacts on the environment
- Minimizing impacts on, and where possible enhancing, TPPL's reputation and image, and
- Minimizing impacts on property or assets.

1.6 TPPL EMERGENCY MANAGEMENT ORGANIZATION

The TPPL Emergency Management Organization is a tiered structure.

On scene responses to an emergency / incident are provided by Emergency Response Teams (ERT) in accordance with facility Emergency Response Plan (ERP). The extent of participation of TPPL personnel in leading and manning these ERTs depends on local arrangements. Depending on the severity of the incident, the Shikarpur Terminal ERP must be capable of expanding to activate the TPPL Crisis Management Plan (TPPL CMP).

Country crisis management functions are carried out by TPPL Crisis Management Team (TPPL CMT) using TPPL Crisis Management Plan (TPPL CMP). The TPPL CMP is linked to the TPPL Corporate Crisis Management Plan (TPPL CMP)

Global crisis management functions are carried out by the Corporate Crisis Management Team (CMT) using the TPPL Corporate Crisis Management Plan (TPPL CMP).

The TPPL Corporate Crisis Management Plan (TPPL CMP) is the lead document for the TPPL Emergency Management Organization. All subsidiary plans cascade from this plan and must be consistent with the next highest level of planning.

2. NOTIFICATION

2.1 INTERNAL NOTIFICATION

Besides notification to the Shikarpur Terminal ERT, an emergency incident occurring at the Shikarpur Terminal may be of such a scale, or have actual or potential consequences, to require notification upwards within the TPPL organization so that activation of the CCMP can be considered.

All Incidents are to be reported immediately to the Total Duty Officer at 0302 4656486

Alarm System

The Shikarpur Terminal has been provided ***Two (2)*** manually activated & ***One (1)*** Electrical alarm station, which will be sounded to warn personnel that an emergency exists. The alarm stations are located in the following areas:

- Adjacent to Main Office (Electrical) Security Guard Room
- Adjacent to Security Guard Room & Meter Room

In case of a fire, product leak or medical emergency, the alarm system should be sounded as follows:

- If only one person is available at the emergency scene to sound the alarm, he will attempt to quickly control the emergency using immediately available equipment, e.g. fire extinguisher. While during so, he shall shout "Help-Help" and task someone to sound the alarm.

- If two or more persons are at the emergency site, one person shall attend to the emergency while the second will go to sound the alarm. If the location of the emergency is not obvious, e.g. a fire or a product leak, this person shall remain at the fire alarm station to direct personnel to the emergency site.

- Upon hearing a fire alarm, any person working near the TTLR / TTCP or tank farm area shall sound the adjacent fire alarm. This is to ensure that all personnel hear the alarm and respond as per their responsibility.

To start the fire alarm, the person shall rotate the handle to produce a continuous sound from the alarm.

At the conclusion of the emergency, the Incident Commander shall instruct a person to give the "All Clear" signal.

- The "All Clear" signal shall be given by activating the alarm three times, with a pause between each alarm sound. (i.e.: Alarm, pause, alarm, and pause)

Level 1 Notification List

- For most incidents at the Shikarpur Terminal, it is expected that the response team shall swiftly control the incident and that a level 1 notification will not be necessary. However, for incidents where a level 1 emergency is NOT declared, an incident report shall be completed. All incidents shall be reported as defined in the attachment Notification Guidelines mentioned in APPENDIX C.

If a level 1 emergency is declared, the Incident Commander shall ensure that the personnel shown in the **Appendix 3** are contacted.

The person contacting the people on the call-out list shall provide the following information to those personnel.

- Type of Emergency (e.g. fire, product leak, etc.)
- Time of the Incident
- Remedial action taken or which is being taken
- Current Status

It is suggested that the person making the calls complete the form shown in **Appendix 4** before starting to call. This will ensure that the same information is given to each person. The person handling communications shall make updates to personnel on the level 1 notification list every 2 hours. Moreover the person handling communications shall fill in **Individual Log Sheet (Appendix A** and Telephone Message Sheet **(Appendix B)** for records and future references.

For Level 1 emergencies, which involve fires, the Shikarpur fire brigade may be called out. However, they shall remain outside of the Shikarpur Terminal on a standby basis until invited to enter by the Incident Commander.

Level 2 Notification

If a level 2 emergency is declared, the Incident Commander shall be responsible for ensuring that the phone calls to personnel shown in **Appendix 5 are** made. Calls shall be made in the order as shown in the list.

The person contacting the people on the call-out list shall provide the following information to those personnel:

• Type of Emergency (e.g. fire, product leak, ate)
• Time of the Incident
• Remedial action taken or which is being taken
• Current Status,

It is suggested that the person making the calls complete the form shown in **Appendix 4** before starting to call. This will ensure that the same information is given to each person. The person handling communications shall make updates to p ersonnel on the level 2-notification list every 2 hours. Moreover the person handling communications shall fill in **Individual Log Sheet (Appendix A)** and Telephone Message Sheet **(Appendix B)** for records and future references.

Communication Responsibilities

During normal working hours, the I Incident Commander shall perform the following activities:

- The IC shall first contact the person handling communications and request him to contact the personnel on the Level 1 or 2 Notification list. The above person shall then notify the personnel, whose names are on the list, in the order shown on the list. Person handling communications shall make updates to personnel on the level 1 notification list every two hours. The above information flow is graphically shown in Appendix 6. In addition to the above the person handling communications shall fill in Individual Log Sheet (Appendix A) and Telephone Message Sheet (Appendix B) for records and future references

- After normal working hours & on holidays, there is no Management / worker staff present at the Shikarpur Terminal. The initial communication regarding the occurrence of an incident at the facility shall be carried out by the Security Guard. The security supervisor shall evaluate the emergency and choose the appropriate course of action as follows:

  In case of a fire or product leak at the Shikarpur Terminal he shall immediately contact Shikarpur fire brigade and also notify the ambulance service (if required in case of an emergency of medical nature). In addition to the above he shall simultaneously call Shikarpur Terminal Manager or his alternate and inform him regarding the occurrence of the incident. The information is graphically shown in **Appendix 7**. Contact telephone numbers for the local emergency response services appear as **Appendix 8**.

  Upon receiving initial notification Shikarpur Terminal Manager or his alternate shall report at the Shikarpur terminal and evaluate the situation. He shall have the authority to activate the ERP. In doing so, he shall declare a level 2 emergency at the facility due to unavailability of adequate resources during the initial response period. He shall notify personnel on the level 2-notification list. This information is graphically shown in **Appendix 9**.

  For a Level 2 emergency after normal working hours, (if necessary and depending upon the type of emergency), the IC shall ask the Security Guard to call out I pass information to the respective Response and Administrative team members and ask them to report at the Shikarpur Terminal. This information is graphically shown in **Appendix 9**.

2.2. NOTIFICATION OF TPPL CORPORATION

There is a requirement to notify TPPL Corporation (TPPL) for a range of described situations. These are fully described in **Appendix C. NOTE THAT THE NOTIFICATIONS TO CORPORATE CRISIS CENTER WILL BE MADE BY TPPL CRISIS MANAGEMENT TEAM (TPPL CMT) AT CHQ**.

3. ACTIVATION OF THE ERP

Upon occurrence of an incident, and based on the nature and severity of the incident and the needs of the Shikarpur Terminal, the Shikarpur Terminal Manager will decide whether to activate the ERP, and if so, the extent of ERP activation.

3.1 LEVELS OF ACTIVATION

Authority for Declaring an Emergency

Upon learning of an incident, either by hearing the fire alarm or by messenger, the Incident Commander shall go to the scene and evaluate the severity of the incident. Based upon his evaluation, the Incident Commander shall decide what level to assign to the incident.

Only the IC shall be authorized to declare an emergency. The response for a Level 1 emergency is graphically shown in Appendix 11. The response for a Level 2 emergency is graphically shown in Appendix 12

3.2 COMMUNICATION WITH ERT MEMBERS

Telephone contact numbers for ERT members appear in the Emergency Contact Directory at **Appendix 10.**

3.4 COMMAND POST

If the emergency is of sufficient duration to warrant it, e.g. long duration product release or fire, the Incident Commander shall establish the main Command Post in the main office. This office has both telephone as \Veil as fax facilities. The main Command Post shall be provided with the following equipment

- One Plot Plan of the Shikarpur Terminal
- One telephone Mobile No. 0300-8313527
- Fax machine (Nil)
- Battery Powered torches (2 sets)
- One copy of the SHIKARPUR TERMINAL ERP, including Contingency plans
- One copy of the TPPLCMP

4. COMPOSITION OF EMERGENCY RESPONSE TEAM (ERT)

Response Team:

Purpose:

To respond and to control emergencies using the TPPL's developed for the ERP, as well as skills received during their emergency response training. To arrange medical care for injured personnel. To control operation of firewater pump during an emergency. To obtain and provide resources for handling the emergency. To control access to the site during an emergency and to confirm there are no employees missing as a result of the emergency. To communicate necessary information and instructions from the Incident Commander to the appropriate parties. To arrange payments for any equipment or supplies purchased to help control an incident.

Organization

During the day shift, Shikarpur Terminal Manager leads the Response Team. In his absence, his Alternate shall lead the team. Team responsibilities are as follows:

Functions	Responsibilities
● Provision of First Aid	Operations Account Administrator
● Closure of pumps, storage tank valves and operating firefighting equipment as per the steps outlined in the respective Logistics Location TPPL's	Filling Operators
● Starting / operating water pump	Operations Account Administrator
● Provision of Logistics Support	Security Guard Supervisor
● Performance of Communication and Finance related activities	Shikarpur Terminal Manager
● Performance of Security related activities	Shikarpur Terminal Manager Security Guards

After normal working hours and on holidays, in case of an emergency or incident, personnel at the facility may need to contact the local emergency response services in addition to contacting the response team for the morning shifts. The organization for the Response Team for the normal working hours appear as **"Appendix 13"**

Administration Team

Purpose:

Organization:

During the day shift, the Administration Team is led by Shikarpur Terminal Manager in his absence, his Alternate, shall lead the team. Other personnel on the Administration Team include.

Functions	Responsibilities
● Performance of Communication and Finance related activities	Shikarpur Terminal Manager

• Performance of Security related activities	Location Supervisor, Security Supervisor, Security Guards

After normal working hours and on holidays, the team shall be led by the Security Supervisor. See the Emergency Response Organization Sheets in **Appendix 13** for a diagram of the Administration Team organization for the day shift.

During the off hours and holidays, the number of personnel available to respond to an emergency will be less. Only security staff will be present at the Shikarpur Terminal and the organization sheet for the same appears as **Appendix 14**. The Incident Commander will therefore need to prioritize his needs in order to effectively utilize his resources.

Needs will be prioritized as follows, with the most important appearing first.

- Rescue of any injured personnel
- Protection of company resources and areas immediately outside Shikarpur Terminal
- Protection of the environment

Should an emergency occur after normal working hours or on holidays, the Incident Commander may need to immediately declare a level 2 emergency to supplement his response and support team resources?

5. RESPONSIBILITIES OF THE ERT

The responsibilities of the Response and Administration Team are given below:

Response Team:

Prior to the Incident;

- Provision of training to the concerned staff regarding Shikarpur Terminal ERP & TPPL's
- Conduct of emergency response drills in accordance with the steps outlined in the respective Shikarpur Terminal TPPL's
- Maintenance of resources (FFE & Others) outlined in the respective Shikarpur Terminal ERP & TPPL's

During the Activation:

- Review I analyze condition I state and. provide response in accordance with the steps outlined in the respective Shikarpur Terminal TPPL's

Post Event:

- Replenishment of resources consumed during the emergency

- Follow recovery plans for specific incidents contained in the respective contingency plans developed for the Shikarpur Terminal

Administration Team:

Prior to the Incident;

- Provision of training to the concerned staff regarding Shikarpur Terminal ERP & TPPL's
- Conduct of emergency response drills in accordance with the steps outlined in the respective Shikarpur Terminal TPPL's
- Maintenance of resources outlined in the respective Shikarpur Terminal ERP & TPPL's

During Activation:

- Review and analyze condition, state and provide response in accordance with the steps outlined in the respective Shikarpur Terminal TPPL's

Post Event:

- Replenishment of resources consumed during the emergency
- Follow recovery plans for specific incidents contained in the respective contingency plans developed for the Shikarpur Terminal

6. ERP DEACTIVATION & RECOVERY PLAN

6.1 DEACTIVATION

The Incident Commander (Shikarpur Terminal Manager is responsible for deactivating the emergency response plan at the end of the emergency. The Incident Commander (IC) shall make this decision after consulting with other members of the emergency response teams, as appropriate. If this has already been done, the Incident Commander shall instruct one of the Response team members to sound the All Clear signal. Moreover the Incident Commander will request the Administration Team Leader team to notify personnel on the Level One or Two Notification list that the emergency has ended. In accordance with the TPPL CMP, TPPL / CHQ staff will be responsible for notifying TPPL CMT that the emergency has ended.

The Incident Commander shall ensure that the emergency site is left undisturbed as much as possible until the Incident Investigation Team Leader has approved work in this area. The exception is movement of materials that are unstable and could create a hazard. However, in such cases, the Incident Commander shall take pictures of the emergency site to document the position and quantity of the materials, which are disturbed. The emergency area will be barricaded to prevent entry of unauthorized personnel.

The Shikarpur Terminal Manager responsible for repairing equipment, reconstructing units, replenishing supplies, cleaning up spilled materials, etc. as required to systematically returning to normal operations as soon as possible.

As part of its post-incident recovery activities, the Shikarpur Terminal is to preserve the evidence at the incident site for the investigation team, which will be formed to investigate the root cause(s) and factor(s) that contributed to the incident.

In addition to the above the recovery plans for specific incidents are contained in the contingency plans developed for the Shikarpur Terminal. In addition to the same, the following general actions should be taken at the conclusion of the emergency:

Emergencies Involving Fires

The Shikarpur Terminal Manager arranges for firefighting equipment used during the emergency to be refilled and returned to its original state. Then return them to their correct location. Clean the fire area, after receiving authorization from the Incident Investigation Team Leader. Complete the Incident Report form within 24 hours of the fire and return to Manager Depot Operations, cc: CHQ HES Unit.

Emergencies Involving HSD/SUP Leaks:

The Shikarpur Terminal In-charge shall make arrangements for repairing the damaged equipment, after receiving authorization from the Incident Investigation Team Leader

An Incident Report form along with the Spill Report form should be submitted to Area Manager, T&O cc: HES at TPPL CHQ.

Additional reporting guidelines may be found in the Spill Reporting Procedure.

7. GLOSSARY

The following terms are used throughout the Shikarpur Terminal Emergency Response Plan, and for purposes of this plan, have the meanings given below:

TPPLCMP	**TPPL** Crisis Management Plan
TPPL CMT	**TPPL** Crisis Management Team
TPPL CMT DIRECTOR	**TPPL** Crisis Management Team Director
TPPL CMP	**TPPL** Corporation Crisis Management Plan
TPPL CMT	**TPPL** Corporation Crisis Management Team
TPPL CORPORATION	**TPPL** Corporation

Crisis	For purposes of this ERP, a 'crisis' is any Incident defined in APPENDIX C, for which the Corporation office must be notified.
ERP	Emergency Response Plan
Incident	For this ERP, an incident is defined as any unplanned event such as a fire, HSD/SUP/KERO spill, injury etc. which results in or could result in an injury to personnel, damage to property or equipment, damage to the environment or disruption of business at the depot. All incidents are not emergencies, as considered by this plan.
Level 1 Emergency	An emergency that can be controlled or handled by Shikarpur Terminal personnel and DOES NOT require the assistance of the local emergency services.

Level 2 Emergency This is an emergency that requires assistance from the local emergency response services, e.g. area. Fire brigade, ambulance service etc. A Level 2 emergency can result from a natural disaster, large fire or leak occurring outside the Shikarpur Terminal.

ABBREVIATIONS

The following abbreviations have been used in this document:

1.1	FBS	Fire Brigade Shikarpur
1.2	PO	Police Station Fazzu / Khanpur
1.3	BU	Business Unit
1.4	TPPL CMP	TPPL Crisis Management Plan
1.5	TPPL CMT	TPPL Crisis Management Team
1.6	CHQ	Corporate Headquarters
1.7	TPPL CMP	TPPL Corporate Crisis Management Plan
1.8	CMT	Crisis Management Team
1.9	TPPL	Total Parco Pakistan Limited
1.10	CP	Contingency Plan
1.11	DP	Dangerous Products
1.12	HES	Health, Environment and Safety
1.13	ERP	Emergency Response Plan
1.14	IC	Incident Commander
1.15	ST	Shikarpur Terminal
1.16	C R	Country representative
1.17	NDP	Non-Dangerous Products
1.18	O&D	Order and Dispatch
1.19	OMCs	Oil Marketing Companies
1.20	PARCO	Pak Arab Refinery Co.
1.21	PPE	Personal Protective Equipment
1.22	PSO	Pakistan State Oil
1.23	QA	Quality Assurance
1.24	SPL	Shell Pakistan Limited
1.25	TTLR	Tank Truck Loading Rack

HES MONITORING

- If an incident is upgraded to an emergency, the IC shall appoint one of the alternate team leaders to check on conditions around the

outside of the facility & to report back to the IC if any hazards develop.

- Specific hazards this person should check for are listed below:
- Product leaks that escape from the terminal
- Fires that start outside of the terminal caused by a fire within the terminal
- Spectators climbing the boundary wall
- If the HES Monitor spots any of the conditions above, he shall relay this information back to the IC.
- This person shall record his observations & submit this to the IC at the end of the emergency. His observations should include a description of the wind direction(s) during the incident.

8 Contingency Plans

8.1 Purpose

TPPL has developed guidelines for ST for responding to incidents & emergencies that can occur at the terminal. Since it is impossible to predict exact conditions during an actual emergency, they are to be used as guidelines for the response & modified as necessary.

As appropriate, each CP contains a section, which provides site-specific procedures to help the facility recover from the incident.

8.2 The following is a list showing the CPs, which have been developed for ST. Note: It should be recognized that many of these events are considered “Incidents” & not “Emergencies”.

Fire Scenarios

CP-1 Tank truck loading rack fire
CP-2 Full surface fire - Tank 1
CP-3 Full surface fire - Tank 2
CP-4 Full surface fire - Tank 8
CP-5 Full surface fire - Tank 9
CP-6 Full surface fire - Tank 22
CP-7 Manifold spill Fire
CP-8 DP Pump House Fire
CP-9 Building fire
CP-10 CP-10Fire in ST due to product spill
CP-11 CP-11Fire in Meter Room due to product spill
CP-12 CP-12Fire in ST due to electrical short circuit

Oil Spill Scenarios

CP-13 CP-13 Tank truck spill at the TTLR
CP-14 CP-14 FOB tank truck spill outside of the Shikarpur terminal
CP-15 CP-15 Liquid Chemical Spill at ST

Medical Emergencies

Sudden unconsciousness, heart attacks etc.

Natural Disasters

Flood

Earthquake

Civil Unrest

Blockage of the Terminal gates

8.3 The IC is authorized to activate the CPs for incidents at the terminal. He shall work closely with his designated counterparts at TPPL CHQ to ensure that the terminal's response is integrated with the TPPL CHQ response.

8.4 The Response Team leader, working with the approval of the IC, is responsible for implementing the response defined within the CP. It is recognized that the actual response may vary from the CP, as conditions may be different than that assumed in the CP.

8.5 The following general procedures should be considered when implementing an emergency response:

8.5.1 Response should be developed in the following order of priority:

8.5.1.1 Rescue of injured or trapped personnel

8.5.1.2 Protection of company assets

8.5.1.3 Protection of the environment

8.5.2 All response teams must take every measure to protect themselves against hazardous conditions at the site of the emergency. Proper PPE must be worn when entering a potentially hazardous area.

EXCEPTION: It is not necessary to first obtain & wear fire fighting clothing when fighting small fires with fire extinguishers & AF120's foam cart trolleys, provided the person using the equipment can stand well away from the fire.

8.6 The CPs shall be regularly updated in accordance with the guidelines contained in Section 15 of the ERP

FIRST AID TEAM LEADER

1. Assume control of the First Aid Team on duty for that shift
2. Upon hearing a fire alarm, or being otherwise notified about the incident, go to the scene of the incident & direct first aid efforts using the equipment available. If the location of the emergency is unknown, go to the fire alarm siren, which was sounded to receive instructions.
3. Prepare the injured person for transport to the hospital using the Edhi ambulance (Note: The IC is responsible for actually calling the ambulance).
4. Ensure that the IC has contacted the Edhi ambulance.
5. Maintain a valid first aid certificate.

FIRST AID TEAM MEMBER

1. Upon hearing a fire alarm, go to the scene of the incident or emergency & assist with first aid efforts using the equipment available. If the location of the emergency is unknown, go to the fire alarm siren, which was sounded to receive instructions.
2. Do not place yourself in a position where the incident or emergency could hurt you.

PERSONNEL NOT ASSIGNED SPECIFIC RESPONSIBILITIES

1. Upon hearing the fire alarm, move to the Assembly area near the main office Building & await instructions
2. Do not return to your normal place of work, or leave the terminal, until the All Clear signal has sounded or you have received permission from the Terminal In-Charge.

RESPONSE TEAM LEADER

1. Assumes control of the Response Team on duty for that shift
2. Respond to all incidents at the terminal, or within the scope of the ERP, & directs emergency response team efforts using the equipment available in line with the following priorities:
   a) Rescue injured or trapped personnel
   b) Protect company assets
   c) Minimize environmental damage
3. Obtain emergency response equipment as necessary to control the emergency, working with the Logistics team as necessary.
4. Use the Contingency Plans developed for the terminal as a guideline
5. Ensure that the fire alarm has been sounded if a fire has occurred & there is a need to evacuate the buildings or TTLR.
6. If requested to do so by the IC, establish a field command post
7. Sound the “All-Clear” signal when the emergency is over

SECURITY AND ADMINISTRATION TEAM LEADER

1. Upon hearing the fire alarm or being otherwise notified that an emergency has occurred, go to the main gate & direct the security team.
2. Instruct the security team not to permit entry or exit of any vehicles or personnel without the consent of the IC.
3. Upon arrival of the fire brigade, politely request them to wait at the location assigned by the IC through the Security Team leader
4. Contact the IC at a suitable time if you are asked by a CPL employee for permission to leave the terminal.
5. Perform a head count of personnel assembled at the emergency meeting point near the main office building. Provide the IC with a report of any persons missing.
6. Arrange to unlock doors as required within the terminal.
7. Permit the following after the head count has been taken:
   a) Visitors can leave without first obtaining the permission of the IC
   b) Empty cartage trucks can leave with your permission, after verifying that the trucks are empty.
   c) Company employees can leave only after receiving permission from the IC.
8. Ensure that all tank trucks move to the waiting area by the TTCP when the fire alarm is activated.

Doc# TPPL-HSEQ-01	Revision # 00	Effective Date: 01-06-2018

APPENDIX B: TELEPHONE MESSAGE SHEET

TELEPHONE MESSAGE

YOUR NAME: DATE: TIME
CALLER'S NAME CALLER'S TELEPHONE NUMBER:
CALLER'S FAX NUMBER:

CALLER'S ORGANIZATION / AFFILIATION:

MESSAGE/NOTES ACTION DEADLINE

APPENDIX A: INDIVIDUAL LOG SHEET

Date: Log taken by:

Time	From	To	Event and comments	Agreed Action	Referred to:	Follow-up/update?

SHIKARPUR TERMINAL
CONTIGENCY PLAN FOR HSD DRY OUT

Description of the Emergency Scenario	HSD dry-out is expected at Shikarpur Termainal in 24-48 hours as result of planning error or higher than plan.
Possible Consequences of the Contingency	• Lost sales and revenue
Likelihood of the Average Emergency occurring	Low
Desired Outcome of the Plan	• Minimum cost of the incident by executing hustle strategy.
Possible Hazards to which Personnel may be Exposed	• None
Hustle Initiation	1. Terminal Manager or designate shall inform SOG every time stocks go below safety stock. 2. SPM (SOG) shall decide if a hustle strategy is required based on current status of product receipt from PARCO.
<u>Hustle Strategy 1A:</u> Product Exchange with PSO through Tank Truck <u>Cost :</u> Nil	1. SPM shall talk / write to counterpart in PSO and obtain following: a) Confirmation on Product Availability b) Product to be made available for the transaction. 2. SPM shall take approval from Manager Supply for the transaction. 3. SPM shall communicate above information to DSM (SCP) along with the time-frame within which the contigency scenario is expected to be resolved. 4. SPM shall create exchange call-off PO and communicate to Terminal Manager. 5. DSM (SCP) shall provide to Terminal Manager the list of customers to be provided product on priority. For local retail customers, CPL fleet shall be used. 6. TC shall send the detail of tank trucks to SPM who in turn shall communicate this information to counterpart in PSO. 7. O&D shall send the tank trucks to PSO Shikarpur Terminal. An O&D representative shall accompany the tank trucks to POS Terminal. 8. The tank trucks after filling shall report at ST. Incharge operations shall do GR against Exchange PO. 9. O&D shall make transfer docs or/and invoice as required.

	10. Manager ST or designate shall send the filled tank truck numbers to SPM and Supply Analyst who would in turn convey to PSO to unblock the tank truck numbers for further upliftment. 11. Once the product is available and stocks are sufficient, SPM shall decide and communicate to counterpart in PSO to uplift the exchange product from ST. SPM shall also communicate the same to Terminal Manager. 12. SPM shall obtain the PSO tank truck numbers that will uplift product from ST and communicate to Terminal Manager.
<u>Hustle Strategy 1B:</u> Product Exchange (Pipeline) with PSO <u>Cost :</u> Nil	1. SPM shall obtain the PSO tank truck numbers that will uplift product from ST and communicate to Terminal Manager. 2. SPM shall talk/write to counterpart in PSO and obtain following: a) Confirmation on Product Availability b) Product to be made available for the transaction. 3. SPM shall take approval from Manager Supply for the transaction. 4. SPM shall communicate above information to DSM (SCP) along with the time-frame within which the contigency scenario is expected to be resolved. 5. SPM shall create exchange call-off PO and communicate to Terminal Manager. 6. Terminal Manager shall coordinate with counterpart at PSO and with PARCO Installation Manager for receipt at CPL installation. 7. After the receipt has been taken, the Terminal Manager shall forward the Appendix C to SPM and CA. 8. If PARCO has provided PSO's custom bonded product, Terminal Manager shall inform counterpart PSO every day about the qty withdrawn for duty payment. 9. When CPL product is available at PARCO Shikarpur, SPM shall advise Terminal Manager for coordination with PARCO and Terminal Manager PSO terminal. 10. Terminal Manager forwards the Appendix C for the receipt taken at PSO terminal to SPM and CA. 11. TM coordinates with counterpart at PSo for duty payments every day in case of custom bonded product. 12. In case of exchange imbalance: • If balance is lying with CPL, SPM shall request PSO to raise invoice based on ex-refinery price and PDL

	applicable in the fortnight in which product was received at CPL terminal. CA will arrange to prepare cheque against the invoice. • If balance is lying with PSO, CA shall prepare invoice based on ex-refinery price and PDL applicable in the fortnight in which product was received at CPL terminal. SPM shall forward at CPL terminal. SPM shall forward the same to PSO for receiving payment.
Hustle Strategy 2: Product Purchase from SPL through Tank Truck Cost : Half OMC Margin	1. SPM shall talk / write to counterpart in PSO and obtain following: a) Confirmation on Product Availability b) Product to be made available for the transaction. c) Product price along with break-up (if it is different from that stipulated in the Agreement). 2. SPM shall communicate above information to DSM (SCP) along with the time-frame within which the contigency scenario is expected to be resolved. 3. SPM or designate shall prepare FP-13B for requisite quantity and forward to Cost Accountant General Accounting after approval from Manager Supply Pakistan. 4. Cost accountant will handle preparation of Cheque in SPL's name. 5. SPM shall create/modify Sale/Purchase PO and communicate to Terminal Manager. 6. DSM shall provide to TM the list of customers to be provided product on priority. TC shall send the detail of tank trucks to SPM who in turn shall communicate this information to counterpart in SPL. 7. TM shall send the tank trucks to SPL Shikarpur Terminal with O&D representative. 8. The tank trucks after filling shall report at ST. TM shall do GR against PO. 9. TM shall make transfer docs or/and invoice as required.
Hustle Stratgey 3: Bridge through Tank Truck from Keamari	1. SPM shall obtain current freight difference from Asst. Manager Freight and forward to DSM for approval.

Cost : Freight difference between pipeline and road movement from Keamari to Shikarpur.	2. SPM shall review product availability at Shikarpur and advise TM-KT how much qty should be sent to ST each day. 3. SPM shall notify TC on requirement of additional tank trucks. 4. Each day Tm KT shall report to SPm and DSM total qty sent to Shikarpur the previous day. 5. After contigency scenario is over SPM shall obtain total qty sent to Shikarpur and forward to Asst. Manager Freight. 6. Asst. Manager Freight shall exclude additional freight incurred from freight pool claim.

Approvals Required
(This part to be revised once designate approvers are nominated)

Hustle	Activity	Approver	Designate Approver
2	Purchase from other OMCs	Manager Supply	None
1A, 1B	Product exchange	Mangaer Supply	None

Definitions:

CA	Cost Accountant
CAOS	Coordinator Area Operations Support (T&O)
DSM	District Sales Manager
KT	Keamari Terminal
O&D	Order & Dispatch
PO	Purchase Order
PSO	Pakistan State Oil
SPL	Shell Pakistan Limited
SPM	Supply Planning Manager
TC	Transport Coordinator
TM	Terminal Manager
ST	Shikarpur Terminal

TOTAL PARCO PAKISTAN LIMITED

EMERGENCY TELEPHONE NOS.

Duty Officer	0302 4656486
Terminal Manager	0300-8295446
Manager Terminal Operations	0307- 8889611
Manager Keamari Terminal	021-32863655 0334-3659199
HSEQ Manager	0300 8481609
Area Security Advisor	0300-8275560
Security Supervisor	0300-2760239
Security 2000 Sukkur	071-5633766
Fire Brigade Shikarpur	0726-920248 Ext:16
Ambulance Edhi Shikarpur	115
Civil Hospital Shikarpur	0726-920027-28
Rural Health Center Khanpur	0306-3514698
D.C Shikarpur	0726-920200– 920201-920204
Police Station Khanpur	0726-571114
Police Station Fazu	0302.2709289 - 0300.3225744
S.P Shikarpur	0726-920103 - 920105
D.S.P Khanpur	0726-920108 - 0306-3469320
D.I.G Larkana	074-9410410 - 9410457
D.C.O Sukkur	071-9310560 - 9310561

Mukhtiarkar (Tehsil Dar) Khanpur	0726-9513510
Xen WAPDA Shikarpur	0300-8310128 - 0726-920170
S.D.O WAPDA Shikarpur	0726-920176
Grid Station WAPDA Karampur	0722-718664
Civil Defense Shikarpur	0726-9243765-03337546337
Bomb Disposal Squad Shikarpur	0726-920305
Parco Pump Station III	0726-616212 - 0715014116
P.S.O	0726-607014 - 571211
S.P.L	0726-607801- 602113-600947
S.D.O Wapda	0300 - 3600416

TRAINED FIRST AID RESOURCE

SNO	NAME	CONTACT NUMBERS
01	M. Kashif Mir	0300-8295446
02	Ahmed Ali	0331-3166218
03	Taj Muhammad	0303-3223200
04	Karam Illahi	0302-3050902
05	Illahi Bux	0300-3147892
06	Dhani Bux	0305-3862575
07	Dur Muhammad	0300-2065019
08	Bakhat Ali	0304-3376048
09	Bashir Ahmed	0307-3672201

Annex-VIII:
Environmental Monitoring Reports (Existing Terminal Operations)

GEL Pvt Ltd

AMBIENT AIR QUALITY	GEL/FO/FF/510/11 Revision #: 00 ISSUE #: 05 ISSUE DATE: 15/08/2018

Report Reference No: GEL/LAB/2463-C/556/1218 Reporting Date: 18/12/2018

Name of Customer : Total Parco Pakistan (Shikarpur Terminal)(TOT-003)

Address : Shikarpur terminal near Parco PS # 3 Shikarpur KandhKot road Shikarpur

Location : Tank Farm Area

Date of Analysis : 10/12/2018

S.No	Parameter	Unit	SEQS Limit	Result	Method
1	CO	$\mu g/m^3$	10	BDL	EVM 7
2	SPM	$\mu g/m^3$	500	259	EVM 7
3	Particulate Matter 10	$\mu g/m^3$	150	94	EVM 7
4	Particulate Matter 2.5	$\mu g/m^3$	75	41	EVM 7
5	Oxides of Nitrogen	$\mu g/m^3$	120	BDL	VRAE-PGM-7840
6	Sulphur Dioxide	$\mu g/m^3$	120	BDL	VRAE-PGM-7840
7	Ozone	$\mu g/m^3$	130	BDL	Gastec Tube
8	Lead	$\mu g/m^3$	1.5	BDL	AAS

SEQS = Sindh Environmental Quality Standards
This report is not valid for any negotiations
BDL= Below detectable Limit.

Approved By G.M. Field Operations

End of the Report

Global Environmental Lab (Pvt) Ltd
2nd Floor, Aiwan-e-Sanat, ST-4/2, Sector-23, Korangi Industrial Area, Karachi.
0304-11-11-GEL (435) Ph: (92-21) 35113804-5 Fax: (92-21) 35113806 Email:info@gel.com.pk

GEL Pvt Ltd

AMBIENT AIR QUALITY

GEL/FO/FF/510/11
Revision #: 00
ISSUE #: 05
ISSUE DATE: 15/08/2018

Report Reference No: GEL/LAB/2463-A/554/1218
Reporting Date: 18/12/2018
Name of Customer : Total Parco Pakistan (Shikarpur Terminal)(TOT-003)
Address : Shikarpur terminal near Parco PS # 3 Shikarpur KandhKot road Shikarpur
Location : Near Office Area
Date of Analysis : 10/12/2018

S.No	Parameter	Unit	SEQS Limit	Result	Method
1	CO	µg/m^3	10	BDL	EVM 7
2	SPM	µg/m^3	500	202	EVM 7
3	Particulate Matter 10	µg/m^3	150	86	EVM 7
4	Particulate Matter 2.5	µg/m^3	75	34	EVM 7
5	Oxides of Nitrogen	µg/m^3	120	BDL	VRAE-PGM-7840
6	Sulphur Dioxide	µg/m^3	120	BDL	VRAE-PGM-7840
7	Ozone	µg/m^3	130	BDL	Gastec Tube
8	Lead	µg/m^3	1.5	BDL	AAS

SEQS = Sindh Environmental Quality Standards
This report is not valid for any negotiations
BDL= Below detectable Limit.

Approved By G.M. Field Operations

End of the Report

Global Environmental Lab (Pvt) Ltd
2nd Floor, Aiwan-e-Sanat, ST-4/2, Sector-23, Korangi Industrial Area, Karachi.
0304-11-11-GEL (435) Ph: (92-21) 35113804-5 Fax: (92-21) 35113806 Email:info@gel.com.pk

آغا خان یونیورسٹی ہسپتال، کراچی
The Aga Khan University Hospital, Karachi

Stadium Road, P.O. Box 3500,
Karachi - 74800, Pakistan
Shikarpur Collection Unit Tel:(0726) 512291

Medical Record # : **L21951691** (SR80211)
Patient Name : MR,TAJ MUHAMMAD
Specimen ID : **2018:BQ8958R**
Clinical Information / Comments:

01 WATER CULTURE BOTTLE RECD FROM OUT SIDE.
C/O TOTAL PARCO PK LTD TERMINAL NEAR KHANPUR
==========.

Age / Gender : 29Y / Male
Location : SHIKARPUR
Requesting Physician : C/O TOTAL PARCO PK LTD
Account # : C27045031 - OSR
Requested on : 08/11/2018 - 19:05
Collected on : 08/11/2018 - 19:05
Reported on : 16/11/2018 - 16:59

SOURCE : WATER

SPECIMEN DATA :- [Final Report]

PLACE/SOURCE	:	C/O TAJ MUHAMMAD
SAMPLE	:	WATER AS MARKED 500 ML STS CONTAINER RECEIVED.

RESULTS:- [Final Report]

TOTAL COLONY COUNT	:	< 01 CFU/ML
TOTAL COLIFORMS	:	NIL
FECAL E.COLI	:	NIL
FECAL ENTEROCOCCI	:	NIL

COMMENTS:- [Final Report]

The sample submitted is bacteriologically satisfactory (See reference value given below)

Recommended value for drinking water
(piped supply/ well water)

Organism	Recomended value
Total colony count	less than 500 cfu/ ml
Total coliforms	0/100 mls
Faecal E.coli	0/100 mls
Faecal streptococci/Enterococci	0/100 mls

Presence of E.coli,faecal streptococci and enterococci is suggestive of faecal contamination.

NOTE: Chemical and toxin analysis was not performed on this sample
The above results cannot be used for advertising Purpose.

This is a computer generated report therefore does not require any signature.
Printed on/by : 22/11/2018 09:06 AM / fahim.soomro

Dr. Afia Zafar
MBBS, FRC (Pathology)
Professor & Chair

Dr. Erum Khan
MBBS, FCPS (Microbiology)
Associate Professor

Dr. Rumina Hasan
MBBS, FRC(Path) PhD (University of London)
Professor

Dr. Seema Irfan
MBBS, FCPS (Microbiology)
Associate Professor

Dr. M. Asim Beg
MBBS, PhD, FRCP (Edin)
Professor & Consultant parasitologist

Dr. Kausar Jabeen
MBBS, FCPS(Microbiology)
Associate Professor

GEL Pvt Ltd

GASEOUS EMISSION TEST REPORT	[illegible] Revision #: [illegible] ISSUE #: [illegible] ISSUE DATE: [illegible]

Report Reference No: GEL/LAB/2454/A/547/1118 Reporting Date: [illegible]

Name of Customer: Total Parco Pakistan (Shikarpur Terminal)(TOT-003)

Address: Shikarpur terminal near Petrol Pump # 2 Shikarpur Karachi road Shikarpur Fuel Used: Diesel

Source: Genset No. 1

Date of analysis: 10/11/2018

S/No	Parameters	Unit	SEQS Limit	Concentration	Method
1	Carbon monoxide (CO)	mg/Nm³	800	770	Testo 350XL
2	Sulphur dioxide (SO2)	mg/Nm³	1700	11.44	Testo 350XL
3	Combined oxide of nitrogen (NOx)	mg/Nm³	400	180.6	Testo 350XL
4	Smoke	Ringlemann	2	<1	Ringlemann Scale
5	Particulate Matter	mg/Nm³	300	49	BS (3x) [illegible] 1968
6	Noise Level	dB	85	81.6	Noise Level Meter

SEQS = Sindh Environmental Quality Standards
This report is not valid for any negotiations
Noise level measured from a distance of 7.5 meters

Approved By: G.M. Field Operations

End of the Report

GEL Pvt Ltd

GASEOUS EMISSION TEST REPORT

GEL/FO/FF/S10/11
Revision #: 00
ISSUE #: 05
ISSUE DATE: 15/08/2018

Report Reference No: GEL/LAB/2454-B/548/1218

Reporting Date: 17/12/2018

Name of Customer : Total Parco Pakistan (Shikarpur Terminal)(TOT-003)

Address : Shikarpur terminal near Parco PS # 3 Shikarpur KandhKot road Shikarpur

Fuel Used: Diesel

Source : Genset No 2

Date of analysis : 10/12/2018

SrNo	Parameters	Unit	SEQS Limit	Concentration	Method
1	Carbon monoxide (CO)	mg/Nm^3	800	267.5	Testo t350xl
2	Sulphur dioxide (SO2)	mg/Nm^3	1700	5.72	Testo t350xl
3	Combined oxide of nitrogen (Nox)	mg/Nm^3	600	213.2	Testo t350xl
4	Smoke	Ringlmann	2	<1	Ringlmann scale
5	Particulate Matter	mg/Nm^3	300	33.33	BS 1747: II : 1969
6	Noise Level	dB	85	70.3	Noise Level Meter

SEQS = Sindh Environmental Quality Standards
This report is not valid for any negotiations
Noise level measured from a distance of 7.5 meters.

Approved By G.M. Field Operations

End of the Report

Global Environmental Lab (Pvt) Ltd
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GEL Pvt Ltd

GASEOUS EMISSION TEST REPORT

GEL/FO/FF/510/11
Revision #: 00
ISSUE #: 05
ISSUE DATE: 15/08/2018

Report Reference No: GEL/LAB/2462-B/550/1218
Reporting Date: 17/12/2018
Name of Customer : Total Parco Pakistan (Shikarpur Terminal)(TOT-003)
Address: Shikarpur terminal near Parco PS # 3 Shikarpur KandhKot road Shikarpur
Fuel Used : Bagges
Source: Fire Engine Pump No 2
Date of Analysis: 10/12/2018

No	Parameter	Unit	SEQS Limit	Result	Method
1	Carbon monoxide (CO)	mg/Nm^3	800	538.75	Testo t350xl
2	Sulphur dioxide (SO2)	mg/Nm^3	1700	11.44	Testo t350xl
3	Combined oxide of nitrogen (Nox)	mg/Nm^3	.....	346.45	Testo t350xl
4	Smoke	Ringlmann	2	<1	Ringlmann scale
5	Particulate Matter	mg/Nm^3	300	40	BS 1747: II : 1969
6	Noise Level	dB	85	83.8	Noise Level Meter

SEQS = Sindh Environmental Quality Standards
This report is not valid for any negotiations
Noise level measured from a distance of 7.5 meters.

Approved By G.M. Field Operations

End of the Report

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GASEOUS EMISSION TEST REPORT

GEL/FO/FF/510/11
Revision #: 00
ISSUE #: 05
ISSUE DATE: 15/08/2018

Report Reference No: GEL/LAB/2462-A/549/1218
Reporting Date: 17/12/2018
Name of Customer : Total Parco Pakistan (Shikarpur Terminal)(TOT-003)
Address: Shikarpur terminal near Parco PS # 3 Shikarpur KandhKot road Shikarpur
Fuel Used : Baggas
Source: Fire Engine Pump No 1
Date of Analysis: 10/12/2018

S No	Parameter	Unit	SEQS Limit	Result	Method
1	Carbon monoxide (CO)	mg/Nm^3	800	430	Testo t350xl
2	Sulphur dioxide (SO2)	mg/Nm^3	1700	8.58	Testo t350xl
3	Combined oxide of nitrogen (Nox)	mg/Nm^3	.....	319.8	Testo t350xl
4	Smoke	Ringlmann	2	<1	Ringlmann scale
5	Particulate Matter	mg/Nm^3	300	20	BS 1747: II : 1969
6	Noise Level	dB	85 -	84.7	Noise Level Meter

SEQS = Sindh Environmental Quality Standards
This report is not valid for any negotiations
Noise level measured from a distance of 7.5 meters.

Approved By G.M. Field Operations

End of the Report

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GEL Pvt Ltd

VEHICULAR GASEOUS EMISSION TEST REPORT

GEL/FO/FF/510/11
Revision #: 00
ISSUE #: 05
ISSUE DATE: 15/08/2018

Report Reference No: GEL/LAB/2465-A/552/1218
Reporting Date : 18/12/2018
Name of Customer : Total Parco Pakistan (Shikarpur Terminal)(TOT-003)
Address : Shikarpur terminal near Parco PS # 3 Shikarpur KandhKot road Shikarpur
Fuel Used : Petrol
Source : Hiace (JF-8727)
Date of Analysis : 10/12/2018

S.No	Parameter	Unit	SEQS Limit	Result	Method
1	Smoke	Ringlmann	2	<1	Ringlmann scale
2	Carbon monoxide (CO)	%	4.5**	1.84	KANE
3	Noise Level	dB	85	60.6	Noise Level Meter

SEQS = Sindh Environmental Quality Standards
This report is not valid for any negotiations
Limits of New Vehicle for CO (Limits for Used Vehicle is 6%)

Approved By G.M. Field Operations

End of the Report

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GEL/LAB/2464-A/551/1218

Reporting Date: 18/12/2018

LIGHT INTENSITY (LUX)	GEL/FO/FF/510/11 Revision #: 00 ISSUE #: 05 ISSUE DATE: 15/08/2018

1) Name Of Customer : Total Parco Pakistan (Shikarpur Terminal)(TOT-003)
2) Address : Shikarpur terminal near Parco PS # 3 Shikarpur KandhKot road Shikarpur
3) Date Of Analysis : 10/12/2018
4) Test Method : LUX Meter
5) No. Of Samples : 3

S.No	Source	Lux
1	HSE Room	313
2	Security Room	509
3	Filling Area	1274

Approved By G.M. Field Operations

End of the Report

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GEL/LAB/3505-A/553/1218

Report Date: 10/12/2018

NOISE LEVEL ESTIMATION RESULT

GEL/FO/FF/510/11
Revision #: 00
ISSUE #: 05
ISSUE DATE: 15/08/2018

1) Name Of Customer : Total Parco Pakistan (Shikarpur Terminal)(TOT-003)
2) Address : Shikarpur terminal near Parco PS # 3 Shikarpur KandhKot road Shikarpur
3) Date Of Analysis : 10/12/2018
4) Description : Noise Level
5) Test Method : Noise Level Meter
6) No. Of Samples : 2

S.No	Source	Average dB
1	DP Room	74.4
2	NDP Room	84.9

SEQS LIMIT is 75 dB for Noise level at day time in industrial Area.

Approved By G.M. Field Operations

End of the Report

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