



HINDUSTAN PETROLEUM CORPORATION LTD

RAPID ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN FOR PALANPUR TERMINAL



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DECEMBER 2011

ACKNOWLEDGEMENT

Secon Pvt Ltd. highly appreciates the opportunity provided by Hindustan Petroleum Corporation Limited, New Delhi by assigning the preparation of Rapid Environmental Impact Assessment study report for Palanpur Terminal. We express our sincere gratitude to the officials of HPCL for the cooperation and support extended to us during this assignment, but for which this report could not have been successfully prepared.

The assistance of large number of persons in government departments and private individuals in data collection are also thankfully acknowledged.

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EXECUTIVE SUMMARY

1.1 INTRODUCTION

To meet the requirement of Finished Petroleum Products, HPCL has proposed a 437 km 18" Dia minimum 6.4 mm thickness pipeline between Rewari to Kanpur. The pipeline will originate from existing marketing terminal at Rewari in Haryana and terminate at proposed new terminal of HPCL at Kanpur in Uttar Pradesh (U.P.).

Various grades of Motor Spirit (BS II MS & BS IV MS), BS III High Speed Diesel (HSD) & BS IV HSD, Superior Kerosene Oil (SKO) are the different Petroleum products proposed to be pumped through the pipeline. Annual throughput capacity for the pipeline is 3.17 MMTPA in phase I, (Year 2018-19) and 3.86 MMTPA in phase II (Year 2023-24).

Required facilities have been planned along the pipeline route depending on major consumer centres and other engineering requirements. New storage installation and receiving station are proposed to be constructed by HPCL at Kanpur in U.P., and existing facilities at Palanpur, Rewari, Bharatpur, and Mathura location will be utilized by augmenting more facilities for receiving products. The present project, for which this Environmental Impact Assessment and Environmental Management Plan are formulated, involves the details of Palanpur Terminal which is located in the state of Gujarat.

However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade.

In order to assess the current status of the environment and the likely impacts which may be caused due to the proposed activities of the Pipeline Project, HPCL had entrusted Seccon Pvt Ltd. for undertaking Environmental Impact Assessment (EIA) study and preparation of Environmental Management Plan (EMP) for the proposed Petroleum Product Pipeline Project.

1.2 JUSTIFICATION OF THE PROJECT

The proposal to lay approx. 437 km 18" Dia minimum 6.4 mm thickness long pipeline from Rewari to Kanpur and terminals at Rewari and Kanpur is justified, looking into the increasing demand of petroleum products. To cater the present and future requirements of various industries and consumers in North India proposed Rewari- Kanpur pipeline project with terminals with tap off station and associated facilities at Rewari, Bharatpur, Mathura, and proposed new terminal at Kanpur is considered.

The current proposal is justified on the following techno-economic considerations:



- 1) Pipeline transfer of petroleum is the safest as well as cheapest mode of Inland transport.
- 2) Pipeline transport of Petroleum is also easy from operational view and is pollution free.
- 3) Satisfactory rail/road links exists in the area for onward transportation from the receiving station at Kanpur.
- 4) Suitable and adequate land is available for construction of additional facilities at Palanpur, Rewari, Bharatpur, and Mathura .

1.3 OBJECTIVE OF THE EIA STUDY

The purpose of the EIA study is to ensure that development options under consideration are environmentally sound and sustainable and that the environmental consequences of the project are recognized early and taken into account in the project design.

1.4 EIA METHODOLOGY

The scope of the EIA study includes:

- Collection and review of available published secondary literature/data/information on geology and soil.
- Field study, survey and monitoring in the study area for generation of primary data on soil, water quality, noise, hydrocarbon, air and ecological parameters.
- Establishment of baseline environmental scenario/conditions of the study area.
- Study of the project activities in terms of construction and operation.
- Assessment of possible impacts on the environment during construction and operation of the project.
- Recommendation of mitigation measures to eliminate/minimize the adverse impacts.
- Formulation of effective Environmental Management Plan (EMP) to ensure the implementation of mitigation measures for environmental sustainability

1.5 SCOPE OF THE REPORT

The EIA is aimed at characterization of the existing environment in the study, prediction of the possible environmental impacts due to operation of the terminal, draw recommendation of mitigatory measures and formulation of an effective Environmental Management Plan (EMP) to ensure an environmentally sustainable development.

1.6 STRUCTURE OF THE REPORT

The report contains analysis of primary field study/survey/monitoring data and secondary data, environmental impact assessment, mitigation measures, and EMP. The report completes with necessary tables, drawings and annexure. The structure of the report is as follows:



- Chapter 1 : Introduction, Background & EIA Methodology
- Chapter 2 : Project Description
- Chapter 3 : Baseline Environmental Scenario
- Chapter 4: Environmental Impacts of the Project
- Chapter 5: Environmental Management Plan

2.1 PROJECT HIGHLIGHTS

To meet the requirement of Petroleum Products, HPCL has proposed a 437 km pipeline between Rewari and Kanpur. The pipeline will originate from existing marketing terminal of HPCL at Rewari in Haryana and terminate at proposed new terminal of HPCL at Kanpur in U.P. The project components for the proposed Rewari Kanpur Pipeline are as follows:

Sr No.	Location	Pipeline	Terminal
1	Cross country Pipeline including SV & IP station	Rewari-Bharatpur- Mathura- Kanpur	-
2	Rewari	Pumping station & associated facilities	Existing installation will be utilized.
3	Bharatpur	Tap off & Other associated facilities	Additional Tankage
4	Mathura	Tap off & Other associated facilities	Additional Tankage
5	Palanpur		Additional Tankage
6	Kanpur	Receiving and associated Facility	New Storage and Distribution Terminal with Road and Rail loading facilities
7	Bahadurgarh	Pumping & associated facilities for pumping of Product from Bahadurgarh	



		to Rewari	
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The present report addresses the Palanpur terminal and so, in the present report, the discussion will be focussed on the existing facilities of marketing terminal at Palanpur.

2.2 FACILITIES PROVIDED AT TERMINAL

Product Pump House, Manifold, Fire water Pump House, Two Tank truck Filling Gantrys, Calibration Facilities, Electric Room/MCC, D G yard, Transformer Yard, Lube Drum Yard and Grease Drum Shed, Lube Ware House, Marketing Room, Admin. Building, Control Room, Amenity, Parking, Sealing Platform, Effluent Treatment Plant, Security & Gate House checking Platform , Watch Tower (4 Nos), Compound wall, Emergency Gate-1 No., Drivers Toilet, Foam Tank Shed, Blue Dye Dosing System, Turbo jet Dosing System, Power Dosing System, Product Storage Tanks.

2.3 INSTRUMENTATION, CONTROL & COMMUNICATION SYSTEM

Instrumentation & Automation

The major activities will be performed by Palanpur terminal are the following:

- a) Storage facilities for BS III MS, BS IV MS, BS III HSD, BS IV HSD and SKO.
- b) Receipt of product through pipeline
- c) Road loading system
- d) Sump & Slop system
- e) Fire water pump system and make up water system

Full fledged Terminal Automation System (TAS) is envisaged for these units. These include:

- a) Tank Farm Management System (TFM)
- b) Terminal data management system
- c) Bay Queuing
- d) Tank Truck loading

Shut Down Features

Emergency Shut Down (ESD) is provided in the terminal control room to stop all dispatch operation. ESD is implemented in the PLC logic as part of terminal automation.

- Emergency push buttons to stop all road loading operations are provided in the middle gantry.
- Emergency push buttons to stop all loading operations in the terminal are provided in the control room.



Communication System

Telecommunication system (interfaced with the public address system) along with Plant Communication System (PCS) is envisaged for the terminals.

2.4 FIRE PROTECTION FACILITIES

System Description

The following fire protection facilities are envisaged at terminals as per the requirements of OISD-117:

- a) Fire Water System – Pressurized at 7.0 Kg/cm²
- b) Foam system
- c) First Aid Fire Fighting Equipment and safety accessories
- d) Mobile Fire Fighting Equipment

Fire Protection Facilities

The facilities provided consist of the following units

- 1) Fire Water Storage Tanks
- 2) Fire Water Pumps and Jockey Pumps
- 3) Fire Water Piping
- 4) Fire Hydrants
- 5) Fixed Foam System
- 6) Water/foam Monitors
- 7) Fixed Water Spray Systems
- 8) Mobile Fire Fighting Equipment
- 9) Portable Extinguishers

2.5 SAFETY, HEALTH AND ENVIRONMENT POLICY

Petroleum Industry occupies an important segment of our economy and is a source of large benefit to the society. In recent years, there has been a rapid increase in volumes handled to meet the increasing demand. Products such as, Euro III MS, Euro IV MS, Euro III HSD, Euro IV HSD, SKO and FO are highly flammable, and safety which forms an integral part of the industry, has always been given paramount importance.

Several Government authorities, both at the centre and state levels such as Inspectorate of Factories, Department of Explosives etc. are entrusted with the responsibility of ensuring safe handling and accident prevention measures. In spite of the measures, possibility of accidents either due to human errors and/or due to equipment/system failure cannot be ruled out. The



lessons learnt from the disasters all over the world, made it essential to draw an Emergency Preparedness Plan to negotiate such eventuality. The imperative of Emergency Preparedness to minimize the adverse effects due to an unfortunate accident occurring in manufacture, storage, import and transport of any hazardous substance is thus well recognized by all concerns.

An Emergency Preparedness Plan is essential to obviate such an eventuality by providing the measures to contain the incident and minimize the after effects. To assist the Industry it is considered essential to provide the guidelines for preparing such plans based on the interactions within the oil industry.

Over the years the oil industry has developed and refined its own directives in the field of safety, health and environment which are to be followed stringently by their members. In addition to the environmental legislation, the OISD (Oil Industry Safety Directorate) makes it mandatory for its members to implement its directives on these issues. HPCL has thus formulated its own corporate policy on environment and safety which is followed in all its installations.

2.6 Utilities

Power Supply Arrangement

Power requirement will be fulfilled from the local grid. Provision for DG set is kept as back up arrangement for emergency power only.

Make Up Water System

The source of water for the make up water system is bore wells. Water from the bore well is collected in sump. From the sump water will be pumped by self priming pumps installed on top of the sump and distributed through a network of buried GI pipes to individual HDPE overhead tanks of Amenities buildings, Admin building, drivers rest room etc. and to the fire water storage tanks.

Effluent Treatment Plan (ETP)

The Effluent Treatment Plant receives oily water through a separate drain line connecting tank farms, TT Gantry area, Pump house manifold area etc. The plant includes a Primary separation unit consisting of a bar screen, Titled Plate Interceptor and Belt type oil skimmer. Subsequently Effluent will be pumped to Filtration unit using a multimedia filter and coalescing filter. The slop oil collected will be pumped to the slop tank. The capacity of the existing ETP is 75KL/hr at Palanpur terminal.

3.1 TOPOGRAPHY AND GEOLOGY

Topography: The Palanpur Terminal is located 7 km West of Palanpur Town along Palanpur-Deesa section of NH-14 at KP 329.500 of the pipeline route. The terminal site is a piece of



industrial land within HPCL premises of existing well developed terminal for MDPL , The geographical location of the site is 24 12' N Latitude and 72 21' E Longitude and 190 msl.

Geology: Palanpur Terminal area is surrounded by ultra basic igneous rocks , which was formed during the Paleo-Meso-Proterozoic epoch, which is part of Kumbhalgarh Group of Delhi Super Group .

3.2 SOIL

3.2.1 SOIL CHARACTERISTICS IN THE STUDY AREA: It includes both Physical and Chemical Characteristics.

3.2.2 FERTILITY STATUS OF SOIL

Soil in the terminal area is generally slightly alkaline with pH range of 8.10. The observed level of pH is not expected to hinder the growth of agricultural crops and forests

3.2.3 CROPPING PATTERN AROUND THE TERMINAL AREA

Palanpur area is irrigated due to network of canals and deep tube wells and also witnesses a rain fed irrigation and cultivates (wheat , jowar and bajra), pulses (gram, moong,) & cumin, cotton , fodder crops (barseem etc).

However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

3.3 LAND USE

Land use pattern highlights the environmental quality of a particular area. It is an important indicator of environmental health, intensity of human activity and degree of interaction between the two. Land use pattern is significantly influenced by the nature of soil, water availability and also climate conditions of the area.

However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

3.4 WATER QUALITY

Ground water has been found as an important source for catering the local needs of water consumption for various purposes, mainly domestic & drinking in the villages of the terminal area,. With this view, ground water quality monitoring station was identified for the monitoring



and assessment of ground water quality. Groundwater monitoring stations designated as GW1 was located at the existing terminal.

Ground water of Palanpur terminal area is moderate in nature. The levels of TDS, total hardness are observed tolerable when compared with the prescribed limit for drinking water. Though there is no bacteriological contamination in the ground water sample, the physico-chemical quality satisfies the limit of the Drinking Water Standards. So from quality point of view it can be concluded that the water is free from contamination. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

3.5 METEOROLOGY

CLIMATE AND SEASONS

The town of Palanpur experiences three seasons overall and these are the seasons of summer, winter and monsoon. Summers in the town of Palanpur are very hot and dry, and winters are very cold, thus the region experience two extremes through the year.

Summers in the town of Palanpur extend through the months of March, April, May and June. This time of the year experiences a very dry climate, as the region falls under the semi arid category. The maximum temperature during the summer months will be around forty degrees (40°C) and the minimum temperature will be around twenty seven degrees (27°C). Days will be blazing hot and nights will be cold.

The region of Palanpur does not experience heavy showers during monsoon, and the monsoon months of July, August, and September will experience moderate showers. The temperatures will come down by a significant amount during this time in Palanpur.

The weather during winters in Palanpur will be cold and dry, devoid of any rain. The maximum temperature during the winter will range around twenty two degrees (22°C) and the minimum temperature will range around five degrees (5°C) to fifteen degrees (15°C) during winters.

Winters in Palanpur are from October-January.

3.6 AIR QUALITY

AMBIENT AIR QUALITY MONITORING STATIONS

Sampling station was set up for monitoring of ambient air quality in and around the terminal area. The location of the monitoring station was selected so as to accord an overall idea of the



ambient air quality scenario in the terminal area. Monitoring was conducted in respect of the following parameters:

- PM₁₀
- PM_{2.5}
- Sulphur Dioxide (SO₂)
- Oxides of Nitrogen (NO₂)
- Carbon Monoxide (CO)
- Lead (Pb)
- Ammonia (NH₃)
- Ozone (O₃)
- Arsenic
- Nickel
- Benzene
- Benzopyrene
- Hydrocarbon

The sampling equipment were placed at a height of 3 to 3.5 meters above ground level at each monitoring station, thus negating the effects of wind blown ground dust. The equipment was placed at open space free from trees and vegetation which otherwise act as a sink of pollutants resulting in lower levels in monitoring results. At locations close to highways, the equipment was placed at least 100m away from such highways/roads to avoid influence of traffic exhaust emissions.

Arithmetic mean values of the 24-hourly average values of PM₁₀ and PM_{2.5} were 23.0µg/m³ and 6.0 µg/m³ respectively. From the above data it can be concluded that 24-hourly average SO₂ and NO_x levels were observed to be within the limit of 80 µg/m³ for industrial area as stipulated in the National Ambient Air Quality Standards and the PM₁₀ & PM_{2.5} levels were also within the limit of 100 µg/m³ & 60 µg/m³ respectively.

3.7 NOISE

NOISE MONITORING STATIONS

To assess the background noise levels in the terminal area ambient noise monitoring was conducted in the area. A location has been selected for measurement of present status of ambient noise levels, covering industrial area. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.



3.8 ECOLOGY

Natural flora and fauna are organized into natural communities and constantly interact with their physical environment as well as among themselves. They show various responses and sensitivities to outside influences. Hence, for a meaningful assessment it is necessary to study changes in status of the plant and animal resources.

The socio-economic profile of the study area is classified into following points:

- Population and dwelling units,
- Social profile,
- Education,
- Health and medical infrastructure,
- Drinking water facilities,
- Communication facilities

No Ecologically Sensitive Areas such as Nation Parks, Sanctuaries or Biosphere Reserves exist in the vicinity of the terminal area. No well defined corridor of wildlife movement or routes of wildlife migration has been reported by the Forest Department of concerned State Governments around the terminal sites.

4.0 ENVIRONMENTAL IMPACTS OF THE PROJECT

The proposed project will have impacts on the environment in construction and operation phase. Identification of impacts is followed by recommendations of appropriate cost effective mitigation measure. These impacts along with mitigation measures are given in the following sections. Spatially the impacts have been assessed over the study area of 3 km radius of the Terminal. Overall impacts in the regional context are negligible unless stated otherwise.

4.1 PROJECT ACTIVITIES

IMPACTS DUE TO ACTIVITIES DURING CONSTRUCTION PHASE

However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

IMPACTS DURING OPERATION PHASE

During the operation stage, there will be as such no sources of pollution and impacts. The main activity during operation is transfer of petroleum products (like BS III MS, BS III HSD



& SKO) through the pipeline under pressure flow, tapping off such products and storage at receipt terminal.

4.2 IMPACTS DURING OPERATION PHASE

Project activities during operation phase include transfer of petroleum products through the pipeline under pressure and tapping off such products and storage at terminal. These activities will result in marginal and temporary enhancement of chemical hazards and socio-economic benefits. There will have as such no other sources of pollution and negative impacts.

Therefore, operation phase activities would have moderate impacts on socio-economics. It could also develop minor impacts on noise.

The main impacts of operation phase are temporary and marginal chemical hazards and enhanced risk level. Socio-economic benefits are long term impacts

Impacts on discreet environmental attributes during operation phase have been discussed below along with suitable mitigation measures.

Impacts on Soil

Soil erosion is an environmental factor, which is likely to degrade the project area and generate dust. Soil erosion is mainly influenced by vegetation cover, land use pattern, intensity of rainfall, drainage condition and soil characteristics. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

Impacts on Land Use

Following the construction phase, the temporarily modified land use pattern, such as construction of temporary camps/tents to accommodate some construction personnel would gradually cleared during the operation stage.

The terminal site, after completion of its development, would consist of built structures, neatly landscaped to lead to a pleasing outlook. Moreover, the piece of land being situated amid few other existing industries would necessarily mingle with the immediately adjacent land use of the area. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area

Impacts on Water Use



During operation water is required for fire water services, gardening and for other domestic requirements only. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

Impacts on Water Quality

As the project does not involve any production process, there will be no process wastewater as such. The industrial effluent generated from oil water separator will be reused for gardening/washing purposes. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

Impacts on Air Quality

The mean 24-hourly average baseline level of PM₁₀, PM_{2.5}, SO₂, HC and NO_x monitored in and around the project site at selected station during the winter season have been found to be within prescribed limits. With exception of the particulate matter (PM₁₀), which can be attributed to the arid condition of the area and high wind speed, such levels are within the permissible limits of respective pollutants for industrial as well as residential areas as stipulated in the latest National Ambient Air Quality Standards. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

Impacts on Noise

There will be no such significant machine/industrial noise during operation of the project except the continuous noise of pump enclosed in pump house. The movement of vehicles in the area and blowing of their horns would contribute to the machinery noise. However, neither its sound intensity nor its duration is expected to be large enough to cause significant impact. Residential areas are quite far away. This would imply that no impact of such noise is likely to be felt by the local people. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

Impacts on Ecology



Landscaping involving plantations of carefully chosen trees, shrubs and herbs would be undertaken in and along the boundary. This would not only restore any loss in ecology of the area, but also sufficiently enhance the floral status around the site.

No tangible effect is expected to be felt on the surface water quality in the study area due to the project. As such, the existing aquatic biota is not expected to suffer any undue stress due to the said activities.

5.0 ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. The present chapter on Environmental Management Plan envisages the management plan, which is going to be adopted for the terminal of the Pipeline Project for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities.

The following issues have been addressed in this EMP:

- Mitigatory measures for abatement of the undesirable impacts caused during the constructions and operation stage.
- Details of management plans (Green belt development plan, Solid waste management plan etc.) institutional set up identified/recommended for implementation of the EMP
- Post project environmental monitoring programme to be undertaken after commissioning of the project



CHAPTER 1.0

INTRODUCTION AND BACKGROUND

1.0 INTRODUCTION, BACKGROUND AND EIA METHODOLOGY

1.1 INTRODUCTION

To meet the requirement of Finished Petroleum Products, HPCL has proposed a 437 km 18" Dia minimum 6.4 mm thickness pipeline between Rewari to Kanpur. The pipeline will originate from existing marketing terminal at Rewari in Haryana and terminate at proposed new terminal of HPCL at Kanpur in Uttar Pradesh (U.P.).

Various grades of Motor Spirit BS II MS & BS IV MS, BS III High Speed Diesel (HSD) & BS IV HSD, Superior Kerosene Oil (SKO) are the different Petroleum products proposed to be pumped through the pipeline. Annual throughput capacity for the pipeline is 3.17 MMTPA in phase I, (Year 2018-19) and 3.86 MMTPA in phase II (Year 2023-24).

Required facilities have been planned along the pipeline route depending on major consumer centres and other engineering requirements. New storage installation and receiving station are proposed to be constructed by HPCL at Kanpur in U.P., and existing facilities at Palanpur, Rewari, Bharatpur, and Mathura location will be utilized by augmenting more facilities for receiving products. The present project, for which this Environmental Impact Assessment and Environmental Management Plan are formulated, involves the details of Palanpur Terminal which is located in the state of Gujarat.

However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade.

In order to assess the current status of the environment and the likely impacts which may be caused due to the proposed activities of the Pipeline Project, HPCL had entrusted Seccon Pvt Ltd. for undertaking Environmental Impact Assessment (EIA) study and preparation of Environmental Management Plan (EMP) for the proposed Petroleum Product Pipeline Project.

1.2 JUSTIFICATION OF THE PROJECT

The proposal to lay approx. 437 km 18" Dia minimum 6.4 mm thickness long pipeline from Rewari to Kanpur and terminals at Rewari and Kanpur is justified, looking into the increasing



demand of petroleum products. To cater the present and future requirements of various industries and consumers in North India proposed Rewari- Kanpur pipeline project with tap off station and associated facilities at Rewari Bharatpur, Mathura, and proposed new terminal at Kanpur is considered.

The current proposal is justified on the following techno-economic considerations:

- 1) Pipeline transfer of petroleum is the safest as well as cheapest mode of Inland transport
- 2) Pipeline transport of Petroleum is also easy from operational view and is pollution free
- 3) Satisfactory rail/road links exists in the area for onward transportation from the receiving station at Kanpur.
- 4) Suitable. and adequate land is available for construction of additional facilities at Palanpur, Rewari, Bharatpur, and Mathura .

1.3 OBJECTIVE OF THE EIA STUDY

The purpose of the EIA study is to ensure that development options under consideration are environmentally sound and sustainable and that the environmental consequences of the project are recognized early and taken into account in the project design.

The major objective of this study was to establish present environmental conditions in the project area through available data/information supported by field studies, wherever necessary; to predict the impacts on relevant environmental attributes due to the construction and operation of the terminal, to suggest appropriate and adequate mitigation measures to minimize/ reduce adverse impacts and to prepare an Environmental Impact Assessment (EIA) report including Environmental Management Plan (EMP) for timely implementation and scheduling of the mitigation measures.

1.4 EIA METHODOLOGY

1.4.1 APPROACH OF THE EIA STUDY

An EIA study basically includes establishment of the present environmental scenario, study of the specific activities related to the project and evaluation of the probable environmental impacts, thus, leading to the recommendations of necessary environmental control measures.

An EIA study, thus, necessarily includes collecting detailed data and information on the existing environmental set up for “Baseline Environmental Scenario” and study of related data on the proposed activities i.e. “Project Description” or project data due to operation of the project. The project data is then superimposed on the baseline data and the resultant environmental conditions and environmental impacts associated with construction and operation are predicted



with the help of effective and appropriate impact prediction tools and procedures under “Assessment of Environmental Impacts”. To mitigate detrimental impacts on the environment (if any), the necessary environmental control, protective and mitigation measures are finally recommended as “Environmental Management Plan”.

The EIA study is aimed at determining the environmental impacts on the “Study Area” of the project, which encompasses all areas falling within 3kms radius of the terminal due to the construction and operation of the project.

The major environmental disciplines in this EIA study include geology, soil, land use, water quality, meteorology air quality, noise, terrestrial & aquatic ecology and demography & socio-economics.

Secondary data sources were identified and relevant secondary data was collected from various agencies with respect to physical, biological and human environment of the study area and other relevant information about the project. Primary field data was generated in the study area during one season period on various relevant environmental attributes. A comprehensive database was established after completion of both primary and secondary data.

The environmental impacts associated with construction and operation of proposed project was then determined through appropriate impact prediction tools and procedures. An Environmental Management Plan (EMP) was formulated for implementing the proposed mitigative measures as well as institutional arrangements required for the purpose.

The scope of the EIA study includes:

- Collection and review of available published secondary literature/data/information on geology, soil.
- Field study, survey and monitoring in the study area for generation of primary data on soil, water quality, noise, Air, hydrocarbon (HC) , and ecological parameters
- Establishment of baseline environmental scenario/conditions of the study area
- Study of the project activities in terms of construction and operation
- Assessment of possible impacts on the environment during operation of the project
- Recommendation of mitigation measures to eliminate/minimize the adverse impacts.
- Formulation of effective Environmental Management Plan (EMP) to ensure the implementation of mitigation measures for environmental sustainability

1.4.2 ESTABLISHING BASELINE ENVIRONMENTAL SCENARIO

“Baseline Environmental Scenario” is generally established through:

- Collection of secondary data through review of existing literature/data/information



- Generation/collection of primary data through field study, survey and monitoring

The baseline environmental conditions of the study area have been established through survey and review of published literature, and field studies/monitoring/survey. At the outset, the relevant secondary data available with various Governmental, educational and other institutions has been collected, reviewed and analyzed.

1.4.2.1 SECONDARY DATA COLLECTION

Besides inputs from the client on relevant information about the project, other secondary data sources have been identified and relevant secondary data and published literature with respect to physical, biological and human environment of the study area has been collected from various agencies.

Geology & Topography: The baseline data on geological setting of the area including topography has been compiled based on the information obtained through maps and publications of the Geological Survey of India and other relevant institutions. Narrative description, in brief, of the geological history of the area has been prepared.

Soil & Agriculture: Available published data and records on soil type and quality in the area has been collected from the Agricultural Departments and Agricultural Research Institutes. Data on cropping pattern has also been collected.

Land Use: Land use patterns (forests, agricultural land irrigated & unirrigated, cultivable wasteland and land not available for cultivation) have been established from the available published Census of India data.

Meteorology: Past meteorological data for parameters as temperature, relative humidity, rainfall, cloud cover, wind speed and wind direction, and weather phenomena has been collected from the nearest IMD station.

Ecology: The baseline data on terrestrial ecology, covering both flora and fauna has been derived from existing literature of Forests Departments, Botanical Survey of India, Zoological Survey of India and earlier studies conducted in the area. The data on the aquatic life of the major rivers in the study area has been derived from existing literature. Data on fish has been collected from the local Fishery department.

Socio-economics: Relevant data on socio-economic features and trends prevalent in the study area has been compiled from the available published Census of India data, to establish the demographic profile, occupational pattern and amenities available. The features which have been analyzed are population, household, population density, family size, sex ratio, SC-ST



population, literacy level, work participation and its distribution, work participation among females, infrastructural facilities and amenities available in the area.

Environmentally Sensitive Areas: In addition to the above, information on the location of human settlements, and ecologically sensitive areas like reserve forests, national parks, wildlife sanctuaries, biosphere reserves, wetlands etc. Within 3 km of the project site has been collected. The distance of the project site from the flood plain of the riverine system, highways, railway lines and airports has been established. Sites of archaeological and national importance, places/sites of historical, cultural, religious and tourist interests, etc., within a radius of 3 km of the project site has also been identified.

1.4.2.2 FIELD STUDY/SURVEY/MONITORING

After obtaining information from the client on the project features and other critical issues and areas, field study/survey/monitoring has been carried out to generate and collect primary data. The duration of fields study/monitoring was one season period. A comprehensive database was then established after completion of both primary and secondary data collection and compilation.

Soil: Soil samples have been collected once in the one season study period from appropriate representative locations within the study area. The samples have been analyzed for relevant physical and chemical parameters and fertility status for establishing the baseline data. For sampling and analysis of soils, established standard methods and procedures have been followed in general.

Water Quality: The quality of the ground water at representative locations has been monitored for generating data on water quality parameters, Samples have been collected once during the one season study period from all the locations and analyzed for physical, chemical and bacteriological parameters for drawing up the baseline data. Important trace inorganic, heavy metals and toxic constituents for those samples have also been analyzed. Parameter selection, sampling and analysis of water samples have been conducted as per established standard methods and procedures.

Air Quality: The quality of air samples were studied by evaluating the parameters of PM₁₀, PM_{2.5}, SO₂, NO_x, and HC at representative locations.

Noise: The ambient noise scenario within the study area was monitored once in the one season period at representative locations covering industrial, commercial and residential areas and silence zones using a suitable sound level meter. The monitoring at each location was conducted over a period of twenty-four hours to monitor the equivalent noise level (Leq) during day and night time to compare with the standards.



Ecology: The collected secondary data on ecology has been supplemented and corroborated through extensive field studies during the one season study period. Special emphasis has been laid on forests. The established methods of have been adopted to determine the floral pattern within the study area.

1.4.3 STUDY OF PROJECT DATA/ACTIVITIES

The project data/details consisting of the general layout and project activities during operation of the project has been established in consultation with the client.

- Project location, layout and project design
- Infrastructural and off-site facilities
- Construction materials and their quantity, storage and handling
- Quantity, nature , handling and disposal of construction spoils
- Sources of noise and their levels during construction/operation
- Other inherent details related to the project

The project data/activities has been studied and analyzed to identify the activities, which may induce potential impacts on the physical, biological and socio-economic environment.

1.4.4 ASSESSMENT OF ENVIRONMENTAL IMPACTS

Changes in land use due to the setting up of the project and ancillary facilities have been established from the long term data. Consequential impacts on the terrestrial and aquatic flora and fauna have been studied with reference to past knowledge and data on authentic research and literature. Impacts on ambient noise within the study area due to generation of unwanted noise from various sources during construction and operation of the plant have been predicted.

Impacts on demographic and socio-economic environment have been drawn from the data collected on project affected persons, employment potential incidental benefits, migration scenario etc.

1.4.5 ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. A project may have considered proper environmental measures but without a management plan to assure its proper implementation and function, the desired results may not be obtained. The EMP envisages the plans for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities. The following issues have been addressed in the EMP:



- Mitigatory measures for abatement of the undesirable impacts caused during operation stage.
- Details of management plans:
 - Green belt development plan
 - Solid waste management plan
- Institutional set up identified/recommended for implementation of the EMP
- Post project environmental monitoring programme including parameters, locations and frequency of monitoring and their implementation programme to be undertaken after commissioning of the project

1.5 SCOPE OF THE REPORT

The EIA is aimed at characterization of the existing environment in the study, prediction of the possible environmental impacts due to construction and operation of the terminal, recommendation of mitigatory measures and formulation of an effective Environmental Management Plan (EMP) to ensure an environmentally sustainable development.

1.6 STRUCTURE OF THE REPORT

The report contains analysis of primary field study/survey/monitoring data and secondary data, environmental impact assessment, mitigation measures, and EMP. The report completes with necessary tables, drawings and annexure. The structure of the report is as follows:

Chapter 1: Introduction, Background & EIA Methodology

Chapter 2: Project Description

Chapter 3: Baseline Environmental Scenario

Chapter 4: Environmental Impacts of the Project

Chapter 5: Environmental Management Plan



CHAPTER 2.0

PROJECT

DESCRIPTION

2.0 PROJECT DESCRIPTION

2.1 PROJECT HIGHLIGHTS

To meet the requirement of Finished Petroleum Products, HPCL has proposed a 437 km 18 "Dia minimum 6.4 mm thickness pipeline between Rewari to Kanpur. The pipeline will originate from existing marketing terminal at Rewari in Haryana and terminate at proposed new terminal of HPCL at Kanpur in Uttar Pradesh (U.P.) .

Various grades of Motor Spirit (BS IIIMS & BS IV MS), BS III High Speed Diesel (HSD) & BS IV HSD, Superior Kerosene Oil (SKO) are the different Petroleum products proposed to be pumped through the pipeline. Annual thrupt capacity for the pipeline is 3.17 MMTPA in phase I, (Year 2018-19)and 3.86 MMTPA in phase II (Year 2023-24) . However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area

Required facilities have been planned along the pipeline route depending on major consumer centres and other engineering requirements. New storage installation and receiving station are proposed to be constructed by HPCL at Kanpur in U.P., and existing facilities at Palanpur, Rewari, Bharatpur, and Mathura location will be utilized by augmenting more facilities for receiving products. The project components for the proposed Rewari Kanpur Pipeline are as follows:

Sr No.	Location	Pipeline	Terminal
1	Cross country Pipeline including SV & IP station	Rewari-Bharatpur- Mathura- Kanpur	-
2	Rewari	Pumping station & associated facilities	Existing installation will be utilised



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3	Bharatpur	Tapoff & Other associated facilities	Additional Tankage
4	Mathura	Tapoff & Other associated facilities	Additional Tankage
5	Palanpur		Additional Tankage
6	Kanpur	Receiving and associated Facility	New Storage and Distribution Terminal with Road and Rail loading facilities
7	Bahadurgarh	Pumping & associated facilities for pumping of Product from Bahadurgarh to Rewari	

The following storage, pumping, receipt and marketing terminals are proposed for receipt and marketing of the products:

- 1) Rewari - Receipt and Marketing Terminal (Existing facilities will be used)
- 2) Bharatpur- Tap-off & Other associated facilities
- 3) Mathura - Tap-off & Other associated facilities
- 4) Palanpur - Additional Tankage facilities
- 5) Bahadurgarh - Pumping & associated facilities
- 6) Kanpur- Proposed storage terminal.

The present report addresses the Palanpur terminal. At present, there is a well developed complex for the marketing facilities, wherein the additional tankage requirements of marketing terminal forming part of present project will also be satisfied within the same campus and so, in the present report, the discussion will be focussed on the facilities of existing terminal at Palanpur.

The present project, for which this Environmental Impact Assessment and Environmental Management Plan are formulated, involves the details of Palanpur Terminal which is located in the state of Gujarat.

The salient features of the terminal have been summarized in **Table-2.1** below.



Table-2.1 Salient Features of Palanpur Terminal

		Existing and Proposed Storage Tanks									Receipt Facilities	Loading facilities
		HSD BSIII	HSD BS IV	MS BSIII	MS BSIV	SKO	SLOP	MS BSIII	MS BSIV	HSD BSIV		
Palanpur	Existing Marketing Terminal	3(E)	3 (E)	2(E)	3(E)	2(E)	2(E)	1(P)	1(P)	1(P)	Pipeline (E)	TT loading (E)

TT – Tank Trucks (Road Loadings), E-Existing, P-Proposed

Road loading terminal also have small storage and injection facilities for dosage of Ethanol and various other additives like Furfural, Blue Dye, Power, Turbojet, Marker etc.

2.2 PIPELINES & STATIONS

2.2.1 SALIENT FEATURES OF THE MAIN PIPELINE

The salient features of the proposed Rewari- Kanpur petroleum product pipeline, which will be supplying the petroleum products to above terminals, has been summarized in **Table-2.2** below.

Table-2.2 Salient Features of the Main Pipeline

Name	Rewari- Kanpur Pipeline
Transport Material	MS BS III, MS BS I V, HSD BS III, HSD BS IV, and SKO.
Pipeline Length	437 km 18”Dia, min. 6.4mm thickness, carbon steel pipeline.
Take-off point	1) Existing Rewari Originating Terminal in Haryana (km0.0,253 mt. s AMSL)
Terminal Point	Proposed Kanpur Terminal of HPCL in U.P. (km 437 ,128 mt.s AMSL)
ROU	18 m
Operating Hours	8000Hrs./Annum
Pipeline	45 microns



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Roughness	
Pipeline Corrosion allowance	0.5mm
Pigging Facilities	Permanent pigging facilities at Rewari, Mathura, and Kanpur, suitable for "intelligent Pigging "shall be provided. Intermediate pigging stations at Saiyyadpur Pran.
Sub soil temperature	25° C throughout the length of the pipeline.
Surge Control	Suitable surge control/surge relief system shall be provided as per requirement of codes/ standards(ASME B31.4-2009Edition)
Pipeline corrosion protection System	Internal protection-Suitable corrosion inhibitor injection system will be provided .Also suitable automated system shall be provided for automated dosing rate. External Protection- Suitable coating shall be provided. Cathodic Protection by impressed current technique for buried portion of pipeline will be provided.
Corrosion monitoring system	Corrosion coupons shall be provided as per requirement including continuous monitoring of corrosion rate.
Sectionalizing Valve	Sectionalizing Valve shall be provided as per ASME B 31.4 & OISD relevant standard.
Design Margin	On flow: Nil. On length: 5% On elevation difference: 5%
Power supply	Power supply shall be taken from SEB. Battery back up shall be provided at all stations for emergency loads.



	Emergency power by DG sets, UPS supply for instrumentation, Telecom & SCADA at dispatch and receipt station.
Fire Fighting and Line maintenance	Fire Tender and gully suckers will be provided at Bharatpur, Mathura and Kanpur
Terminals	Rewari, Bharatpur, Mathura and Kanpur with tap off point and associated facilities.
States en-route	Haryana, Rajasthan & U.P.

2.2.2 PIPELINE ROUTE DESCRIPTION

The pipeline takes off at Rewari in Haryana and terminates at Kanpur in U.P. The length of the pipeline including main route is given in **Table-2.3**

Table-2.3 Length of the Pipeline Sections

SN	Section	Length(km)
1.	Main Line (Rewari to Kanpur)	437

2.2.3 SUMMARY OF PIPELINE DETAILS

Summary of the various pipeline parameters is given in **Table-2.4**

Table-2.4 Summary of Pipeline Details

Item	Details
Length (km)	Main line:437 km,
Line size & thickness	18" and 6.4-7.9 mm.
Pipe Material & Grade	Carbon steel
ROU (m)	18m
Throughput	3.17 MMTPA in phase I, (Year 2018-19) and 3.86 MMTPA in phase II (Year 2023-24) .
Burial Depth (m)	1.0 m to 1.2 m.



Pipeline Design Basis	ASME B 31.4 and OISD -141
Methods for rail/road/river/canal crossings	Horizontal Directional Drilling (HDD), boring and conventional methods as required.
Pipeline corrosion protection measures	<p>Three layers of external PE coating consisting epoxy, adhesive and Polyethylene having coating thickness 2.2 -3.5mm shall be provided.</p> <p>To avoid internal corrosion, corrosion inhibitor is injected at the rate of 6-12 ppm during product pumping.</p> <p>Cathodic Protection by Impressed Current Cathodic Protection (ICCP)system</p>
Communication System	Optical Fibre Cable(OFC)based telecom system
Leak Detection & protection system	<p>During construction, the welds will be radio graphed followed by hydro testing to ensure no leakage from pipe manufacturing source or construction work.</p> <p>During operation, SCADA with electronic leak detection soft ware based on pressure flow will be provided. This will also have necessary detectors to give necessary alarms and repeating of alarms at central control room, SCADA system along with telecommunication system and instrumentation system shall be supplied power through uninterrupted power supply source with 12 hours back up. Besides UPS, Diesel generators will also be installed in case of power failure for more than 12 hours.</p>
Inspection & Patrolling system	Periodical Inspection of ROU by Officers, periodical inspection of pipeline and coating health and regular patrolling of ROU by line walkers.

2.2.4 GEOGRAPHICAL LOCATION OF TERMINAL

Geographical locations of the Terminal is given in the **Table-2.5**



Table-2.5 Geographical Locations of the Terminal

Stations	RL (m)	Lat (N)	Long(E)	Village	District	State
Palanpur Terminal	190	24-12'	71-21'	Chandisar	Banskantha	Gujarat

2.2.5 SUMMARY OF STATION DETAILS AT TERMINAL

The summary of Pipeline station details at terminal location including type of station, facilities provided in the station are given in **Table-2.6**

Table-2.6 Station Details at Terminal

Station	Station Type	Facilities Provided
Palanpur	Pumping station and associated facilities.	Product Receipt Facilities. Pig Receiving facilities, Metering, Sump tank, Slop tanks

2.3 FACILITIES PROVIDED AT TERMINAL

Product Pump House, Manifold, Fire water Pump House, Two Tank truck Filling Gantrys, Calibration Facilities, Electric Room/MCC, D G yard, Transformer Yard, Lube Drum Yard and Grease Drum Shed, Lube Ware House, Marketing Room, Admin. Building, Control Room, Amenity, Parking, Sealing Platform, Effluent Treatment Plant, Security & Gate House checking Platform , Watch Tower (4 Nos), Compound wall, Emergency Gate-1 No., Drivers Toilet, Foam Tank Shed, Blue Dye Dosing System, Turbo jet Dosing System, Power Dosing System, Product Storage Tanks.

2.3.1 PUMPING & LOADING FACILITIES AVAILABLE AT PALANPUR TERMINAL

Product	Palanpur
HSD BS III	3 X 4800
HSD BSIV	2 X 2400



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MS BSIII	3 X 2400
MSBSIV	2 X 2400
SKO	2 X 2400
Slop	2 X 1200
U/G & HOR	7 X 300

2.3.2 SCHEDULE OF FACILITIES AVAILABLE AT PALANPUR TERMINAL

Item	Description	Size (M)	Area (SQM)
1	Product Pump House	5.5MX49M	269.5
2	Manifold	10MX49M	560
3	Fire water Pump House	19MX7.5M	142.50
4	Tank truck Filling Gantry	42.32MX14.6M	617.87
4A	Tank truck Filling Gantry	21.16MX14.6M	308.94
5	Calibration Facilities	12MX8M	96
6	Electric Room/MCC	30MX8M	240
7	D G yard	10MX10M	100
8	Transformer Yard	10MX10M	100
9	Lube Drum Yard and Grease Drum Shed	30MX15M	450
10	Lube Ware House	30MX15M	450
11	Marketing Room	12MX6M	72
12	Admin. Building, Control Room, Amenity	12MX24M	288
13	Parking	18MX6M	108
14	Sealing Platform	8MX9.6M	76.8
15	Effluent Treatment Plant	35MX25M	875
16	Security & Gate House checking Platform	4MX5M	20



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17	Watch Tower (4 Nos)	1.2MX1.2M	1.44
18	Compound wall	3M Ht. with Barbed Wire fencing	
19	Emergency Gate-1 No.	6M Wide	
20	Drivers Toilet	4.5MX3.25M	14.625
21	Foam Tank Shed	5.0MX4.0M	20.00
22	Blue Dye Dosing System	4MX8M	32
23	Turbo jet Dosing System		
24	Power Dosing System		

2.3.3 TANK TRUCK LOADING FACILITIES

The Tank Truck loading Gantry consists of loading bays & loading arms. Product wise distribution of loading arms envisaged in the Gantry of the Terminal is given in **Table-2.7**

Table-2.7 TT Loading Facilities in Terminal

Terminal	No. of Loading Bays	No. of Loading Arms for				
		HSD BSIII	HSD BSIV	MS BSIII	MS BSIV	SKO
Palanpur	12	8	2	4	3	3

Table 2.8 Salient Features of Existing and Proposed Tankages At Palanpur



Sr. No.	Item No	Description	Dimension	Remarks	Existing/ Proposed
1	TF-1,2,3 TF-6	FRVT 3173.2KL EACH HSDIII CLASS-B TF-6 CONVERTED FROM HSD-IV TO III	18MØ×14MHT.	API-650	Existing
2	TF-4,5	TANK FRVT 2918.8KL EACH HSD IV CLASS-B	18MØ×13MHT	API-650	Existing
3	TF-7,8	TANK FRVT 2603.8KL EACH MS III-CLASS-A	17MØ×13MHT	API-650	Existing
4	TF-9,10 TF-11	TANK FRVT 3602.4KL EACH MS IV CLASS A	20MØ×13MHT	API-650	Existing
5	TF-12 TF-13	TANK FRVT 1497.7KL EACH SKO CLASS -B	15MØ×10MHT	API-650	Existing
6	TF- 14,15	TANK FRVT 509.2KL EACH SLOP CLASS-A/B	10MØ×8MHT	API-650	Existing
7		U/G SUMP VESSELS (7 No.s) 70 KL EACH	3MØ×11MHT EACH	As per IS: 10987-92	Existing
	TS-1	MSIII,CLASS-A			
	TS-2	MSIV, CLASS-A			
	TS3,4,5	HSD III,HSD IV,SKO,CLASS-B			
	TS-6,7	ETHANOL CLASS-A			
8	W-1 W-2	FIRE WATER TANKS(2 Nos) ORVT-2228.5-each	14MØ×15MHT	API-650	Existing
				API-650	Existing
9	W-3	DISPLACEMENT WATER TANK	27.7MØ×15MH T	API-650	Existing
10	TF-16	MSIII,CLASS- A,FRV,4700KL	22MØ×14MHT	API-650	Proposed
11	TF-17	MSIV, CLASS-A,1700 KL	15MØ×13MHT	API-650	Proposed
12	TF-18	HSD IV,CLASS-B,3450 KL	20MØ×13MHT	API-650	Proposed

2.4 DESIGN BASIS FOR PRODUCTS FACILITIES

2.4.1 PRODUCT CHARACTERISTICS

POL Products to be handled/stored are: MS BS III, MS BS I V, HSD BS III, HSD BS IV and SKO

2.4.2 STORAGE FACILITIES

The storage facilities are planned to suit the minimum requirement of 1 Batch plus 5 days off-take at the terminal.



2.4.3 ROAD LOADING/RECEIPT FACILITIES

Product loading in Road tankers is through loading arms. Contingency provision is also made for unloading of product from road tankers and pumping into respective storage tanks.

2.4.4 APPLICABLE CODES & STANDARDS

- Laws – Codes & Rules as mandatory under the legislation of India, among others, but not limited to and due attention shall be paid to the following with amendments thereof :
 - a.OISD: Oil Safety Directorate
 - b. PMPA: Petroleum & Mineral pipeline Act, 1962
 - c. Railways./ Forest/NH/Other pipeline – Terms and conditions applicable.
 - d. Petroleum Act, 1934 and Rules 2002.
 - e. MoEF- Ministry of Environment and Forest.
- The set of laws- Codes and Rules that have been agreed between HPCL and the authorities for the implementation of the high pressure system where applicable.
- AMSE (ANSI) B 31.4 American Code and relating US code applicable for similar facilities.
- The” Rules of good practice” commonly used world wide OIL industry.

Table-2.9 Applicable Codes & Standards

S.N.	Code/Standard	Applicable for
1.	API 650/ IS803	For above ground storage tanks
2.	IS 10987	For underground storage tanks
3.	API 5L	For product pipes
4.	API 1104	For welding of pipelines and related facilities
5.	API 1110	Pressure testing of pipelines
6.	OISD 117	For fire fighting facilities
7.	OISD 118	Layout of Terminal Depots
8.	API 600	Gate Valves



9.	API 6D	Pressure Balanced Plug Valves
10.	BS 5351	Ball Valves
11.	ASME B16.9	Pipe Fittings
12.	ASME B16.5	Pipe Flanges
13.	API 610	Products Pumps

2.5 INSTRUMENTATION, CONTROL & COMMUNICATION SYSTEM

2.5.1 INSTRUMENTATION & AUTOMATION

The major activities will be performed by terminal are the following:

- a) Storage facilities for BSIII MS, BS IV MS, BSIII HSD, BS IV HSD, and SKO.
- b) Receipt of product through pipeline
- c) Road loading facilities
- d) Sump & Slop tanks
- e) Fire water pumps and make up water system

Full fledged Terminal Automation System (TAS) is envisaged for these units. These include:

- a) Tank Farm Management System (TFM)
- b) Terminal data management system
- c) Bay Queuing
- d) Tank Truck loading

TFM Automation

Tank Farm Management System (TFMS) is a part of Terminal Automation System. Each tank is provided with Radar type level transmitter, Multi Element averaging temperature sensor, Water/Product interface measurement and pressure transmitters for density measurement is also envisaged for additional facilities created at Rewari. The indication is available locally in the tank side display unit and in the TAS in the control room. Underground tanks are provided with Radar type transmitter. Data of the underground tank are available on the TAS. Volumetric data of each product are also being available as a part of tank farm management system.

Fire Water Pump Automation

Fire water pumps are diesel engine driven. Pumps are activated by remote manual call points located at various points in the terminal/depot. If the pressure developed by one pump drops



less than 7 kg/cm² second pump starts automatically. Three nos. of firewater pumps are operating. One pump is on stand by. Fire water pump automation is achieved through PLC. It is possible to operate the pumps manually too locally and from control room.

Make Up Water Pump Automation

Make up water system may be by means of bore well.

2.5.2 SHUT DOWN FEATURES

Emergency shut down is provided in the marketing terminal control room to stop all dispatch operation.

- Emergency push buttons to stop all road loading operations are provided in the middle gantry.
- Emergency push buttons to stop all loading operations in the terminal/depot are provided in the control room.

2.5.3 COMMUNICATION SYSTEM

Telecommunication system (interfaced with the public address system) along with Plant Communication System (PCS) is envisaged for the terminals. The communication system broadly comprises of the following:

- 1) Telephone exchange equipment and peripherals (EPABX) and Mobile Phones
- 2) Main Distribution Frame
- 3) Explosion proof and industrial type telephone instruments

2.6 FIRE PROTECTION SYSTEM FOR TERMINAL

2.6.1 SYSTEM DESCRIPTION

The following fire protection facilities are envisaged at terminals as per the requirements of OISD-117:

- a) Fire Water System – Pressurized at 7.0 Kg/cm²
- b) Foam system
- c) First Aid Fire Fighting Equipment and safety accessories
- d) Mobile Fire Fighting Equipment

2.6.2 FIRE PROTECTION FACILITIES

The facilities provided consist of the following units

- 1) Fire Water Storage Tanks
- 2) Fire Water Pumps and Jockey Pumps



- 3) Fire Water Piping
- 4) Fire Hydrants
- 5) Fixed Foam System
- 6) Water/foam Monitors
- 7) Fixed Water Spray Systems
- 8) Mobile Fire Fighting Equipment
- 9) Portable Extinguishers

The design of the fire water system is based on one single largest risk. **Table-2.10** presents the capacity of firewater tanks and pumps at different locations.

Table-2.10 Fire Water Tanks & Fire Fighting Pumps at Terminals

Terminal	Fire Water Tank		Fire Water Pumps	
	Capacity	Dia(m) x Ht(m)	No.	Capacity
PalanpurTerminal(Existing)	2x2228.5 KL	14x15	2W+1S	410m ³ /hr

*DCP/CO₂ extinguishers, water/foam monitors, personnel proactive equipment etc. are provided as per the prevailing OISD norms.

2.7 SAFETY, HEALTH AND ENVIRONMENT POLICY

Petroleum Industry occupies an important segment of our economy and is a source of large benefit to the society. In recent years, there has been a rapid increase in volumes handled to meet the increasing demand. Products such as, Euro III MS, Euro IV MS, Euro III HSD, Euro IV HSD, SKO and FO are highly flammable, and safety which forms an integral part of the industry, has always been given paramount importance.

Several Government authorities, both at the centre and state levels such as Inspectorate of Factories, Department of Explosives etc. are entrusted with the responsibility of ensuring safe handling and accident prevention measures. In spite of the measures, possibility of accidents either due to human errors and/or due to equipment/system failure cannot be ruled out. The lessons learnt from the disasters all over the world, made it essential to draw an Emergency Preparedness Plan to negotiate such eventuality. The imperative of Emergency Preparedness to minimize the adverse effects due to an unfortunate accident occurring in manufacture, storage, import and transport of any hazardous substance is thus well recognized by all concerns.



An Emergency Preparedness Plan is essential to obviate such an eventuality by providing the measures to contain the incident and minimize the after effects. To assist the Industry it is considered essential to provide the guidelines for preparing such plans based on the interactions within the oil industry.

Over the years the oil industry has developed and refined its own directives in the field of safety, health and environment which are to be followed stringently by their members. In addition to the environmental legislation, the OISD (Oil Industry Safety Directorate) makes it mandatory for its members to implement its directives on these issues. HPCL has thus formulated its own corporate policy on environment and safety which is followed in all its installations.

Table-2.11 Emergency Preparedness

Emergency communication facility	Three independent modes of communication viz dedicated OFC line and Land Line and Mobile Telephone are adequate for communication during any emergency.
Copy of Mutual Aid Agreements	Will be provided before commissioning.
Emergency Control Structure/organization chart of HPCL	Will be provided before commissioning. Sample control structure/ organization chart is provided in the Risk Analysis Report.
List of safety equipment available at site (e.g. fire proximity suits, SCBAs, First Aid etc)	Safety equipment like breathing apparatus, safety helmets, rubber gloves, fire extinguishers, fire proximity suits, first aid box will be made available at all control locations before commissioning as per OISD guidelines.
Details of emergency control centre and standby location.	Terminal control station at the respective location is designated to act as emergency control centre. First aid facilities with ambulance services will be provided to treat the affected people as and when



	need arises or to shift the injured to the nearby hospitals in case of any emergency.
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The same HSE Policy which is practiced presently by HPCL, will be adopted for transportation, storage and marketing of proposed petroleum products as well.

2.8 UTILITIES

2.8.1 POWER SUPPLY ARRANGEMENT

Power requirement will be fulfilled from the local grid. Provision for DG set is kept as back up arrangement for emergency power only. The Estimated Power Requirement is given in table 2.12

Table:2.12 Power Supply Requirement

Station	Requirement (KVA)	Source	Back up DG sets for Emergency Power (KVA)
Palanpur (Existing)	420	66 KV (Grid)	525

2.8.2 MAKE UP WATER SYSTEM

The source of water for the make up water system is bore wells. Water from the bore well is collected in sump. From the sump water will be pumped by self priming pumps installed on top of the sump and distributed through a network of buried GI pipes to individual HDPE overhead tanks of Amenities buildings, Admin building, drivers rest room etc. and to the fire water storage tanks.

2.8.3 EFFLUENT TREATMENT PLAN (ETP)

The Effluent Treatment Plant receives oily water through a separate drain line connecting tank farms, TT Gantry area, Pump house manifold area etc. The plant includes a Primary separation unit consisting of a bar screen, Titled Plate Interceptor and Belt type oil skimmer. Subsequently Effluent will be pumped to Filtration unit using a multimedia filter and coalescing filter. The slop oil collected will be pumped to the slop tank. The capacity of the existing ETP is 75KL/hr at Palanpur terminal.



CHAPTER 3.0

BASELINE

ENVIRONMENTAL

STATUS

3.0 BASELINE ENVIRONMENTAL STATUS

3.1 TOPOGRAPHY AND GEOLOGY

3.1.1 TOPOGRAPHY

Palanpur Terminal

The Palanpur Terminal is located 7 km West of Palanpur Town along Palanpur-Deesa section of NH-14 at KP 329.500 of the pipeline route. The terminal site is a piece of industrial land within HPCL premises of existing well developed terminal for MDPL, which is bounded by NH-14 on the Northern side and Palanpur-Kandla railway track on its southern side. The geographical location of the site is 24 12' N Latitude and 72 21' E Longitude and 190 msl.

3.1.2 GEOLOGY

3.1.2.1 GENERAL DESCRIPTION

Palanpur Terminal area is surrounded by ultra basic igneous rocks, which was formed during the Paleo-Meso-Proterozoic epoch, which is part of Kumbhalgarh Group of Delhi Super Group.

3.1.2.2 SEISMICITY

Palanpur Terminal is located in Zone IV (having severe seismic intensity) and will have risk of potential damage due to earthquake.

3.2 SOIL

3.2.1 SOIL MONITORING STATIONS

To assess the impacts of the developmental activities on the soils in the terminal area, the physico-chemical characteristics of soils within the study area have been examined by obtaining soil samples from selected points and analysis of the same.



Sampling station in the terminal was selected for studying soil characteristics, the location of which is listed in **Table-3.1**

Table-3.1 List of Soil Quality Monitoring Station

SI NO.	Location Code	Location Soil Sampling Point
1	SQ1	Existing Palanpur HPCL Terminal

3.2.2 METHODOLOGY OF SOIL MONITORING

Soil samples representing premonsoon period were collected during April to May 2011. A number of parameters were determined which are indicative of physical, chemical and fertility characteristics. Sampling and analysis was conducted as per the standard methods.

3.2.3 SOIL CHARACTERISTICS IN THE STUDY AREA

The physico-chemical characteristics of the soils in the study area, as obtained from the analysis of the soil samples, are presented in **Table-3.2**

The physical properties examined include texture, specific gravity, bulk density, and moisture content and percentage grain size distribution.

As per Triangular Classification System, texture of soils of all the sampling locations can be described as sandy loam, loam and silty loam. Silty soils are permeable and well drained but are less water retentive and hence need more frequent irrigation for successful crop growth than fine textured clay soils. The clay fractions control most of the important properties of the soils. They consist of high specific surface and are most reactive. They also have high capacity to retain water and nutrients. The silt particles are intermediate between sands and clays. Mineralogical silt particles are similar to those of sand, as they are largely composed of primary minerals.

Table-3.2 Physico-Chemical Characteristics of Soil in the Terminal

Sr.No.	Parameter & Unit	Palanpur
	Physical Parameters:	
1.	Texture	Greyish Brown Silty Sand
2	Natural Moisture Content (%)	3.739



3	Grain size distribution	
	a) Sand (%)	56.6
	b) Silt+ Clay(%)	43.4
	Chemical Parameters:	
4	pH	8.35
5	Conductivity(μ mhos/cm)*	246.0
6	Organic Matter(%)	0.32260
7	Nitrate (%)	0.000730
8	Calcium(%)	0.010421
9	Magnesium(%)	0.004618
10	Sodium(%)	0.023750
11	Potassium(%)	0.000150
12	Chloride(%)	0.029991
13	Sulphate(%)	0.001350

3.2.4 FERTILITY STATUS OF SOIL

Soil in the terminal area is generally slightly alkaline with pH range of 8.35. The observed level of pH is not expected to hinder the growth of agricultural crops and forests.

Soil of Palanpur indicate moderate to good fertility or agricultural potentials of the soils. The levels of other elements were appreciably good.

3.2.5 CROPPING PATTERN AROUND THE TERMINAL AREA

Mainly cultivated land with Wheat and Bajra cultivation around the location. Palanpur area is irrigated due to network of canals and deep tube wells and also witnesses rain fed irrigation and cultivate (wheat, jowar and bajra), pulses (gram, moong,) & cumin, cotton, fodder crops (barseem etc).



3.3 LAND USE

Land use pattern highlights the environmental quality of a particular area. It is an important indicator of environmental health, intensity of human activity and degree of interaction between the two. Land use pattern is significantly influenced by the nature of soil, water availability and also climate conditions of the area.

However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

3.3.1 Land Use Pattern in the Terminal Area

Based on the terrain configuration, surface and features and land use in the terminal area is presented in **Table-3.3**

Table-3.3 Land Use Pattern

Terminal & Location	Terrain and Land use	Communication
Palanpur Terminal Village-Chandisar District-Banaskantha State-Gujarat	Flat terrain and undulating terrain ground with seasonal Nala, Drains and Rivers. Surface soil is silty clay. Mainly cultivated land with Bajra, jowar, cumin and cotton field interspersed with open scrubs.	Communication System is Good.

3.4 WATER QUALITY

3.4.1 WATER QUALITY MONITORING STATIONS

Ground water has been found as an important source for catering the local needs of water consumption for various purposes, mainly domestic & drinking in the terminal area. With this view, ground water quality monitoring station was identified for the monitoring and assessment of ground water quality. Groundwater monitoring stations designated as GW1 was located at the existing terminal where the terminal is constructed.

However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and



conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

The locations of the ground water quality monitoring stations is listed in **Table-3.4**

Table-3.4 List of Ground Water Quality Monitoring Stations

SN	Code	Location	Source
1	GW1	Palanpur Terminal	Bore well

3.4.2 METHODOLOGY OF WATER QUALITY MONITORING

Water sample was collected in the month of May 2011 from terminal station during the one season study period.

The sample was analyzed for relevant physical, chemical and bacteriological parameters for drawing up the baseline data. All the basic precautions and care were taken during the sampling to avoid contamination. Analysis of the samples was carried out as per established standard methods and procedures prescribed by the CPCB and relevant IS Codes.

3.4.3 GROUND WATER QUALITY IN THE TERMINAL AREAS

The ground water sources monitored was tube wells of boring (water being drawn through pump). Since the ground water is used without treatment by a large portion of population, the quality of ground water is of more concern. The ground water quality monitoring results are statistically analyzed in **Table-3.5** All the ground water samples exhibited limited variation of temperature which is the typical characteristics of ground water.

Table: 3.5 Ground water quality monitoring results

Parameter & Unit	Units	Palanpur
pH		7.70
Temperature	°C	26.7
Chloride	mg/l	299.91
Sulphate	mg/l	13.50
Carbonate	mg/l	0.0



Bicarbonate	mg/l	395.00
Total Hardness	mg/l	450.00
Total Alkalinity	mg/l	395.00
Calcium	mg/l	104.21
Magnesium	mg/l	46.18
Nitrate	mg/l	7.30
Turbidity	NTU	<0.12
Sodium	mg/l	237.50
Potassium	mg/l	1.50
Phosphate	mg/l	0.05
Total Suspended Solids	mg/l	<2.0
Total Dissolved Solids	mg/l	1075.00

Palanpur Terminal

Ground water of Palanpur terminal area is moderate in nature. The levels of TDS, total hardness are observed tolerable when compared with the prescribed limit for drinking water. The physico-chemical quality satisfies the limit of the Drinking Water Standards. So from quality point of view it can be concluded that the water is free from contamination.

The monitoring results for salient water quality parameters are listed in **Table-3.5**

3.5 METEOROLOGY

3.5.1 CLIMATE AND SEASONS

The town of Palanpur experiences three seasons overall and these are the seasons of summer, winter and monsoon. Summers in the town of Palanpur are very hot and dry, and winters are very cold, thus the region experience two extremes through the year.

Summers in the town of Palanpur extend through the months of March, April, May and June. This time of the year experiences a very dry climate, as the region falls under the semi arid



category. The maximum temperature during the summer months will be around forty degrees (40°C) and the minimum temperature will be around twenty seven degrees (27°C). Days will be blazing hot and nights will be cold.

The region of Palanpur does not experience heavy showers during monsoon, and the monsoon months of July, August, and September will experience moderate showers. The temperatures will come down by a significant amount during this time in Palanpur.

The weather during winters in Palanpur will be cold and dry, devoid of any rain. The maximum temperature during the winter will range around twenty two degrees (22°C) and the minimum temperature will range around five degrees (5°C) to fifteen degrees (15°C) during winters.. Winters in Palanpur are from October-January.

Temperature

In Summer, it's hot and humid with an average temperature of 42 Degrees with hot sandy winds. In Winter, it's 5 to 15 degrees, which is quite cold as compared to other cities in Gujarat.

Wind

Winds are generally light with some strengthening in force during the summer and the southwest monsoon seasons. During the southwest monsoon season, winds blow mostly from the west or southwest. Towards the end of the southwest monsoon season, north- westerly appears and in the next four months winds are mostly from directions between northwest and east. In February and March, winds in the mornings are from directions between northwest and northeast, while in the afternoons they are from directions between southwest and northwest. In April and May, winds are mainly from directions between southwest and northwest, as observed during field studies.

Mean wind speed is 8.0 km/hr for summer season and most of the time wind blows with speed in the range of 3.3-13.7 km/hr.

Prominent wind direction in different seasons

Season	Prominent wind directions
Summer	Southwest-Northwest
Monsoon	West-southwest
Post – Monsoon	Northwest
Winter	Northeast-Northwest



Rainfall

The average rainfall in the study area is about 20 to 30 inches per season.

Humidity

It is dry in the summer months particularly April to May. As the climate of Gujarat is humid, there is no significant drop in the humidity level during the summer months and ranging between 49-73% in the morning and 20-35% in the evening.

3.6 AIR QUALITY

3.6.1 AMBIENT AIR QUALITY MONITORING STATIONS

Sampling station was set up for monitoring of ambient air quality in and around the terminal area. The location of the monitoring station was selected so as to accord an overall idea of the ambient air quality scenario in the terminal area. The location of the monitoring station was based on preliminary analysis of the meteorological conditions, particularly predominant/frequent wind directions, Logistic considerations such as accessibility, security, and availability of reliable power supply etc. were examined while finalizing the location of such station.

The location of the ambient air quality monitoring station are summarized in **Table-3.6**

Table-3.6 Details of Ambient Air Quality Monitoring Station (AAQMS)

Sl No	Stn Code	Location of Monitoring Station
1	AAQ1	At the Administrative Building of Existing Palanpur HPCL Plant .

3.6.2 PARAMETERS, FREQUENCY AND MONITORING METHODOLOGY

Monitoring was conducted in respect of the following parameters:

- PM₁₀
- PM_{2.5}
- Sulphur Dioxide (SO₂)
- Oxides of Nitrogen (NO₂)
- Carbon Monoxide (CO)
- Lead (Pb)



- Ammonia (NH₃)
- Ozone (O₃)
- Arsenic
- Nickel
- Benzene
- Benzopyrene
- Hydrocarbon

Fine Particulate Samplers and Respirable Dust Samplers have been used to collect samples for PM₁₀ & PM_{2.5} in ambient air at a constant flow rate of 1.0 m³/hr. The ambient air was sucked through the wins impacters and filter paper by a blower. Samples of gases were drawn at a flow rate of 0.2 liters per min. and were analyzed in the laboratory.

PM₁₀ & PM_{2.5} have been estimated by gravimetric method (IS: 5182 P-IV 1999). Jacobs-Hochheiser method (IS-5182 Part VI, 2000) has been adopted for the measurement of NO₂. Modified West and Gaeke (IS-5182 Part II 2001) have been adopted for measurement of SO₂ and CO, Lead and Ammonia were analyzed by APHA method (2nd ed.)

The Ambient air quality monitoring methodology are summarized in below Table

Methodology for Ambient Air Quality Monitoring

Parameter	Measurement Methods
PM ₁₀	Gravimetric
PM _{2.5}	Gravimetric
SO ₂	Colorimetric (EPA modified West & Gaeke Method)
NO ₂	Colorimetric (Arsenite modified Jacobs & Hochheiser Method)
CO	Non Dispersive Infra Red (NDIR) Spectroscopy Technique
Pb	By AAS
NH ₃	Colorimetric
O ₃	Colorimetric
Arsenic	AAS
Benzene	Gas Chromatography Based Continuous Analyzer
Benzopyrene	Gas Chromatography Based Continuous Analyzer



Parameter	Measurement Methods
PM ₁₀	Gravimetric
Nickel	AAS
Hydrocarbon	Gas Chromatography Based Continuous Analyzer

3.6.3 MONITORING RESULTS

The detailed on-site 24-hourly monitoring results of PM₁₀, PM_{2.5}, SO₂, NO_x and other parameters) corresponding to air quality stations AAQ1, is presented in **Table-3.7**

3.6.4 AMBIENT AIR QUALITY IN THE TERMINAL AREA

Palanpur Terminal

Ambient Air Quality Monitoring Results of Palanpur Terminal has been summarized in **Table-3.7** Arithmetic mean values of the 24-hourly average values of PM₁₀ and PM_{2.5} were 23.0 µg/m³ and 6.0 µg/m³ respectively. From the following table it can be concluded that 24-hourly average SO₂ and NO_x levels were observed to be within the limit of 80 µg/m³ for industrial area as stipulated in the National Ambient Air Quality Standards and the PM₁₀ & PM_{2.5} levels were also within the limit of 100 µg/m³ & 60 µg/m³ respectively.

Table-3.7 Ambient Air Quality Monitoring Results of Palanpur Terminal

3.7.1 Analysis data for parameters Particulate matter (PM₁₀), Particulate matter, (PM_{2.5}) and Nitrogen dioxide (NO₂)

Sr. No	Code	Sampling Location	Parameters		
			PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	NO ₂ (µg/m ³)
01	AAQ1	Existing Palanpur Terminal	23.0	6	15
NAAQ Standards for Industrial Residential ,Rural and other area (24 hourly)			100	60	80
NAAQ Standards for ecologically and sensitive area(24 hourly)			100	60	60
Below Detection Limit (BDL)			<5.0	<5.0	<5.0



Table: 3.7.2 Analysis data for parameters Sulphur dioxide(SO₂), Carbon monoxide(CO), and Ozone(O₃)

Sr. No	Code	Sampling Location	Parameters		
			SO ₂ (µg/m ³)	CO (µg/m ³)	O ₃ (µg/m ³)
01	AAQ1	Existing Palanpur Terminal	10.0	BDL	BDL
NAAQ Standards for Industrial Residential , Rural and other area (24 hourly)			80	02	100
NAAQ Standards for ecologically and sensitive area(24 hourly)			80	02.0	100
Below Detection Limit (BDL)			<5.0	<0.1	<5.0

Table: 3.7.3 Analysis data for parameters Lead (Pb), Ammonia (NH₃) and Benzene(C₆H₆)

Sr. No	Code	Sampling Location	Parameters		
			Pb (µg/m ³)	NH ₃ (µg/m ³)	C ₆ H ₆ (µg/m ³)
01	AAQ1	Existing Palanpur Terminal	BDL	BDL	BDL
NAAQ Standards for Industrial Residential ,Rural and other area (24 hourly)			1.00	400	05
NAAQ Standards for ecologically and sensitive area(24 hourly)			1.00	400	05
Below Detection Limit (BDL)			<0.01	<1.0	<0.1



Table: 3.7.4 Analysis data for parameters Benzoapyrene(Bap), Arsenic (As), Nickel (Ni) and Hydrocarbon(HC)

Sr. No	Code	Sampling Location	Parameters			
			Bap ($\mu\text{g}/\text{m}^3$)	As ($\mu\text{g}/\text{m}^3$)	Ni ($\mu\text{g}/\text{m}^3$)	HC ($\mu\text{g}/\text{m}^3$)
01	AAQ1	Existing Palanpur Terminal	BDL	BDL	BDL	BDL
NAAQ Standards for Industrial Residential ,Rural and other area (24 hourly)			01	06	20	-
NAAQ Standards for ecologically and sensitive area(24 hourly)			01	06	20	-
Below Detection Limit (BDL)			<0.01	<1.0	<1.0	<0.05

Intpretation

It is inferred from the analysis of various parameters at location sampled that the results are well within the limit prescribed by MoEF and CPCB published in Gazette of India , New Delhi, dated November 18, 2009 as shown in above tables.

3.7 NOISE

3.7.1 NOISE MONITORING STATIONS

To assess the background noise levels in the terminal area ambient noise monitoring was conducted in the area. A location has been selected for measurement of present status of ambient noise levels, covering industrial and residential areas.

3.7.2 METHODOLOGY OF NOISE MONITORING

During construction phase, noise shall be generated through Vehicle movement, construction activities, etc. There will not be any increase in noise during operation phase of the pipeline project. However, the expected noise levels will be in the range of 34.6 -45.2 dB (A) and shall be further attenuated by appropriate measures.

To measure the existing noise sources and to identify the background noise levels, the noise pollution survey around the proposed pipeline was carried out. The collection of baseline noise environment data included Identification of noise sources and to measure background noise levels and Measurement of noise levels due to transportation and other local activity. The noise



monitoring was carried out at the same locations as air monitoring. Refer Table: 3.8 for details of noise monitoring location.

3.7.3 NOISE LEVELS AT MONITORING STATIONS

Specific studies reveal that noise levels in industrial areas are generally within the prescribed limits in respect of commercial, residential during certain hours. The problem is more conspicuous near the traffic intersections and commercial centers. As the activities of RKPL project are proposed to be within the already existing terminal of MDPL, the location for monitoring air quality is selected within the premises (industrial category) ,where the source of maximum noise is likely to be during the construction and operation phase of the project.

The noise levels for Palanpur terminal is presented below in Table: 3.8

Table 3.8: Noise Monitoring

Sr. No.	Station Code	Noise Monitoring location /village name	Category of Area/Zone	Noise levels in dB(A)	
				Maximum	Minimum
1.	NQ1	Palanpur Terminal	Industrial	45.2	34.6

3.7.4 APPLICABLE NOISE STANDARDS

Table 3.9: Applicable Noise Standards

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential area	55	45
D	Silence zone	50	40

Note 1 Day time is reckoned in between 6 am and 10 pm.

Note2 Night time reckoned in between 10 pm and 6 am.



- Note 3 Silence zone is defined as areas up to 10 meters around such premises as hospitals, education, institutions and courts. The silence zones are to be declared by the Component Authority.
- Note 4 Mixed categories of areas should be declared as one of the four above-mentioned categories by the Component Authority and the corresponding standard shall apply.

3.8 ECOLOGY

Natural flora and fauna are organized into natural communities and constantly interact with their physical environment as well as among themselves. They show various responses and sensitivities to outside influences. Hence, for a meaningful assessment it is necessary to study changes in status of the plant and animal resources. The information about flora & fauna of the terminal site has been collected. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

3.8.1 ECOLOGICAL ASSESSMENT METHODOLOGY

The main objective of ecological survey is to study the baseline status of flora and fauna in terrestrial and aquatic ecosystems under the study area. Information has also been collected from different Government organizations such as Forest Department, Social Forestry, etc. On the basis of onsite observations as well as Forest Department records, a checklist of flora and fauna was prepared.

3.8.2 FLORA OF THE STUDY AREA

Actually, Palanpur terminal of Rewari Kanpur Pipeline Project is located on route of already existing Mundra Delhi Pipeline project. The location of terminal is in Banaskantha district of Gujarat State.

However, the terminal at Palanpur is far away from Blaji- Ambaji wild Life Sanctuary, which is also located in Banaskantha district, the following description is given for Biodiversity of Banaskantha district inclusive of Balaji- Ambaji Wild Life Sanctuary.

Table 3.10: List of Flora in the study area

Sr. No.	Scientific Name	Common Name
1	<i>Acacia Catechu</i>	Khair/ Kaththa
2	<i>Acacia nilotica</i>	Babool
3	<i>Aegle marmelos</i>	Bel
4	<i>Anogeissus sp.</i>	Dhaura



5	<i>Boswellia serrata</i>	Gunj
6	<i>Butea monosperma</i>	Palash/ Dhak
7	<i>Dendrocalamus strictus</i>	Baans
8	<i>Diospyros melanoxylon</i>	Tendu
9	<i>Holoptelia integrifolia</i>	Kangu
10	<i>Lannea spp.</i>	Jhingan
11	<i>Madhuka indica</i>	Mahua
12	<i>Pongamia pinnata</i>	Karanj
13	<i>Prosopis cineraria</i>	Khejri
14	<i>Sterculia urens</i>	Kulu
15	<i>Syzygium cumini</i>	Jamun
16	<i>Tectona grandis</i>	Teak
17	<i>Terminalia sp.</i>	Arjun
18	<i>Wrightia</i>	Indrajav
19	<i>Zizyphus sp</i>	Ber

3.8.3 FAUNA OF THE STUDY AREA

Actually, Palanpur terminal of Rewari Kanpur Pipeline Project is located on route of already existing Mundra Delhi Pipeline project. The location of terminal is in Banaskantha district of Gujarat State.

However, the terminal at Palanpur is far away from Balaji- Ambaji wild Life Sanctuary. The following description is given for Biodiversity of Banaskantha district inclusive of Balaji -Ambaji Wild Life Sanctuary.

Panther is the top carnivore which roams freely in the diverse habitat conditions. Sloth bear, the flagship species of this sanctuary has his most favorite home in rock encapments and undisturbed vallies. The other areas are dotted by Stripped Hyena, Panther, Jungle cat, Jackal, Indian Fox, Neelgai, Common Langur, Bats, Porcupines etc. Major reptile species that are found in the forest include Indian Cobra, King Cobra, Russell's Viper, Indian Turtle, Scaled Vipers, Monitor Lizard etc.

Table 3.11: List of Avi Fauna in the study area

Sr. No.	Scientific Names	Common Name
1	<i>Aeredotheres tristis</i>	Indian Myna
2	<i>Aeredotheres ginginianus</i>	Bank Myna
3	<i>Centrspus sinensis</i>	Crow-Pheasant
4	<i>Coconia cinonia</i>	European white stork
5	<i>Columba ivia</i>	Blue rock pigeon
6	<i>Corvus macrohynchos</i>	Jungle Crow
7	<i>Corvus splendens</i>	House crow
8	<i>Dandrotta vegabunda</i>	Tree pie



9	<i>Dicrurus adsimilis</i>	Black drongo
10	<i>Dinophum benghalense</i>	Golden backed woodpecker
11	<i>Egretta garzetta</i>	Common egret
12	<i>Egretta gularis</i>	Western Reef Egret
13	<i>Elanus caeruleus</i>	Black winged kite
14	<i>Eudynamys scolopacea</i>	Asian Koel
15	<i>Gallus sonneratil</i>	Red Jungle Fowl
16	<i>Gyps indicus</i>	Long billed Vulture
17	<i>Haliastur indus</i>	Brahminey Kite
18	<i>Himantopus himantopus</i>	Black winged stilt
19	<i>Lanius excubitor</i>	Grey Shrike
20	<i>Lanius vittaous</i>	Bay backed shrike
21	<i>Merops orientalis</i>	Ware tail bee eater
22	<i>Milvis migrans</i>	Black kite
23	<i>Milvus Migrans</i>	Pariah kite
24	<i>Motacilla alba</i>	White wagtail
25	<i>Motacilla flava</i>	Yellow wagtail
26	<i>Motacilla maderatensis</i>	Large pied wagtail
27	<i>Nectarinia asiatica</i>	Purple rumped Sunbird
28	<i>Nectarinia minima</i>	Small Sunbird
29	<i>Oriolus oriolus</i>	Golden oriole
30	<i>Orthotomus sutorius</i>	Tailor Bird
31	<i>Pandion haliaetus</i>	Osprey
32	<i>Passeer domesticus</i>	House Sparrow
33	<i>Pavo cristatus</i>	Peacock
34	<i>Ploceus philippinus</i>	Baya Weaver Bird
35	<i>Pernis ptilorhynus</i>	Oriental honey buzzard
36	<i>Psittacula krameri</i>	Rose ringed Parakeet
37	<i>Pycnonotus cafer</i>	Red vented Bulbul
38	<i>Sternus Pogadarum</i>	Brahminy Myna
39	<i>Sternus contra</i>	Pied Myna
40	<i>Streptopelia chinesis</i>	Spotted Dove
41	<i>Streptopelia decaocto</i>	Ring Dove
42	<i>Streptopelia senegalensis</i>	Little Brown Dove
43	<i>Terpsiphone paradise</i>	Paradise Flycatcher
44	<i>Turdoides caudatus</i>	Common babbler
45	<i>Upupa epops</i>	Hoopoe
46	<i>Vanellus indicus</i>	Red wattled Lapwing

3.8.4 AQUATIC FAUNA OF THE STUDY AREA

No wetland or water body has been diverted for the purpose of construction of the additional three tankages at the existing terminal. Aquatic ecosystem has not been met with at the terminal location.



3.8.5 SOCIO-ECONOMIC PROFILE OF STUDY AREA

The socio-economic profile of the study area based on Census of India data of 2001 is classified into following points:

- Population and dwelling units,
- Social profile,
- Education,
- Health and medical infrastructure,
- Drinking water facilities,
- Communication facilities

3.8.5.1 POPULATION AND HOUSEHOLDS

The statistics regarding the human population (male/female classification) and the no: of households in the district within the study area is given in below Table 3.12

Table 3.12 Population and Households in the study area

District	Total Population	Male	Female	Sex Ratio	Households
Banaskantha	2504244	1297404	1206840	930	426781

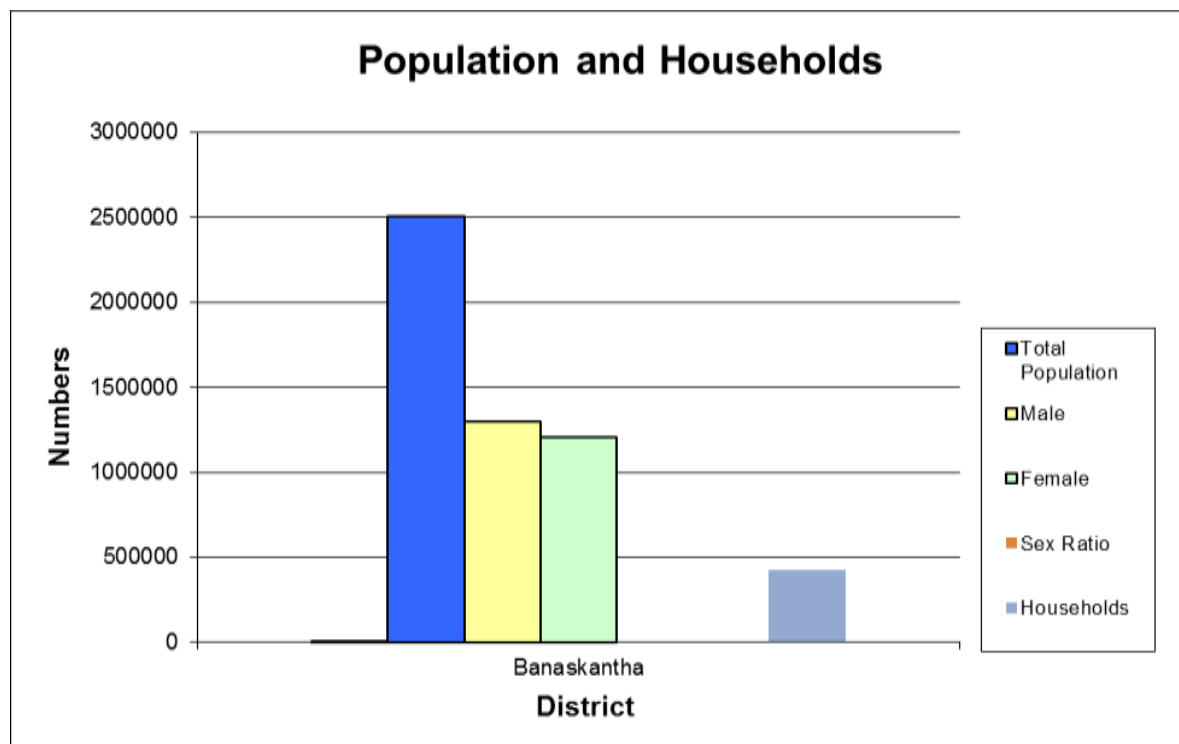


Fig 3.1 Population and Households in the study area



3.8.5.2 SOCIAL PROFILE

The statistics regarding the social profile of the human population as per 2001 census in the district within the study area is given in below Table:3.13

Table :3.13 Social profile in the study area

District	Total Population	SC Population	% SC	ST Population	% ST
Banaskantha	2504244	271484	10.84%	205904	8.22%

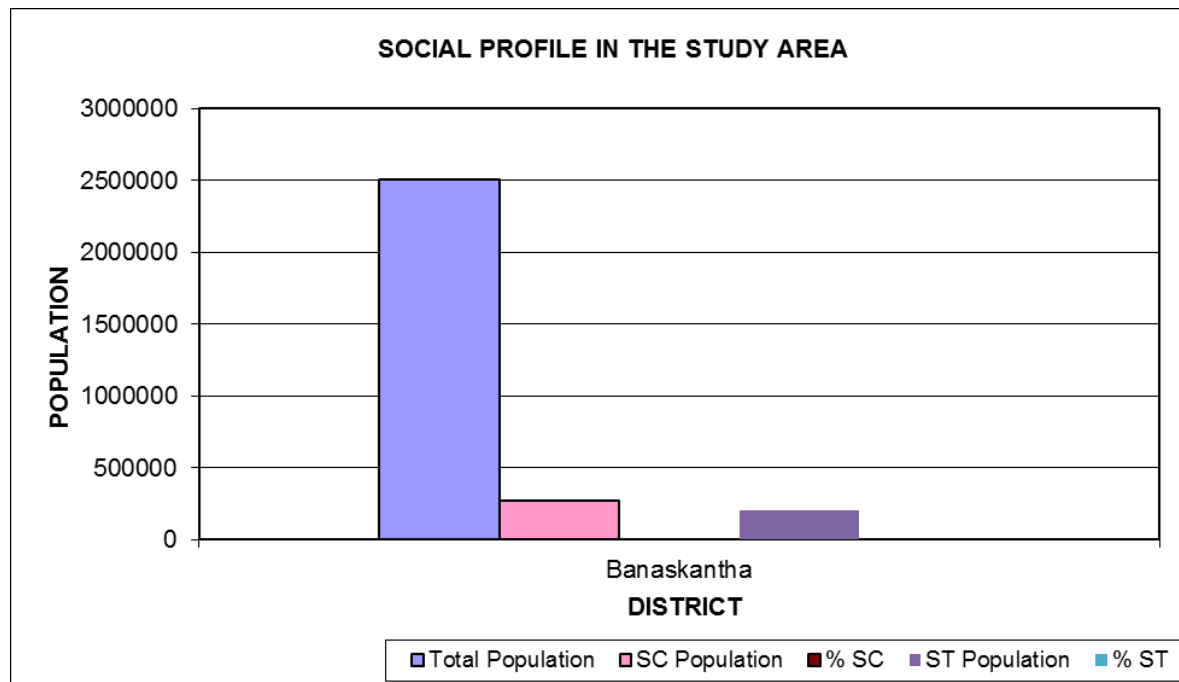


Fig 3.2: Social profile in the study area



3.8.5.3 LITERACY AND EDUCATION

The literacy in the district within the study area is presented in below Table :3.14

Table 3. 14 Literacy and Education in the study area

District	Male			Female			Total Population		
	Literates	Male Literacy %	Total	Literates	Female Literacy %	Total	Literate	Total Literacy %	Total
Banaskantha	699080	66.47	1297404	338539	34.40	1206840	1037619	50.97	2504244

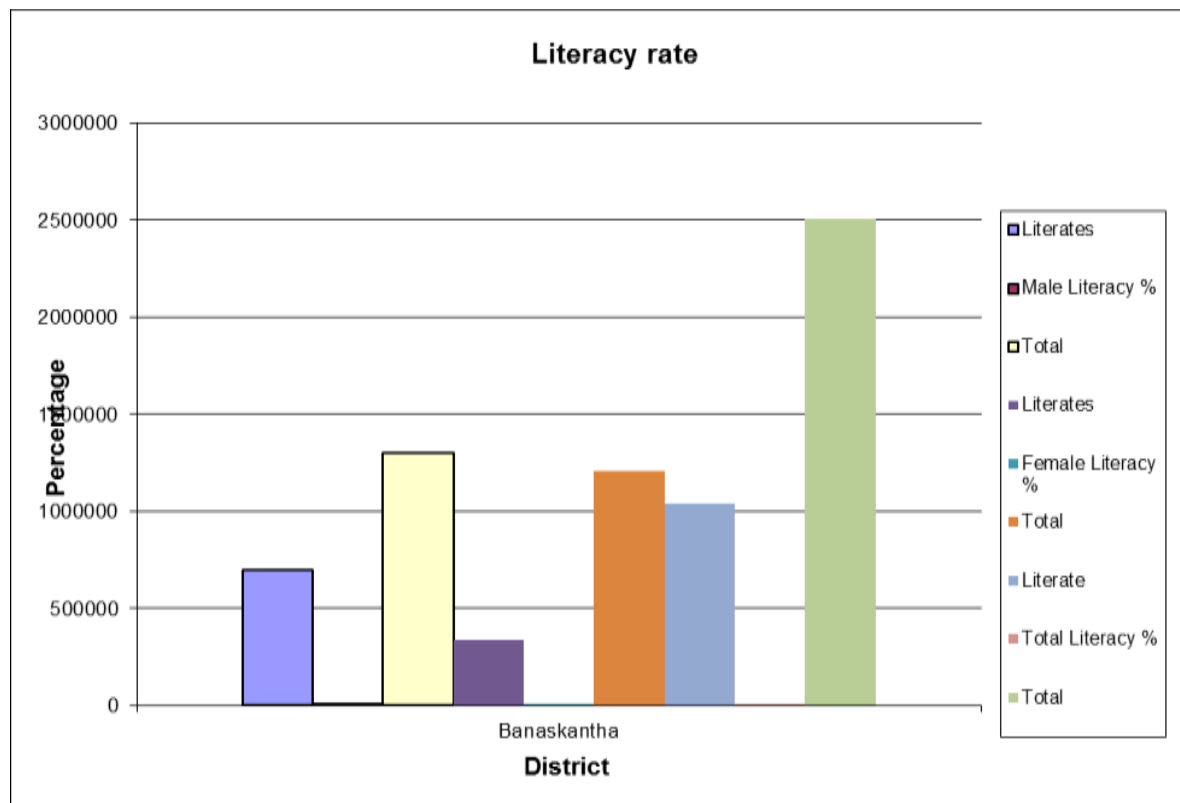


Fig 3.3 Literacy and Education in the study area



3.8.5.4 HEALTH AND OTHER INFRASTRUCTURE

The health and medical infrastructure facilities within the study area is presented in below Table:3.15

Table 3.15 Health and Power supply in the study area

District	No. Of villages	Medical facility	Primary Health Centre	Primary Health Sub-Centre	Power supply	Domestic (Electricity)	Agriculture (Electricity)
Banaskantha	1244	523	61	252	1225	328	197

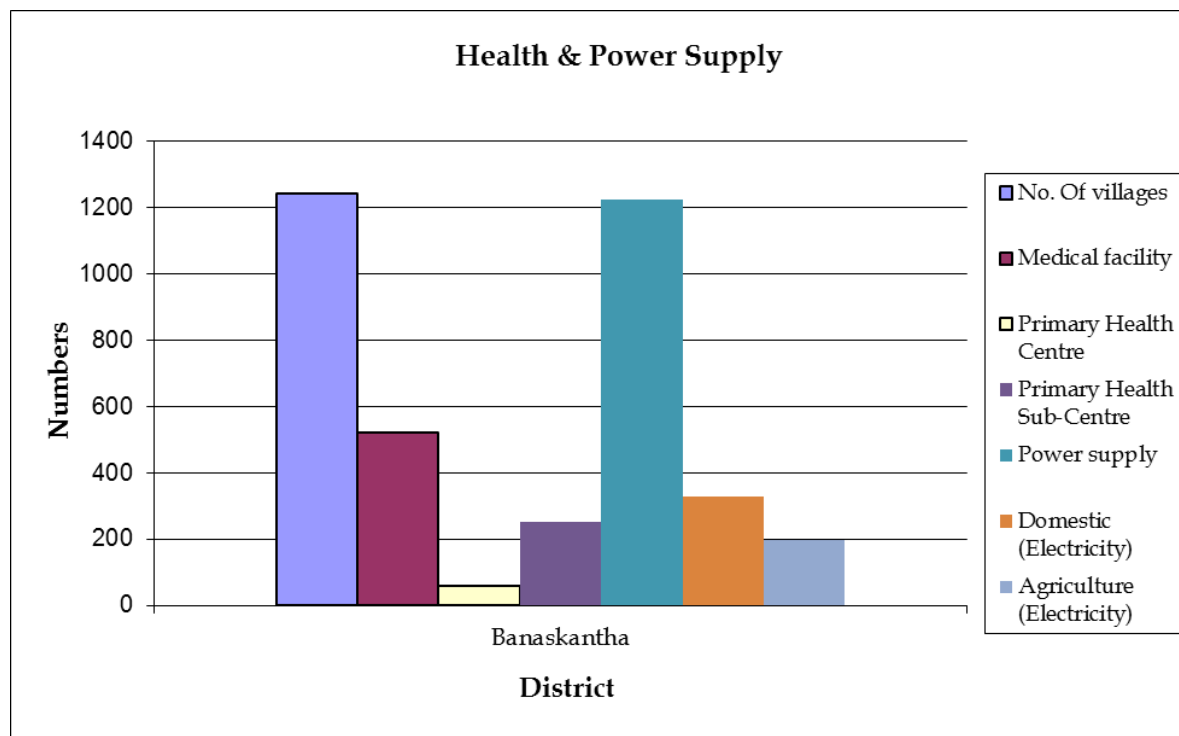


Fig 3.4 :Health and Power supply in the study area



3.8.5.5 DRINKING WATER AND EDUCATION FACILITIES

The drinking water and education facilities within the study area is presented in the below Table:3.16

Table 3. 16 Drinking water and Education facilities in the study area

District	No. Of villages	Drinking water facilities	Primary Schools	Middle schools	Secondary schools	College
Banaskantha	1244	1242	1217	Nil	198	4

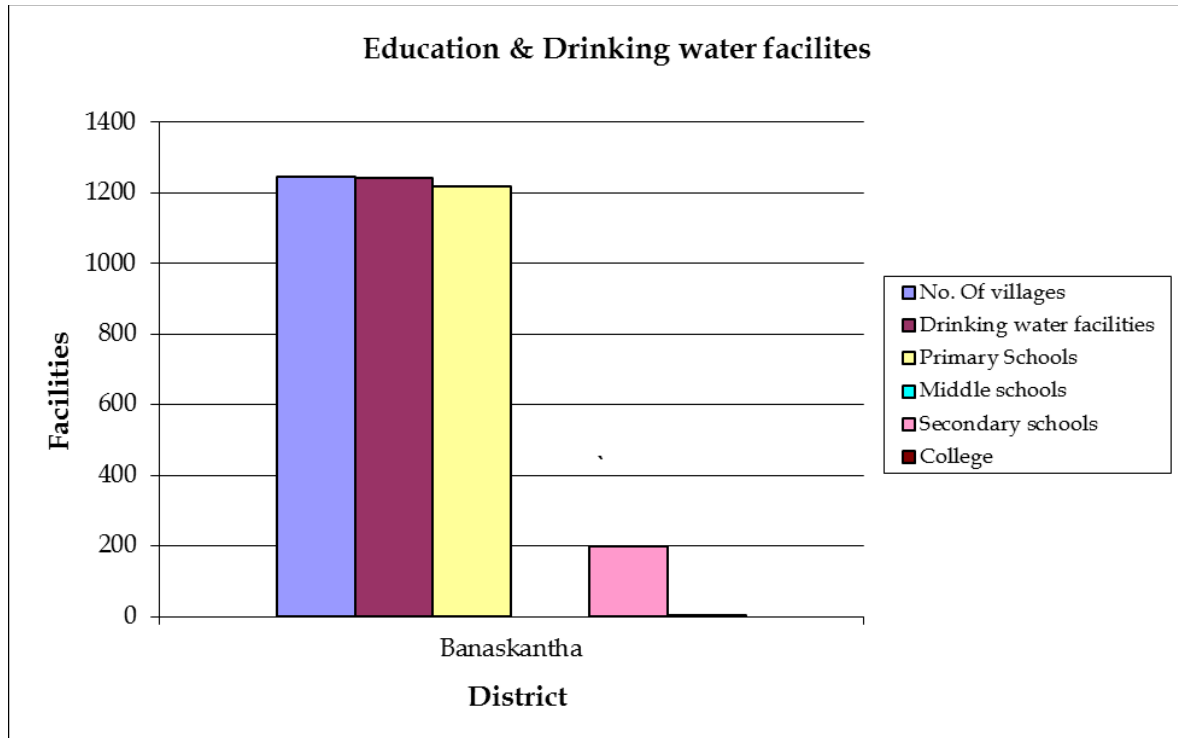


Fig 3.5: Drinking water and Education facilities in the study area



3.8.5.6 TELECOMMUNICATION , POST AND TELEGRAPH FACILITIES

The Telecommunication , Post and Telegraph Facilities with in the study area is presented in given below Table:3.17

Table 3.17 Telecommunication, Post and Telegraph Facilities in the study area

District	No. Of villages	Post, Telegraph	Bus services	Paved approach road	Mud approach road
Banaskantha	1244	954	1114	1066	729

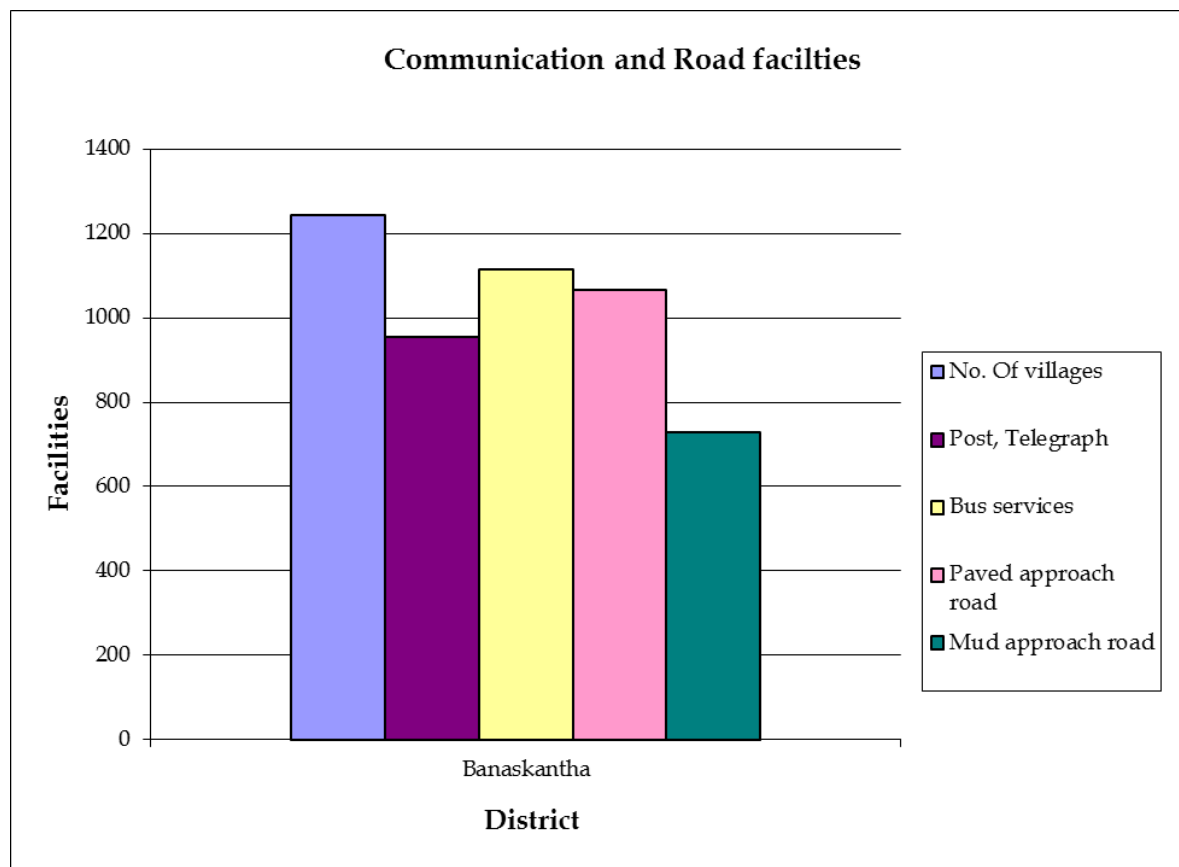


Fig 3.6: Telecommunication, Post and Telegraph Facilities in the study area

3.8.6 ECOLOGICALLY SENSITIVE AREAS

No Ecologically Sensitive Areas such as Nation Parks, Sanctuaries or Biosphere Reserves exist in the vicinity of the terminal area. No well defined corridor of wildlife movement or routes of wildlife migration has been reported by the Forest Department of concerned State Governments around the terminal site.



CHAPTER 4.0

ANTICIPATED

ENVIRONMENTAL

IMPACTS

4.0 ENVIRONMENTAL IMPACTS OF THE PROJECT

Identification of impacts is followed by recommendations of appropriate cost effective mitigation measure. These impacts along with mitigation measures are given in the following sections. The impacts have been assessed over the study area of 3 km radius of the terminal. Overall impacts in the regional context are negligible unless stated otherwise.

However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

4.1 PROJECT ACTIVITIES

The proposed project envisages limited additional construction activities, and envisages using existing facilities by rescheduling only depending upon actual operational requirements, hence, marginal environmental impacts during construction and operational phase are envisaged.

4.1.1 ACTIVITIES DURING CONSTRUCTION PHASE

The proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade.

Earth excavation work, material storage, transportation and handling of construction materials, and wind erosion are the major factors that would produce a temporary, localized increase in Particulate Matter levels. The increased movement of heavy vehicles carrying construction materials, operation of DG sets as standby power back up system would generate gaseous emissions. The degree of dust generated would depend on the soil compaction and moisture content of the ground surface during construction. Dust and exhaust particulate emissions from heavy equipment operations would temporarily degrade air quality in the immediate construction zone.



4.1.2 ACTIVITIES DURING OPERATIONAL PHASE

The main activity during operation is transportation of petroleum products (MS BS III, MS BS IV, HSD BS III, HSD BS IV, & SKO) through the pipeline under pressure and storage at receipt terminal.

Project activities during operation phase include transportation of petroleum products through the pipeline under pressure and storage at receipt terminal. These activities will result in marginal and temporary enhancement of chemical hazards and significant socio-economic benefits. There will have as such no other sources of pollution and negative impacts.

Therefore, operation phase activities would have moderate impacts on socio-economics. It could also develop minor impacts on noise.

The main impacts of operation phase are chemical hazards and enhanced risk level and socio-economic benefits having long term impacts.

Impacts on discreet environmental attributes during operation phase have been discussed below along with suitable mitigation measures

Impacts on discreet environmental attributes have been discussed in the following sections.

4.2.1 IMPACTS DURING CONSTRUCTION PHASE

Earth excavation work, material storage, transportation and handling of construction materials, and wind erosion are the major factors that would produce a temporary, localized increase in Particulate Matter levels. The increased movement of heavy vehicles carrying construction materials, operation of DG sets as standby power back up system would generate gaseous emissions. The degree of dust generated would depend on the soil compaction and moisture content of the ground surface during construction. Dust and exhaust particulate emissions from heavy equipment operations would temporarily degrade air quality in the immediate construction zone.

Mitigation measures

- The water sprinkling for suppression of dust will be practiced as per requirement.
- The construction activities will be done during day time to reduce noise levels if it exceeds more than stipulations.
- The local laborers will be employed to the possible extent for reducing population shifts as per requirements.
- However, in view of the limited construction activities, the impacts during construction phase are envisaged to be temporary, marginal and reversible.



4.2.2 IMPACTS DURING OPERATION PHASE

Project activities during operation phase include transportation of petroleum products through the pipeline under pressure and storage at receipt terminal. These activities will result in marginal and temporary enhancement of chemical hazards and significant socio-economic benefits. There will have as such no other sources of pollution and negative impacts.

Therefore, operation phase activities would have moderate impacts on socio-economics. It could also develop minor impacts on noise.

The main impacts of operation phase are chemical hazards and enhanced risk level and socio-economic benefits having long term impacts.

Impacts on discreet environmental attributes during operation phase have been discussed below along with suitable mitigation measures.

4.3.1 IMPACTS ON SOIL

Soil erosion is an environmental factor, which is likely to degrade the project area and generate dust. Soil erosion is mainly influenced by vegetation cover, land use pattern, intensity of rainfall, drainage condition and soil characteristics. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

Mitigation Measures

- The soil conditions of the project site would be allowed to stabilise during this period after the impacts of the construction phase/ gardening.
- The top soil in non-built up areas of the terminals would be restored and such portions of the site would be subjected to plantations which would help in bounding together of the soil, thus increasing its strength.

4.3.2 IMPACTS ON LAND USE

Following the construction phase, the temporarily modified land use pattern would gradually stabilize itself during the operation stage.

The terminal site, consists of built structures, neatly landscaped leading to a pleasing outlook. Moreover, the piece of land being situated amid few other existing industries has mingled with the immediately adjacent land use of the area. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities



already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

Mitigation Measures

- Land released from the construction /gardening activities would be put to economic and aesthetic use to hasten recovery from adverse impacts.
- Plantation of trees in the open spaces will be undertaken which would add a different dimension and would provide a visual comfort.
- Original shape and top soil of the non-build up area of the terminal will be restored.

Solid Wastes

Solid waste from the terminal will be mainly domestic scraps and sludge settled from oil water separator.

Mitigation Measures

- Sludge would be disposed in a secured area within the plant premises. This would ensure no leaching or percolation into ground water. Also as the waste would be confined within the plant premises, there will be no impact on the outside land environment.
- Domestic solid wastes in the form of scraps , papers, plastics, cardboards etc. will be collected ,segregated and reused /disposed off approximately (recycle, reuse and composting/landfill)

4.3.3 IMPACTS ON WATER USE

Water will be required mainly for firewater service and domestic requirements only.

As a mandatory requirement, adequate water will be stored for fire fighting in fire water storage tanks in terminals. However, this water demand is for emergency use and not a continuous type of water use.

Regular water requirement would be for additional domestic requirement (as potable and sanitation water for maximum 25 persons) and for gardening, cleaning and maintenance. Therefore, the water requirement at the terminal is nominal and will be met by extraction of ground water through bore wells. As the terminal is located away from the settlements and there are no other users in the close vicinity, extraction of little amount of water for domestic purpose is not expected to have any tangible impact on the ground water resources as well as on the surrounding users as far as water use is concerned.



4.3.4 IMPACTS ON WATER QUALITY

As the project does not involve any production process, there will be no process wastewater as such. The industrial effluent generated from oil water separator will be reused for gardening/washing purposes.

The drainage from the premises due to storm water or routine cleaning and maintenance could possibly contain some suspended solids and traces of oil escaped during handling. In order to arrest any solids and oil from the site drainage, the same would be led to catch pit and then oil water separator. Treated effluent would be reused for gardening/washing purposes.

The sanitary wastewater including any canteen waste will be led to septic tank followed by soak pit to assure necessary treatment and to meet the regulatory standards. The effluents will be completely treated and their quality will conform to the prescribed discharge standards. Treated effluent would be reused for gardening/washing purposes it may therefore be concluded that no impact is likely on the surface or ground water quality due to operation of the said project. However, the proposed activity as a part of RKPL pipeline project will be addition of three tanks within the premises of existing terminal facilities already developed for MDPL project, and conversion of one tank storage material from HSD IV to HSD III grade. This will have marginal impact on the environment of the area.

4.3.5 IMPACTS ON AIR QUALITY

The mean 24-hourly average baseline level of PM₁₀, PM_{2.5}, SO₂, HC and NO_x monitored in and around the project site. With exception of the particulate matter (PM₁₀), which can be attributed to the arid condition of the area and high wind speed, such levels are within the permissible limits of respective pollutants for industrial as well as residential areas as stipulated in the latest National Ambient Air Quality Standards.

As the project does not involve any production activity but only receipt, storage and dispatch of petroleum products, there is practically no source of continuous emissions from the industrial operations. Undesirable pollutants will be generated mostly by Tank Trucks plying in the terminal area and nominally by DG sets during power cut, and occasionally fire water pump engines etc. However, such impact will only be confined within the terminal area and as such; no significant incremental increase in the existing concentrations of air pollutants is expected from the industrial activities to be carried out at the plant premises. This will have negligible impact on the ambient air quality outside the terminal premises. As a result, the post operational concentrations of PM₁₀, PM_{2.5}, SO₂, HC, and NO_x in ambient air are expected to remain around the present day levels and thus within the stipulated standards.

Mitigation Measures



- It will be ensured that all the vehicles have vehicular emission within the permissible limits, and engines turned off while standing/waiting.
- Regular monitoring of ambient air quality will be carried out at fixed interval.
- Trees will be planted around the terminal area, which will act as a sink for air pollutants.
- Stack height and emission for the DG Set will be as per CPCB/SPCB stipulations.

4.3.6 IMPACTS ON NOISE

There will be no such significant machine/industrial noise during operation of the project except the continuous noise of pump enclosed in pump house. The movement of Tank Trucks and cars in the area and blowing of their horns would contribute to the machinery noise. However, neither its sound intensity nor its duration is expected to be large enough to cause significant impact. Residential areas are quite far away. This would imply that no impact of such noise is likely to be felt by the local people.

Though operational activities is not expected to cause any undue disturbances to the people living in the proximate areas outside the plant boundary, impacts on persons working very close to the noise sources like pumps are likely.

Mitigation Measures

- Administrative office would be located away from the pump house and major road traffic.
- Impacts of noise on workers shall be minimized through adoption of adequate protective measures in the form of (a) use of personal protective equipment (ear plugs, ear muffs, noise helmets etc.), (b) education and public awareness, and (c) exposure control through the rotation of work assignments in the intense noise areas (above 90dBA).
- Low noise equipment should be used.
- It would be ensured that all the equipment used are properly maintained to keep noise within the permissible limits.
- Blowing horns within the terminal are prohibited in normal situation.

4.3.7 IMPACTS ON ECOLOGY

Landscaping involving plantations of carefully chosen trees, shrubs and herbs would be undertaken in and along the boundary. This would not only restore any loss in ecology of the area, but also sufficiently enhance the floral status around the site.

No tangible effect is expected to be felt on the surface water quality in the study area due to the project. As such, the existing aquatic biota is not expected to suffer any undue stress due to the said activities.



4.3.8 IMPACTS ON SOCIO-ECONOMICS

Employment Opportunity

No permanent resident is expected within the project boundary. Employees and staff of Palanpur terminal would contribute to negligible increase in total population in the area. However, the impacts on the demographic fabric of the area due to low number of such migrant people will be negligible.

Economic Boost Up

Large beneficial impacts in terms of gross economic yield shall accrue. In addition gross economic yield shall increase through increase in high-income group and through marketing multiplier effect. The benefits accrued shall be obviously considerable in local as well as regional context.



CHAPTER 5.0

ENVIRONMENTAL MANAGEMENT PLAN

5.0 ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. The present chapter on Environmental Management Plan envisages the management plan, which is going to be adopted for the terminal of the Pipeline Project for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities.

The following issues have been addressed in this EMP:

- Mitigatory measures for abatement of the undesirable impacts caused during the constructions and operation stage.
- Details of management plans (Green belt development plan, Solid waste management plan etc.) institutional set up identified/recommended for implementation of the EMP
- Post project environmental monitoring programme to be undertaken after commissioning of the project

5.1 MITIGATORY MEASURES

The major impacts due to different project activities and their mitigation measures have been identified in Chapter-4. These measures together constitute part of Environmental Management Plan (EMP). The environmental mitigation measures for operation phase has been given below:

5.1.1 DURING OPERATION

The following environmental protection/mitigation measures shall be adopted during the operation stage of the project:

- To control water pollution:
 - The drainage from the premises due to storm water or routine cleaning and maintenance would be led to catch pit to arrest suspended solids and then oil water separator to trap any traces of oil and clear treated effluent would be reused for gardening/washing purposes. Excess effluent, if any, would be let out of the premises, after satisfying the stipulated regulatory standards.
 - Septic tank and soak pit for sanitary wastewater.



- As the proposed activities at Palanpur depot will be carried out in already existing well developed depot of HPCL, the additional sewerage, domestic wastes in liquid forms will be disposed off in already existing treatment and drainage system at Palanpur depot.
- The Effluent Treatment Plant receives oily water through a separate drain line connecting tank farms, TT Gantry area, Pump house manifold area etc. The plant includes a Primary separation unit consisting of a bar screen, Titled Plate Interceptor and Belt type oil skimmer. Subsequently Effluent will be pumped to Filtration unit using a multimedia filter and coalescing filter. The slop oil collected will be pumped to the slop tank. The capacity of the existing ETP is 100KL/hr at Palanpur terminal.
- To control air pollution:
 - Stack height and emission for the DG Set will be as per CPCB/SPCB stipulations.
 - It will be ensured that all the vehicles have vehicular emission within the permissible limits, and engines turned off while standing/waiting.
 - Regular monitoring of ambient air quality will be carried out at fixed interval.
- To control pollution due to solid wastes:
 - Suitable disposal of other domestic solid wastes from the plant will be done. The bio degradable and non-biodegradable solid wastes will be separated and disposed off suitably.
- To control noise pollution:
 - Proper maintenance and acoustic enclosure for pumps, and DG sets
 - Personal protective equipment for people working in high noise areas
 - Blowing horns within the terminal area will be prohibited.
- Green belt will be maintained properly round the year including replacement of the decayed trees and raising of seasonal flowering plants.
- Adequate safety measures complying with the occupational safety manuals to prevent accidents/hazards to the workers.
- Undertaking appropriate periphery and community development programmes in the vicinity.
- Undertaking all necessary pollution control measures to maintain the emissions and discharges within the prescribed/stipulated limits.

Other special mitigation measures particular to terminal projects:

- Full fledged Terminal Automation System (TAS)
- Full fledged fire fighting facilities comprising fire water storage tanks and pumps, piping and fire hydrants, fixed foam system, water/foam monitors, fixed water spray systems,



mobile fire fighting equipment, portable fire extinguishers, fire detection and alarm system etc.

- Adequate safety equipment will be available at terminals.
- OFC based dedicated communication system (including data and voice mail)
- Detail Emergency/Disaster Management Plan (DMP) will be prepared and implemented.

5.2 DETAILS OF MANAGEMENT PLANS

5.2.1 GREENBELT DEVELOPMENT PLAN

Green areas not only improve the floral status and land use as well as the aesthetic look of the area, but also serve the dual purpose of filtering any fugitive dust from unpaved or open areas and also help to abate the noise effects through dampening effects and replenish the oxygen and ameliorating the surrounding temperature. Therefore, development of green belt is nowadays imperative around industrial complexes.

As per environmental policy of MOEF, ten times the trees will be planted against one tree cut for project development. 25% of the total area of the terminal would be covered by Green belt.

Adequate plantation programme in and around the project site have been planned and will be adopted in order to enhance the aesthetic look of the area as well as to compensate for any loss in flora during construction. Considering the inadequacy or limitation of space, a nominal green belt has been considered along the periphery in addition to few small patches of green belt has been considered in the unutilized open spaces. Development of green belt will include:

- 1) Plantation along the boundary/periphery of the terminal complex for protection against particulate dispersion and noise dispersion. The peripheral green belt will vary in width to suit the plant design requirement (refer plot plans where green belt has been shown).
- 2) Plantation along approach road and pathways for protection against noise and vehicular emissions and for aesthetics.
- 3) Block plantation in some available open areas.
- 4) Landscaping and grass plantation on open unpaved areas to prevent erosion of soil.

The following general guidelines and measures will be adopted:

- Felling of existing trees will be minimized.
- The plantation of trees will be initiated with start of the construction stage so that substantial growth may be achieved when the project is completed.
- The greenbelt development programme will be drawn to conform to natural climate conditions and adaptability of the species.



- Species involved in plantation should include indigenous, fast growing and sturdy plant species having economic value.
- Proper drainage system and proper plantation techniques should be adopted.
- Plantation should be properly maintained and protected by fencing from grazing and felling.

The plantations would consist of a mixture of carefully chosen locally available species of trees, shrubs and herbs, preferably evergreen and resistant to pollution. The plant species will be selected based on criteria such as being indigenous, fast growing, sturdy, perennial, evergreen and having economic, medicinal or ornamental values, morphological characteristics (height, crown and flowering) availability of local species, resistant to pollutants and adverse environmental conditions, plant layout, climate conditions, water availability etc. Due regard for reasons of fire hazard would be given to tree species which are less littering in nature.

Common indigenous tree species suggested for green belt development are *Acacia nilotica* (Babul), *Acacia catechu* (Kher), *Butea frondosa* (Palas), *Cassia fistula* (Garmalo). Besides this, ornamental trees such as *Bougainvillea glaba* (Bougainvillea), *Bougainvillea spectabilis* (Bougainvillea), *Caesalpinia pulcherrima* (Gultura), *Tecoma stans* (Yellow Bells), *Nerium indicum* (Kaner), *Musanda glabra* (Musanda), *Hibiscus rosasinensis* (Jaswand), *Delonix regia* (Gulmohar) could be planted.

5.2.2 SOLID WASTE MANAGEMENT PLAN

Solid waste from the terminal will be mainly domestic scraps and sludge settled from oil water separator.

- Sludge would be disposed in a secured area within the plant premises. This would ensure no leaching or percolation into ground water. Also as the waste would be confined within the plant premises, there will be no impact on the outside land environment.
- Domestic solid wastes in the form of scraps and papers would be disposed as per the prevailing practice in the area.

5.3 INSTITUTIONAL SET UP

5.3.1 KEY PLAYERS FOR IMPLEMENTATION OF EMP

The responsibility for designing the mitigative measures are delegated to the **Hindustan Petroleum Corporation Ltd. (HPCL)**, whose role in present context, is to mobilize the appropriate expertise to mitigate the adverse impact.



Forest Department, Government of Gujarat would provide advice the project proponent in green belt development at the project site.

Department of Environment & Forests (DOEF), and **State Pollution Control Board**, Govt. Of Gujarat, would help for sorting out various environmental issues arising out of the different project activities.

The responsibility of environmental management of the project lies mainly with Site Incharge who acts as a coordinator for environmental matters.

5.3.2 SAFETY & ENVIRONMENT OFFICER (SEO)

The responsibility of environmental management lies mainly with the **Safety & Environment Officer (SEO)** at site, who acts as a coordinator for safety & Environmental matters and supervises the proper implementation of the EMP. The SEO acts as a nodal officer for various groups at project and head quarters as well as outside agencies like State Pollution Control Board and other Govt. Departments.

Functions of SEO:

- Co-ordination with statutory bodies, various departments in the project site, head quarters, etc.
- Environmental compliance with statutory guidelines and statutory requirements at the project site during operation stages.
- Obtaining consent order from the State Pollution Control Board (SPCB)
- Testing/monitoring of functions of the pollution control systems and environmental field monitoring and analysis in and around the project during operation under post project environmental monitoring programme.
- Maintenance of environmental database, analysis of environmental data, preparation of report, and transmission of report to statutory authorities, head quarters etc.
- Interactions for evolving and implementation of modification programmes to improve the efficiency of pollution control devices/systems.
- Environmental appraisal (internal) and environmental audit thru recognized external agencies.
- Procurement of equipment for pollution control and their testing
- Landscaping and greenbelt development in the project area.
- Water supply and sanitation at the project site
- Looking after occupational safety and health aspects in absence of safety officer
- To strengthen the public image of the company in respect of social aspects and maintain good relationship with community in the vicinity.



- Organizing environmental training, workshops, seminars etc.

Regular training programmes will be organized to train up the project staff in various environmental and project related issues. Specialists from various fields of environment, health, and project would impart the training. The training would mainly focus on how to handle problem areas.

The monitoring and analysis of various environmental parameters and safety measures will be carried out as per the guidelines laid down by Govt. Of Gujarat and Govt. of India.

The SEO will regularly monitor the pollution during the operation stage. The State Pollution Control Board (SPCB) will make occasional checks.

5.4 POST PROJECT ENVIRONMENTAL MONITORING

It is imperative the Project Authorities set up regular monitoring stations to assess the quality of the neighboring environment after the commissioning of the project. An environmental monitoring programme is important as it provides useful information and helps to:

- Verify the predictions on environmental impacts presented in this study.
- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures, and
- Identify the effectiveness of mitigative measures suggested in the EMP

5.4.1 MONITORING PROGRAMME

After commissioning of the project, post project monitoring of environmental parameters will be carried out at regular intervals. The monitoring programme in different areas of the environment has been based on the findings of the impact assessment studies. The post project monitoring programme including areas, number and location of monitoring stations, frequency of sampling and parameters to be covered is summarized in **Table-5.1** and are elaborated in this section. The monitoring will be the responsibility of SEO.

Ambient Air Quality: Ambient air quality would be monitored outside the plant boundary, in order to compare and ensure the ambient air quality is maintained within the stipulated limits.

Stack Emission: Monitoring of stack emissions for the DG sets will be conducted on a regular basis to ascertain the emissions are within the stipulated limits. Maintenance and servicing will be conducted regularly as required.

Effluents: Quality of all disposable effluents would be monitored on a regular basis for the first year of operation in accordance with relevant parameters to ascertain the effluent quality meets the stipulated limits for discharge.



Table-5.1 Post Project Environmental Monitoring Programme

SN	Parameter	Monitoring Location	Frequency
1.	Air Quality: PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , HC	Inside & outside the plant	Twice in a week for 2 weeks in each season and as per requirement of SPCB
2.	Stack emission: Particulates, SO ₂ , NO _x	All DG stacks	Once in a season and as per requirement of SPCB
3.	Noise Levels: a) Ambient day and night time Leq outside plant boundary b) 8-hourly Leq in work zones	a) Location outside the plant b) Location inside the plant	a) Once in a season and as per requirement of SPCB b) Once in a season and as per requirement of SPCB
4.	Liquid effluents: All parameters prescribed in standards for discharge of effluents into inland surface water	All effluent discharges from the plant	Once in a season and as per requirement of SPCB

Note: Plant means terminal premises.

Noise: Ambient noise levels would be monitored outside the plant boundary, in order to compare and ensure that the ambient noise levels are maintained within the stipulated limits. In addition, noise levels at appropriate locations close to the industrial noise sources within the plant will also be monitored to ensure that the noise levels in work zones is within the permissible exposure limits to workers.

Fire: Automatic fire and Smoke detectors would be provided at various strategic locations within the plant premises.

The post-operational monitoring programme and environmental affairs would be taken care of by a competent person nominated by the Plant Manager.



5.4.2 INSTITUTIONAL SET-UP FOR MONITORING

The post operational monitoring programme will be under the supervision of the SEO at the project site. Monitoring can be get carried out by outside recognized laboratories.

5.5 OTHER RELATED ASPECTS

5.5.1 FIRE AND SAFETY MANAGEMENT

Necessary fire fighting facilities will be provided in the project site to tackle any fire contingency. Regular safety audits will be carried out for improving safety performance. On – site and off-site Disaster Management Plans (DMP) will be developed and mock drills will be conducted at regular intervals to keeps the disaster management team in a state of full preparedness. In addition, refresher training programme will be conducted at regular intervals for employees and selected contractor laborers to enhance their safety awareness and preparedness.

5.5.2 LEGAL AND STATUTORY COMPLIANCE

All the environmental standards/ stipulation will be fully complied with. The plant has to obtain yearly Consent from the State Pollution Control Board for liquid wastes disposal as per Water (Prevention & Control of pollution) Act and Air (Prevention & Control of Pollution) Act. It will be supervised that all requirements under these acts and rules are met, and if not met, the satisfactory explanations for it are sought. The officer in charge for environmental aspects will prepare these reports.

5.5.3 DOCUMENTATION AND QUALITY ASSURANCE

All the monitoring data, environmental and safety and health related, will be stored in systematic manner so that the specific records are easily available as required. A quality assurance plan will be developed that includes all reference methods for monitoring, relevant analytical technique, calibration of equipment, standard of reagents, collection and presentation of results, frequencies of monitoring etc.

5.5.4 INFORMATION DISSEMINATION AND PUBLIC RELATIONS

Everybody nowadays is concerned about environment. This requires a well planned public relation and information dissemination process so that unnecessary public intervention is avoided. This can be done through community in environmental projects (like tree plantation) etc. The management in the project will be entrusted with all these responsibilities.

5.6 OCCUPATIONAL HEALTH AND SAFETY MEASURES

In large projects, pipeline project in particular, where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance, the men, materials



and machines are the basic inputs. Along with the boons, the industrialization has brought several problems like Occupational Health and Safety (OHS). The industrial planner, therefore, has to properly plan and take the steps to minimize the impacts of industrialization to ensure appropriate occupational health and safety including fire.

The occupational health problems envisaged in this case in construction stage can mainly be due to noise and accident. The problems of occupational health, in the operation and maintenance phase are due to accidents. To overcome these hazards following occupation health and safety measures will be undertaken:

- Arrangements will be made to reduce noise levels within limit.
- Suitable personnel protective equipment shall be supplied to workers.
- First aid, ambulance service, and medical check up facilities will be provided.
- A qualified and experienced safety officer will be employed to ensure safety at site.
- Safety training will be provided regularly by the safety officer.

5.6.1 PERSONNEL PROTECTIVE EQUIPMENT

The workers will be given the following suitable personnel protective equipment while working in high noise and hazard prone areas:

- 1) Industrial safety helmets/ Crash helmets
- 2) Face shield/Welders equipment for eye and face protection
- 3) Goggles
- 4) Ear plug/Ear muffs
- 5) Breathing apparatus
- 6) Safety suits
- 7) Hand gloves
- 8) Gum boots/Safety shoes

5.6.2 MEDICAL FACILITIES

First aid facilities with ambulance services will be provided to treat the affected people as and when need arises or to shift the injured to the nearby hospitals in case of any trauma. Nearby hospital facilities will also have to be available round the clock for attending emergency arising out of accidents, if any. All working personnel will be medically examined at least two years and at the end of his term of employment. This is in addition to the pre-employment medical examination.



5.6.3 SAFETY POLICY AND REGULATIONS

Keeping in view of the safety requirement during construction, operation and maintenance phase, the project authority will formulate its safety policy and rules in accordance with the requirement of Factories Act and other standard guidelines. Duties and responsibilities of the safety officers shall be clearly defined.

5.6.4 SAFETY OFFICER

The project authority shall employ a qualified and experienced safety officer to ensure safety at its site. The responsibilities of the safety officer shall include identification of the hazardous conditions and unsafe acts of workers and advise on corrective actions, conduct safety audit, organize training programme and provide professional expert advice on various issues related to occupational safety and health. He shall also see compliance of safety rules/statutory provisions. The contractors will be forced to follow safety rules to ensure safety to all constructions workers.

5.6.5 SAFETY TRAINING

Safety training will be provided by the safety officer with assistance of faculty members called from Professional Safety Institutions and Universities. In addition to regular employees, limited contractor labourers will also provided safety training. To create safety awareness safety films will be shown to workers and leaflets etc. will be distributed.

5.7 CRITICAL AREAS AND CONCLUSION

Following an accidental loss of containment from the process routes or from the storage vessels while loading/unloading/transferring the MS BS III, MS BS IV, HSD BS III, HSD BS IV, MS, HSD, and SKO due to either hardware failure or operational errors, a range of generic hazards can occur. These hazards basically lead to fire. This aspect has been elaborated in the Risk Assessment Report prepared separately.

Based on the findings of the EIA Study, following are deemed to be critical areas:

- Noise and dust during construction
- Chemical hazards and risks to workers during operation

It is understood that the plant management will implement necessary and appropriate mitigatory measures, post project monitoring and safety assurance measures as discussed in the EMP throughout the life cycle of the project. Given that commitment the project should not pose significant intolerable impact to the environment.



CONCLUSION:

Based on these environmental aspects, it can be concluded that the terminal will not have any significant adverse impacts on existing environment and ecology of the project area.

References

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AIR MONITORING FOR BASELINE STATUS



AIR MONITORING FOR BASELINE STATUS



SOIL SAMPLING FOR ANALYSIS



SOIL SAMPLING FOR ANALYSIS



TESTING AND ANALYSIS



NOISE MONITORING



WATER SAMPLING FOR ANALYSIS



FLAME PHOTOMETER

