

EXECUTIVE SUMMARY

Introduction

Karaikal Port Private Limited (KPPL) is an all-weather Port developed on Build, Operate and Transfer format under Public Private Partnership in terms of the concession awarded by the Government of Puducherry. The Port is in operation since 2009 and has handled over 32 Million Tonnes of various cargoes including Liquid Petroleum. The port provides a vital sea link for the rich hinterland and thus holding the key for accelerated growth of the entire region.

Project Location

Karaikal Port is located 9 km south of Karaikal town within the Union Territory of Puducherry. The coastal orientation near the port is nearly straight and oriented in N5°E direction. The inland formation exhibits low barren land with thorny bushes. The coastal stretch comprises very low and narrow beaches. The port location is abutted by Vettar River on the south side and Paravanar river on the north side. The tidal influence in both the rivers is restricted due to the formation of sand bar at the mouth and the absence of fresh water flow from upstream. During northeast monsoon, the rivers bring large quantity of fresh water discharge draining out from the neighbouring catchment basin and the mouths get open. Nagapattinam minor port is located at about 7 km south of Karaikal Port. CPCL Oil Terminal is located at about 500 m south of the southern breakwater. Chemplast Sanmar Chemical Terminal is located at about 500 m north of northern breakwater.

Liquified Natural Gas

KPPL is contributing to India's endeavour to graduate into use of less environmentally benign fuels, resulting in less number of environmental concerns such as smog, acid rain and green house gas emission.

- Natural gas, the cleanest fossil fuel, is a highly efficient form of energy.
- Natural gas burns cleaner than the other fossil fuels such as coal and oil due to the highly efficient combustion process, which produces very few by-products that are released into the atmosphere as pollutants. Due to the clean burning process, natural gas does not leave residues like soot or ash when compared to coal.
- Natural gas produces 70% less carbon di-oxide emissions compared to other fossil fuels.
- Natural gas is non-toxic and is not poisonous to humans if inhaled in small volumes.
- Natural gas is a multi-user fuel. It is used inside the house for cooking, generating electric power, powering vehicles (by substituting for diesel and petrol), producing plastics, paints, fertilizers, refineries, dying in textiles, food processing, steam generation and many more uses.

The proposed terminal at Karaikal (Puducherry) is best suited to supply the natural gas to the specific geographies (catchment area) based on economics.

Existing port facilities

At present the port is capable of handling 21.5 MTPA of various cargoes like Coal, General Cargoes, Containers, Crude oil, Edible oil, Project cargoes etc. The details of the facilities are:

- Two breakwaters one on the north side and another on the south side.
- Five operational berths (2 cape size and 2 Panamax size berths and 1 OSV).
- Approach channel with a dredged depth of (-) 16.5 m CD and Berths with a dredged depth of (-) 15.5 m CD.
- Open cargo storage area of about 6,50,000 m².
- Covered area for cargo storage about 63,000 m² (Warehouses).
- Three numbers of dedicated railways siding within port premises and connected to main railway line between Nagore and Karaikal.
- Internal roads and Road connectivity to NH 45A & NH 67.
- Adequate tugs, mooring boats and navigational aids.
- Adequate Fire fighting capabilities
- Adequate Pollution Control & Monitoring systems

Proposed Bulk liquid berth for handling LNG

The present proposal involves the development of Bulk Liquid Berth for handling LNG through Floating Storage Regasification Unit (FSRU)/Floating storage unit (FSU) with LNG vessel berthed alongside and connected to the shore by means of an approach jetty. The technical feasibility study was carried out by Royal Hoskoning DHV which indicated encouraging results in terms of technical feasibility and financial viability. For the proposed development of liquid berth for handling LNG, KPPL wanted to take up the necessary EIA and EMP studies with appropriate risk assessment and Disaster Management Plan.

Organization of present report

KPPL has awarded the overall EIA study to Indomer Coastal Hydraulics (P) Ltd., Chennai, an ISO 9001:2008 certified organization and QCI (NABET) accredited organization. Indomer has taken the assistance of Aditya Environmental Services Pvt Ltd, Mumbai, a QCI- NABET accredited agency for preparing the Terrestrial EIA and EMP and ROOTS EHS Advisory, Vadodara for carrying out the Risk assessment and Disaster Management plan. The primary surveys of soil, air, noise and water monitoring analysis were conducted through Creative Engineers & Consultants, Chennai, a QCI- NABET accredited agency and a NABL accredited laboratory.

Details of LNG terminal proposed at Karaikal Port

It is proposed to maintain a depth of (-) 19.0 m CD alongside of the berth. LNG upto 5 MTPA can be handled at this berth facility. Provision of Buffer LNG storage tanks within the port also comes under the proposed project. The LNG line from the port will be directly connected to the GAIL network which is within 4 km proximity of the port. For the development of LNG Terminal at Karaikal Port, the site was selected at the southern side of the port, after considering three locations within the port, i.e. Southern side of the port, Northern side of the port and Outer harbour. A terminal option analysis

was conducted. The mooring options like Stand alone/Twin jetty, Single jetty side by side mooring and submerged turret mooring was studied and the supply chain of LNG was arrived.

Baseline data

The baseline data for the **Terrestrial environment** including Ambient Air quality, Noise, Ground water quality, Surface water quality, meteorological data on Climate and Rainfall, Traffic, Land environment (Topography, Geology, Land use and Land cover, Soil and seismicity) were collected in October 2013. From the baseline data collected it shows that the measured parameters are within the acceptable limit and as such the terrestrial environment is not polluted.

The baseline data for the **Marine environment** was collected in August 2013 and the secondary data available on the physical parameters such as Wind, Wave, Storm and Tsunami were compiled. From the baseline data collected on Water quality, Sediment quality, Phytoplankton, its biomass and diversity, Zooplankton, its biomass and diversity, Macrobenthos, its biomass and diversity, Turtles, Corals, Mangroves and Fisheries, Coastal Vegetation it is concluded that these parameters are within the acceptable limit and as such the marine environment is not polluted. The coastal water is clean and productive.

Modelling

The mathematical modelling studies for the proposed development of liquid berth were conducted on Tides and currents inside port basin, Sediment transport inside port basin, Dredge disposal, Oil spill analysis, Storm surge, Littoral drift, Shoreline erosion and Beach nourishment

From the modelling study, it could be seen that the current pattern do not alter due to the construction of LNG terminal as the berthing wharf will be abutted with the shore and the FSRU will not cause any interference to the prevailing flow since it is a floating facility. There is no significant change in sediment flux and there is no change in seafloor level due to the construction of the LNG terminal. The sediment dredged during the development of LNG terminal can be disposed in the existing disposal ground or alternatively, the sediments can be deposited along the northern side of the shoreline for beach nourishment purposes. This will help better shoreline management and beach stabilization.

Risk Assessment

The Risk Assessment study covers the following aspects:

- Assessing risk levels due to the operations of the facility
- Identification of the risk mitigation measures to bring the potential risk within acceptable range
- To suggest general safety improvement measures.
- To help generate accident free hours
- To identify emergency scenarios and suggest mitigation measures.

The factors like Site Meteorology, Climate, Rainfall, Temperature, Humidity, Wind and Atmospheric stability has been considered for the Risk Assessment. The risk and the disaster associated with Earthquake, Wildfire, Tsunami, Mud/landslide, Damfailure, Riverine floods, Cyclone, Flash floods, Thunderstorm and lightening, extreme weather conditions, Major Industrial accidents/industrial disaster/nuclear disaster, Fire, Explosion, Toxic release and disruptive activity have been studied.

For the natural disasters like Cyclone and Tsunami, a detailed disaster management plan and Preparedness plan is presented.

Impact assessment

The impacts on the **Terrestrial environment** including the land, air, noise, water, ecology and Socio economic status is discussed. The impacts due to Equipment mobilization, Material transport, Erection and Assembling of land based facilities in the construction phase and Traffic movement and Operation of FSU/FSRU during operation phase is studied. It can be seen that the project will have Temporary insignificant negative impacts on terrestrial environment except Socioeconomic, where it will be Temporary insignificant positive in construction phase. Operation phase will have permanent insignificant negative impacts on terrestrial environment except Socioeconomic, where it will be Temporary insignificant positive. From the impact study it could be seen that the net impact due to proposed development will not have any appreciable impact on environment and all the activities indentified as part of the project have insignificant impacts.

In analyzing the impacts on the **Marine environment**, the influence of Construction of LNG terminal, Dredging & Disposal, Shoreline changes, Oil spill, Storms and Tsunami, Fisheries, Turtles and Mangroves, Discharge of Coldwater are considered.

The coastline is presently stable and this part of coastline experieces low littoral drift and it behaves close to nodal drift. The examination of water quality of this region indicated that they do not vary substantially both in vertical and spatial directions indicating the coastal waters are well mixed. Various results on the chemical and biological parameters indicate that the water is well oxygenated, nutrient rich and biologically productive at primary and secondary levels. The sub-tidal benthic fauna is moderately rich in diversity and numbers compare to the Inter tidal benthic fauna. The proposed development is only within the existing basin and the cargo transfer takes place straight from the FSRU to the nearby GAIL network by means of pipeline system except a small quantity for supply to small time consumers. As such the impact due to construction of the marine facility to the marine environment will be very minimal.

Environmental Management Plan

Karaikal Port has a well documented Marine & Terrestrial Environmental Management Plan (EMP). This plan is in place since commencement of operation of the port facilities in April 2009 and improved/modified suitably to suit the requirements arising out of enhanced port facilities from a 2-berth system initially to the present level. It is suggested to implement the same EMP with suitable adjustments to take care of the specific requirement of LNG handling aspects.

EMP for **Terrestrial environment** is prepared by taking into account the construction and operation phases of the Bulk Liquid Berth for handling LNG. The plan include measures to mitigate environmental and social impacts; plan of action for execution of mitigation measures; Environmental Monitoring Program; institutional mechanism for ensuring implementation; and budget allocated for environmental management. The mitigation measures and action plan for activities like Traffic Management during Construction of Berths, Environmental Management during Landside Construction, Solid Waste Management, Hazardous Materials Management, Occupational Health Safety during the Construction Phase is discussed.

The mitigation measures and action plan for activities like Water Pollution Control, Environmental Management during Cargo Handling, Environmental Management at Cargo Storage Areas, Port Traffic Management Plan, Solid Waste and Hazardous Materials Management, Occupational Health and Safety and Terrestrial Environmental Monitoring Plan during the Construction Phase is discussed.

Though the proposed port activities involves construction of bulk liquid berth primary to LNG terminal, leading to certain adverse impacts initially on **Marine environment**, there is sufficient scope for mitigation measures.

In order to limit the damage to benthos at initial stage, the bed should not be disturbed much and it is suggested that the explosives should not be used. The construction materials should be placed above one another by using proper hoisting machineries and should not be dropped on the seafloor. There should not be any sudden increase in flow velocity within the port basin.

To control the Shoreline erosion, the Port authorities have to make necessary beach nourishment scheme for stabilizing the downdrift coastline. Regular monitoring of the shoreline is essential in order to design a suitable shore protection method if needed. Oil spill contingency plan is in place to handle any accidental spill. Oil spill contingency equipments like boom, skimmer and dispersant chemicals should be stored. Oil Spill Contingency Team established at Port may be further increased and strengthened. They should coordinate with National Oil spill Committee headed by Indian Navy.

Post project monitoring

Post project monitoring is an important aspect in Environmental Management Plan. Monitoring program has to be done during the construction and operational phases of the project. It should be repeated at periodic intervals after the commencement of the project, when the project is fully operational. Karaikal Port is already having a well established and documented post monitoring programme to assess the terrestrial parameters (Ambient air quality, Noise, Water quality, Land) and marine parameters (Water and sediment quality and Biological parameters) on a regular basis. The same system can be continued for the proposed expansion. The regions to be monitored can be increased and the locations can be near the proposed Liquid berth.

The results of monitoring shall be reported to Ministry of Environment and Forests, Zonal office, Bangalore, State Department of Environment, Puducherry Pollution Control Committee and National Biodiversity Authority for NIMS authority annually or as required.

The monitoring has to be organized with qualified and experienced environmental team. Standard procedure shall be followed in sample collection and analysis.