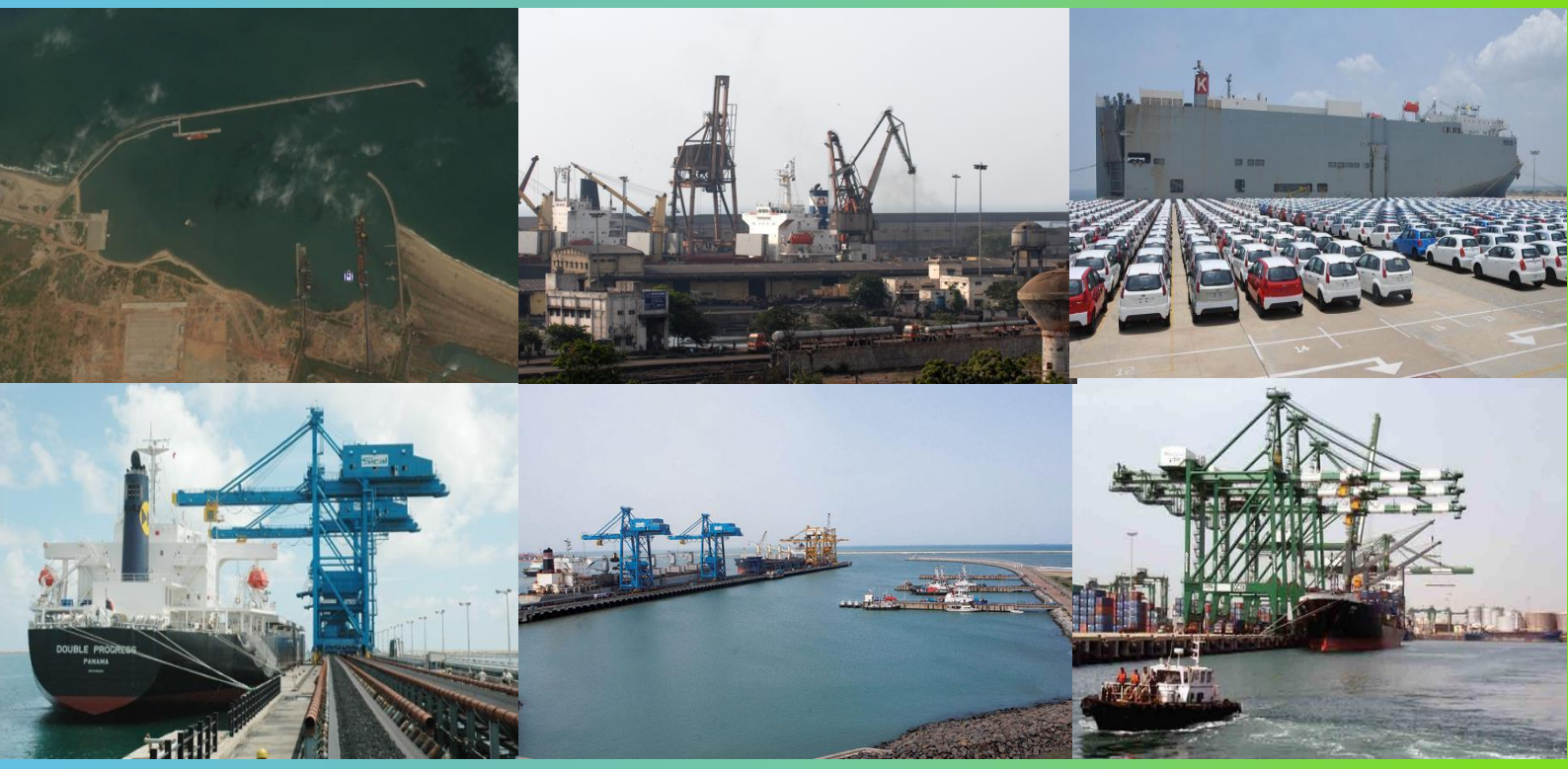
MASTER PLAN FOR KAMARAJAR PORT



Master Plan for Kamarajar (Ennore) Port

Prepared for

Ministry of Shipping / Indian Ports Association

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1.0 INTRODUCTION

1.1 Background

The Sagarmala initiative is one of the most important strategic imperatives to realize India's economic aspirations. The overall objective of the project is to evolve a model of port-led development, whereby Indian ports become a major contributor to the country's GDP.

As shown in **Figure 1.1**, the Sagarmala project envisages transforming existing ports into modern world-class ports, and developing new top notch ports based on the requirement. It also aspires to efficiently integrate ports with industrial clusters, the hinterland and the evacuation systems, through road, rail, inland and coastal waterways. This would enable ports to drive economic activity in coastal areas. Further, Sagarmala aims to develop coastal and inland shipping as a major mode of transport for the carriage of goods along the coastal and riverine economic centres.

As an outcome, it would offer efficient and seamless evacuation of cargo for both the EXIM and domestic sectors, thereby reducing logistics costs with ports becoming a larger economy.

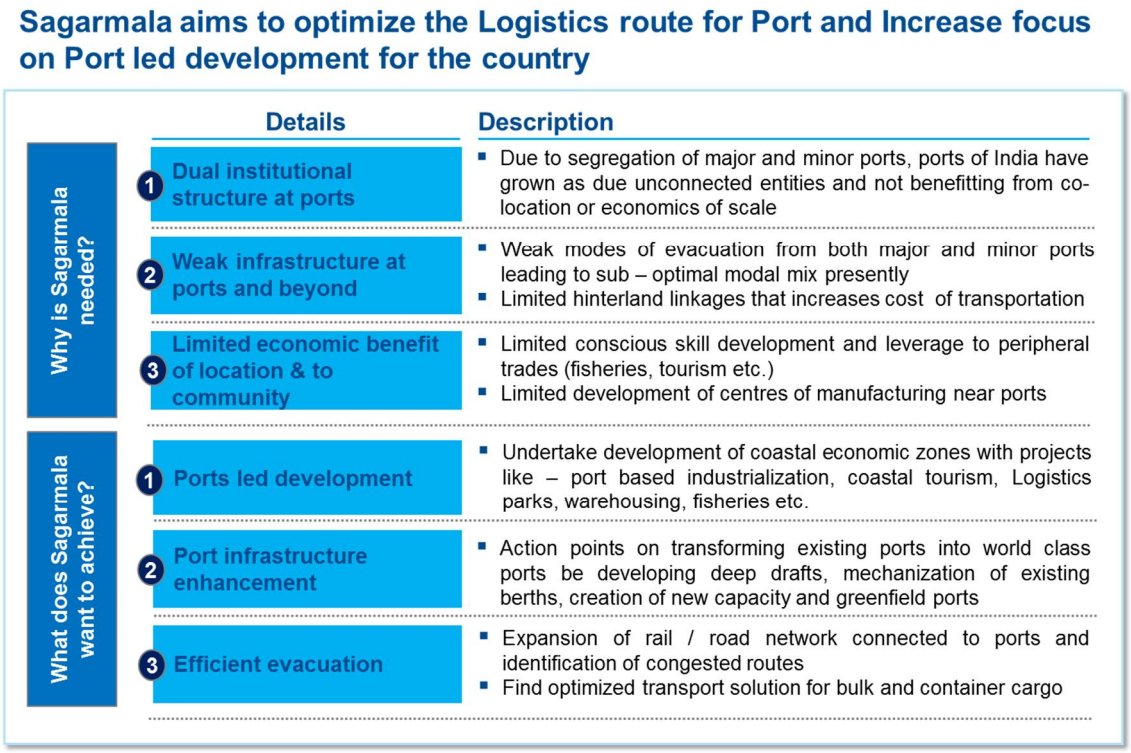


Figure 1.1 Aim of Sagarmala Development

In order to meet the objectives, Indian Port Association (IPA) appointed the consortium of McKinsey and AECOM as Consultant to prepare the National Perspective Plan as part of the Sagarmala Programme.

1.2 Scope of Work

The team of McKinsey and AECOM distilled learnings from experience in port-led development, the major engagement challenge to develop a set of governing principles of approach is shown in **Figure 1.2** below.

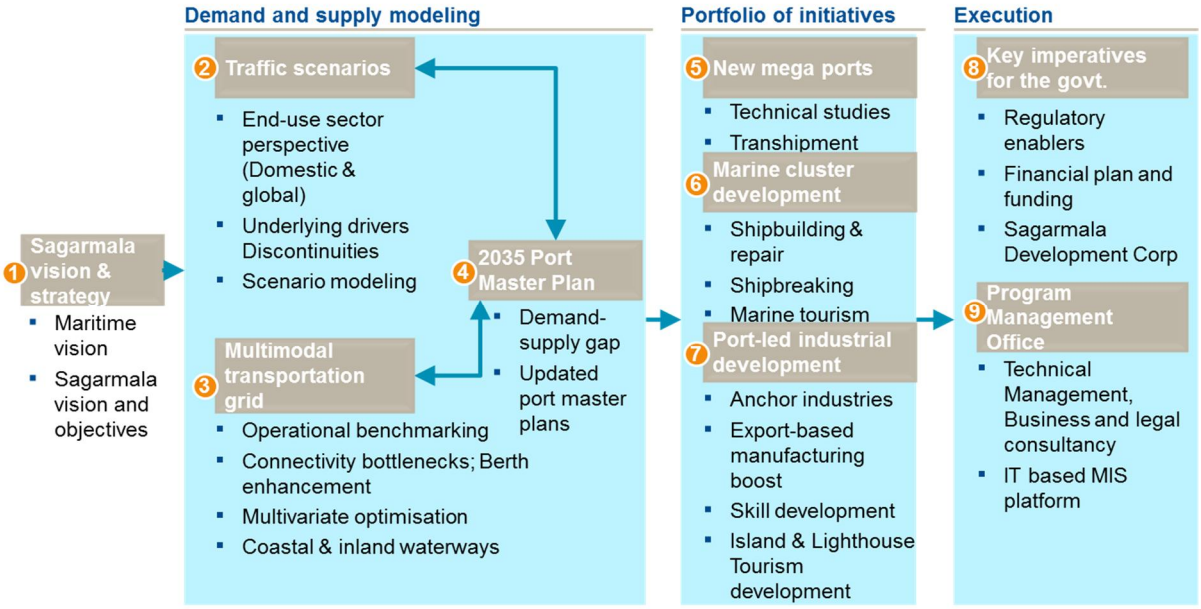


Figure 1.2 Governing Principles of Approach

As indicated above, the origin-destination of key cargo (accounting for greater than 85% of the total traffic) in Indian ports shall be mapped to develop traffic scenarios for a period of next 20 years. The forces and developments that will drive change in the cargo flows shall also be identified. This would lead to the identification of regions along the coastline where the potential for expansion of existing port exists. The various activities involved in the port led developments are charted in **Figure 1.3**.

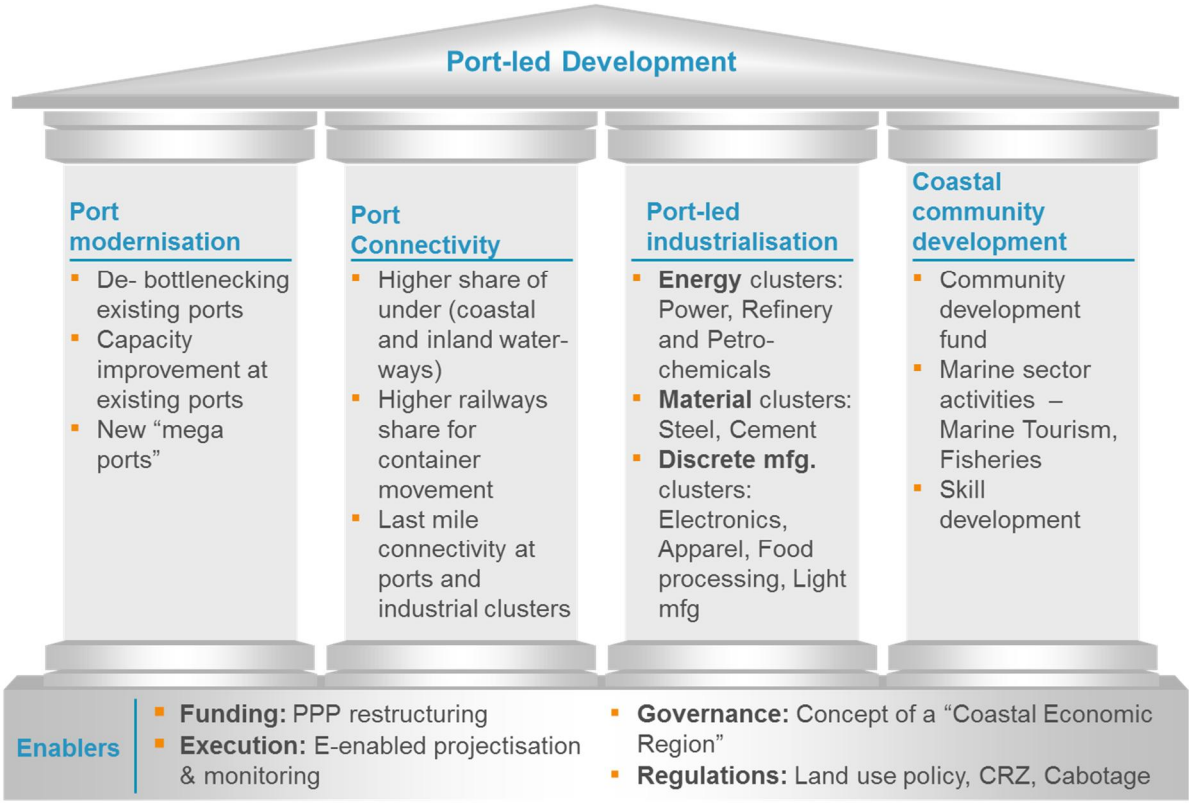


Figure 1.3 Port Led Developments

As part of the assignment, it is also expected to coordinate with the team working on "Benchmarking Operational Improvement Roadmap for Major Ports in India" study (which is being carried out simultaneously along with this assignment) and identify current and future logistic constraints (at the Major Ports) for the top 85% cargo categories based on analysis of current port capacity, productivity levels in comparison to international benchmark and evacuation bottlenecks in the logistics chain. This understanding should be an input in defining the 2035 Master Plan for each port.

Accordingly, this Master Plan Report has been prepared taking into consideration the inputs provided on the future traffic and the benchmarking and operational improvements suggested for this port.

1.3 Present Submission

The present submission is the Final Report for Development of Master Plan for Kamarajar Port (Ennore) as part of Sagarmala assignment. This report is organised in the following sections:

Section 1 : Introduction
Section 2 : The Port and Site Conditions
Section 3 : Details of Existing Facilities
Section 4 : Performance, Options for Debottlenecking & Capacity Assessment
Section 5 : Details of Ongoing Developments
Section 6 : Traffic Projections
Section 7 : Capacity Augmentation Proposals
Section 8 : Port Internal Network, External Connectivity and Infrastructure
Section 9 : Scope for Future Expansion
Section 10 : Shelf of New Projects and Phasing

2.0 THE PORT AND SITE CONDITIONS

2.1 Kamarajar Port as at Present

The Govt. of India declared Kamarajar Port as the 12th Major Port in March, 1999. It was incorporated as a corporate entity, Kamarajar Port Limited (KPL), under the Indian Companies Act of 1956 on 11th October, 1999.

KPL is operating the Port as a landlord port limiting its functions to overall planning for development, conservancy of the port, regulatory aspects, environment monitoring, dredging the berth areas, port basin and approach channel, installation of navigational aids/fire-fighting facilities, road and rail connectivity. The development and operation of individual cargo terminals are entrusted to private operators.

Kamarajar Port is located on the east coast at Latitude 13° 15' 30" N and Longitude 80° 21' 00" E as shown in **Figure 2.1**.

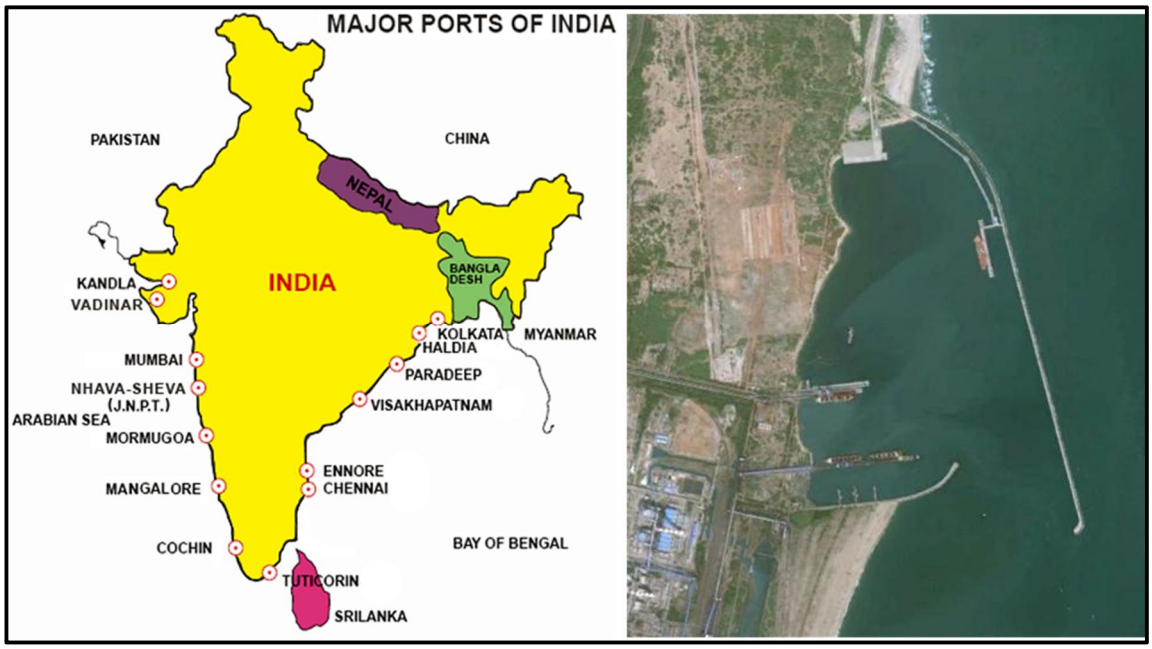


Figure 2.1 Location of Kamarajar Port

The Port presently consists of a harbour basin protected by two breakwaters – 3,080 m long on the north/east side and 1,070 m on the south side. An approach channel 3,775 m long; 250 m wide and 19/20 deep (CD) leads to a turning basin of 600 m diameter and 18.5 m deep (CD). For safe navigation in and out of the Port, KPL has a signal tower and navigations aids in the form of two transit light towers, six channel buoys and one fairway buoy. It has also set up an 11 kV sub-station. The navigation of ships in and out of the port and handling them inside the port have been offloaded to an agency on contract basis. The marine crafts include 3 × 40 T bollard pull tugs; 2 pilot launches and 3 mooring launches.

2.1.1 Road Connectivity

The following are the three important National Highways emerging from Chennai/ Ennore, these are:

- NH 5 connecting Chennai and Kolkata and passing through major cities such as Vijayawada, Visakhapatnam and Cuttack.
- NH 4 linking Chennai and Mumbai passing through Bangalore and Pune
- NH 45 linking Chennai and Madurai and connecting the southern parts of Tamil Nadu.

All-important destinations in India whether on the North, West or East could be accessed through any one of these three National Highways

2.1.2 Rail Connectivity

Presently, Kamarajar Port is connected by rail to the mainline at Attipattu and Attipattu Pudunagar Stations located in the Chennai – Gudur section of the Southern Railway on the Chennai – Delhi/Kolkata route. The southern connectivity takes off from Attipattu Pudunagar Railway Station. The northern connectivity takes off from Attipattu Railway Station. These two lines merge at the Apex Point and run as a single line to the NCTPS Yard. One line branches off from the NCTPS line to Ennore Port premises.

KPL developed the railway facilities connecting the stackyards of the coal and iron ore terminal to the existing NCTPS Railway line.

2.2 Site Conditions

2.2.1 Meteorology

The climate in the region has a typical monsoon character. Two monsoons dominate the climate - the southwestern summer monsoon and the north-eastern winter monsoon. The summer monsoon starts around the beginning of June and holds on until September. The northeast monsoon starts by the latter half of October and lasts until December. The summer monsoon is stronger than the winter monsoon and the months between both monsoons form a transition period of calmer weather. Storms occur particularly in autumn months.

2.2.1.1 Winds

The wind rose indicating the wind climate near Ennore is given in **Figure 2.2**. The diagram shows that the largest frequencies of occurrence are from northeast and southwest directions. This corresponds with the monsoon seasons and is in accordance with more general data for the western part of the Bay of Bengal. South to southeast wind directions also occur frequently, mainly during the transition period between the two monsoons.

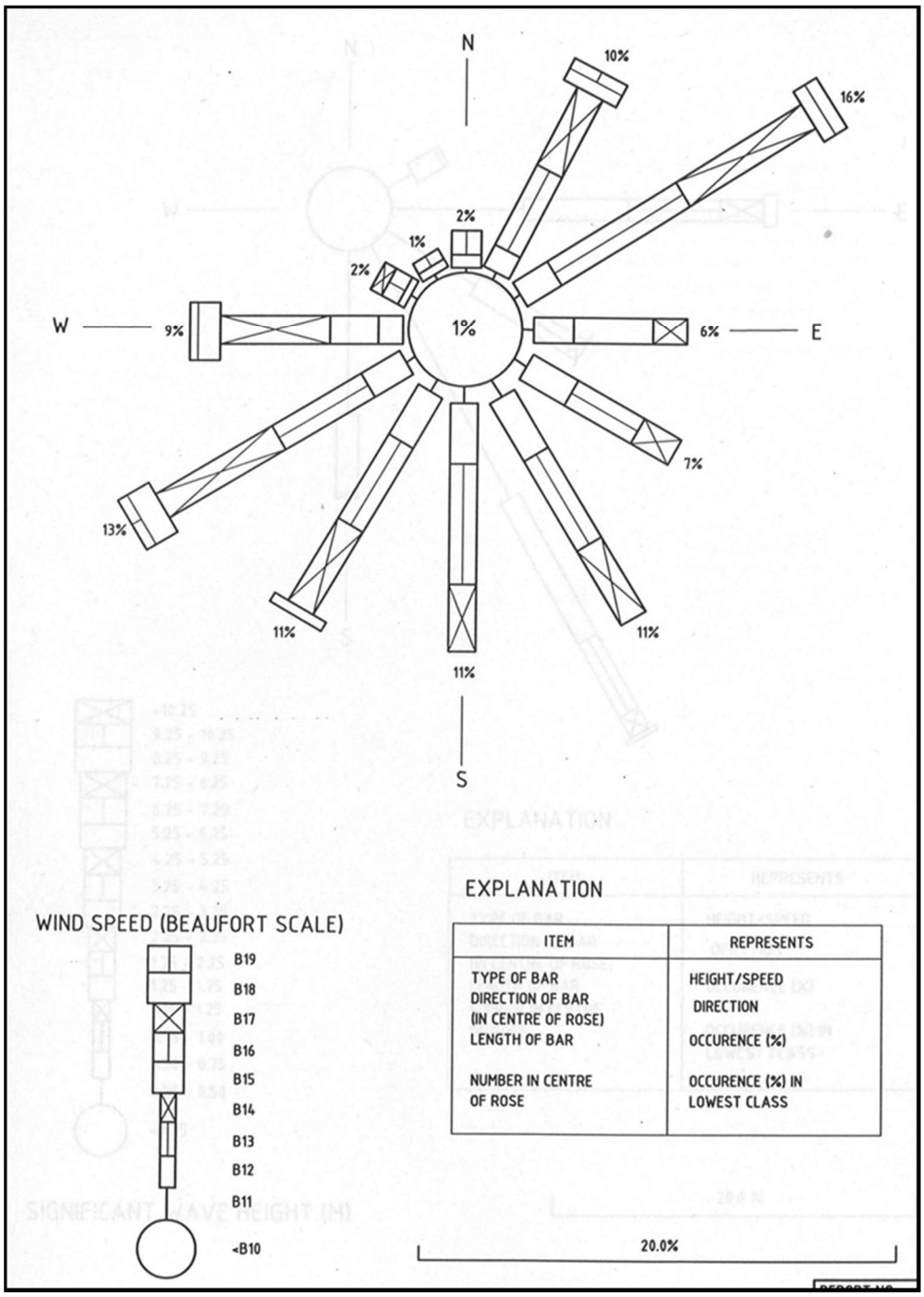


Figure 2.2 Wind Rose Diagram – Kamarajar Port

2.2.1.2 Rainfall

More than 60% of the annual rainfall takes place during the northeast monsoon (October to December). The average monthly rainfall in the period 1972 –1983 varied from 1 mm in March/April to 416 mm in November. The total annual rainfall shows considerable variation over the years, from 1,525 mm in 1975 to 550 mm in 1982.

2.2.1.3 Temperature

The average monthly air temperature varies between 37° C in May and June to about 29° C during December and January. The average minimum temperature varies between 28° C in May and June to 21° C in January and February. The highest recorded temperature is 43° C and the lowest recorded temperature is 15° C.

2.2.2 Oceanography

2.2.2.1 Tides

The tides at Ennore are semi-diurnal in nature with a tidal range, relative to the Chart Datum (CD), as follows:

- *Highest high water level (HHWL) + 1.50 m*
- *Mean high water springs (MHWS) + 1.10 m*
- *Mean high water neaps (MHWN) + 0.80 m*
- *Mean Sea Level (MSL) + 0.65 m*
- *Mean low water neaps (MLWN) + 0.40 m*
- *Mean low water springs (MLWS) + 0.10 m*
- *Lowest low water level (LLWL) - 0.10 m*

2.2.2.2 Currents

During the NE monsoon, the current is directed southwards while during the SW monsoon the current is directed northwards. The currents in the coastal zone are approximately 0.15 to 0.20 m/s. NIOT has measured currents at four locations off Ennore Port during March 2002. At two locations with water depths of 15 m and 10 m, measurements were taken at 1 m depth intervals. It was noted that the maximum current velocity was 0.35 m/s at the surface and 0.25 m/s near to the seabed.

Current data were also collected by NIOT from the NDBP buoy. It has been noted that the maximum current recorded during March to July, 1999 was around 0.40 m/s and for a few days it reached up to 0.60 m/s. The predominant current direction was towards NNE.

2.2.2.3 Waves

As the near-shore area off Ennore is sheltered from the westerly winds by the mainland, the strong southerly to westerly winds during the SW monsoon do not cause high waves due to the limited fetch available. Consequently, the wave conditions at Ennore are moderate.

Waves at Ennore, approach predominantly from two directions - 135° N during March - September and 90° N during November – January. During the transition period (February and October), waves approach from 115° N.

The wave rose diagram for offshore waves are shown in **Figure 2.3**.

NIOT deployed a wave rider buoy off Chennai Port at a water depth of 16 m. The buoy could measure waves and currents only for a part of 1998, during which no cyclones crossed the coast. After interpolating for the missing data and making corrections based on visual observations, the wave climate for 1998 was generated. The monthly mean values of wave parameters estimated from the above data are given in the following **Table 2.1**.

Table 2.1 Monthly Mean Wave Parameters

Month	Significant Wave Height (m)	Significant Wave Period (s)	Wave Direction from True North
January	0.90	8.10	090°
February	1.10	8.20	115°
March	0.90	8.30	135°
April	1.30	9.50	135°
May	1.60	10.80	135°
June	1.50	11.10	135°
July	1.00	10.40	135°
August	1.10	11.00	135°
September	1.20	11.00	135°
October	1.10	9.80	115°
November	1.00	8.60	90°
December	1.40	8.40	90°

Note : 90° – waves approach from E
115° – waves approach from ESE
135° – waves approach from SE

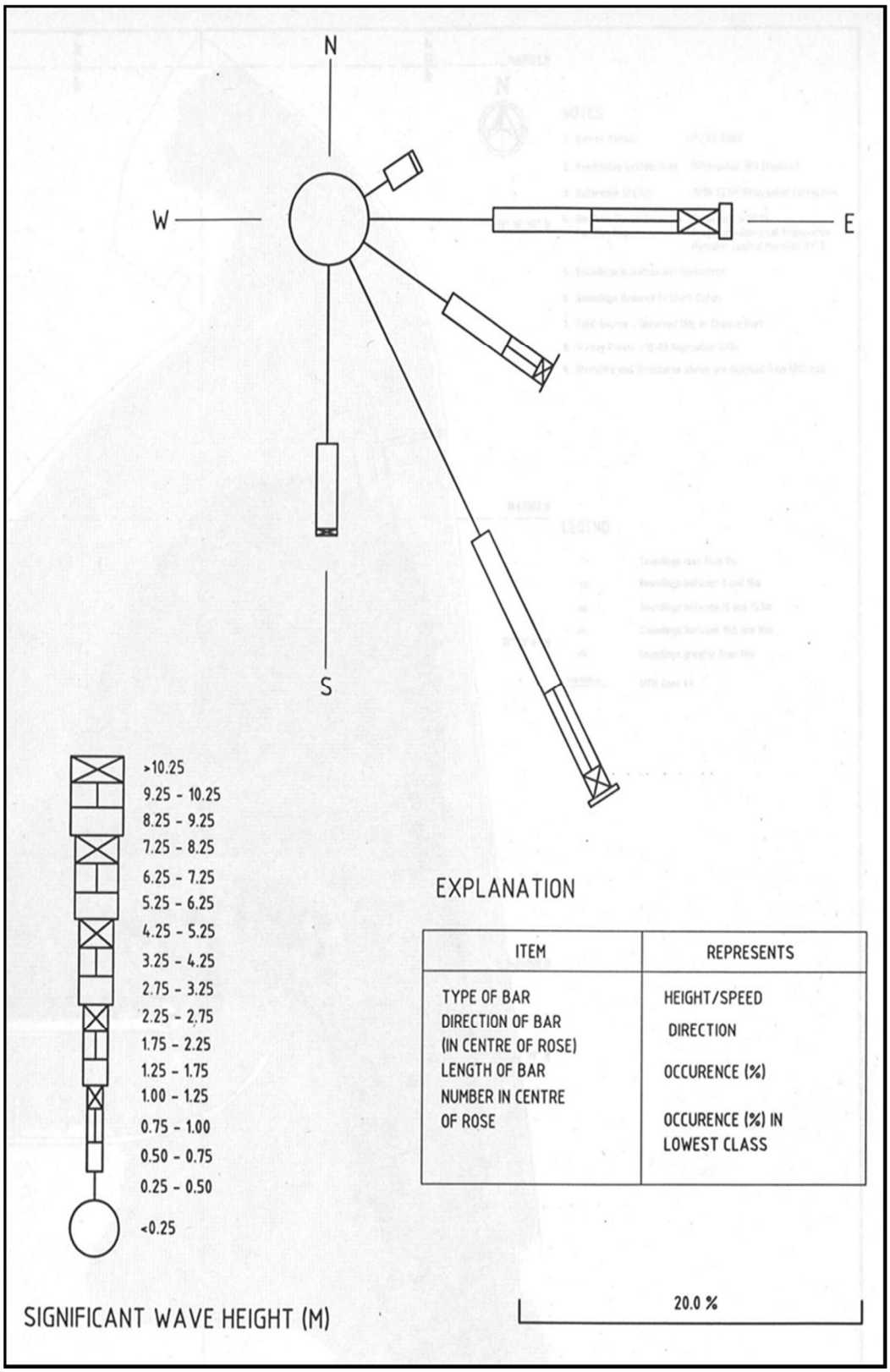


Figure 2.3 Wave Rose Diagram – Kamarajar Port

3.0 DETAILS OF EXISTING FACILITIES

3.1 General

Kamarajar Port at present has five operating berths while the sixth berth developed for exporting iron ore has been lying idle since the date of commissioning due to ban on iron ore exports. There are two coal berths for handling coal exclusively for Tamil Nadu Electricity Board (TNEB); one coal berth for multi-users (non-TNEB); one multi-user liquid terminal and one berth for export of automobiles. The locations of these berths along with their back-up areas are shown in the **Figure 3.1**.

Figure 3.1 Existing Facilities of Ennore Port

3.2 TNEB Coal Berths

Coal berths 1 & 2 are operated by the port and are exclusively for TNEB (TANGEDCO) to handle thermal coal brought from Paradip by coastal transport for its thermal power plants at north Chennai, Ennore and Mettur. Unloaded Coal is directly moved through the conveyor system to the stackyard located in the adjoining North Chennai Thermal Power Station (NCTPS) from where a part of it is moved further to Mettur and Ennore through railway connectivity.

These berths are located north of the southern breakwater and are in the form of a continuous finger jetty. Each berth is 280 m long and 26 m wide with a dredge depth of 15.0 m. The berths have been designed to accommodate bulk carriers up to 85,000 DWT.

NTECL, JV of TNEB erected 2 no. of shore based gantry grab unloaders at CB-2.

Coal Berth 1 (CB-1) is equipped with gantry grab unloaders, each of 2,000 TPH rated capacity. There are two conveyors each of 4,000 TPH running along the entire length of the finger jetty covering the two berths. Coal Berth 2 (CB-2) does not have any shore based unloader and the coal is discharged through ship's own gears. It is equipped with six mobile hoppers on the deck set over the conveyor. In addition there is one large mobile hopper installed for receiving coal through a self - discharging vessel. This hopper is positioned in the middle of the two berths.

3.3 Common User Coal Terminal 1

The License to develop a Common User Coal Terminal was awarded to M/s. Chettinad International Coal Terminal Private Limited (CITPL) in 2006 for a thirty-year concession period. The terminal operations commenced in 2010-11. The cargo handled are Steam coal, Thermal coal, Coking coal, Metallurgical coke and Petroleum coke. This terminal is understood to serve about 30 different users.

The berth is in the form of a finger jetty with the berthing face located at a distance of 400 m from the northern face of the TNEB coal berths. The berth is 347.5 m long and 30 m wide. It has been designed for handling Capesize carriers up to 1,50,000 DWT to suit -18.0 m CD dredge depth. The berth is equipped with two rail mounted grab unloaders, each of 1,750 TPH rated capacity. The approach is 145 m long and 8.0 m wide and connects the existing road to the coal berth.

The stackyard area is located at about 2.5 km west of the berth. The total plot area is around 52.0 Ha. The stock pile area is 1,670 m × 105 m with two rows of piles on either side. Each pile is 45 m wide and 10m high with a capacity of 65,000 T each, giving a total capacity of the yard as 7,80,000 T. The stackyard is served by two rail-mounted Stacker cum Reclaimer units each of 3,500 TPH of capacity for stacking and 2,000 TPH capacity for reclaiming. The berth, the yard and the loading stations are all interconnected through a system of conveyors. The receiving conveyors have a rated capacity of 3,500 TPH for coal and 1,400 TPH for coke. The despatch conveyors have a rated capacity of 2,000 TPH.

An in-motion wagon loading station has been suitably installed for loading one full rake of 59 wagons (3,500 T) in about 1 hr 40 min. A steel surge silo of 1,300 T capacity fed through the reclaiming system serves the system. There is an in-motion weigh bridge 50 m south of the silo with an interface with the wagon loading system. Two more parallel tracks have been added to reduce the turn round time of wagons. At present 35 % of traffic moves through rail.

Two truck loading stations along with 1 standby station with pitless weigh-scales are provided for evacuation through trucks. A surge silo of 500 T capacity is provided with swing spouts dust loading spouts. The operations are manually controlled and at present 65% of traffic moves through road.

3.4 Multi-User Marine Liquid Terminal 1

The license to develop a Multi-User Marine Liquid Terminal 1 (MLT 1) was awarded to M/s. Ennore Tank Terminals Private Ltd. (ETTPL) in 2004 for a 30 year concession period. The terminal was commissioned in January, 2009. It handles POL, LPG, and chemicals.

The jetty is located at about 1,330 m from the root of the northern breakwater on the western side. The berthing face is at a distance of 160 m from the northern breakwater. The berth is an integrated structure with a continuous deck of 360 m length and 20.75 m width. The structure has been designed to handle fully loaded tankers up to 1,50,000 DWT. Presently, the jetty has a water depth of 15 m sufficient to handle tankers up to 13.50 m loaded draft. The jetty is connected to the shore by a 1.3 km long and 12 m wide approach trestle.

The ship-shore transfer of products is handled through marine unloading arms and flexible hoses. These are one 2 × 12" arms for refrigerated LPG; 1×12" arm for black oil and 1 × 10" arm for white oils. The hoses are of 8" diameter for chemicals. Pipeline manifolds have been provided at the centre as well as quarter point on the northern side. For transfer of products from berth to tank farm, a set of nine pipelines has been laid. These are 2 × 24" dia. (mild steel); 2 × 18" (insulated}; 2 × 12" dia. (mild steel); 2 × 10" and 1 × 8" (stainless steel). All these pipelines are piggable. Required pig launchers and receivers have been provided. There is sufficient space available at the approach trestle as well on the quay supports for laying additional pipelines as and when required. The berth has been provided with Fire Protection System designed as per Oil Industry Safety Directorate (OISD) Standard 156.

The tank farm is located in a 33 acre port-leased plot at about 3.7 km from the berth. It is located within the port security area with an exclusive access from the public road through the west gate. There are seven enclosures for different group of products. There are 63 tanks with a total storage capacity of about 247,990 KL. These can store class A/B/C petroleum products, petrochemicals, vegetable oils, biofuels, acids and safe class liquids. There are stainless steel tanks and internally coated tanks for handling specialised products. All the enclosures have their own truck loading bays with loading gantries with facilities for top or bottom loading. Each enclosure has 5 × 2 truck loading bays except Enclosure 1 which has 3 × 2 loading bays. Each chemical has dedicated pumps and pipeline for delivery to the trucks. There are two 60 T weigh bridges. The entire terminal is having an integrated firefighting system consistent with the requirements of OISD Standard 117.

3.5 General Cargo Berth 1 / Automobile Terminal

Kamarajar Port entered into an agreement with M/s. Nissan Motor India Pvt Ltd., M/s Ford India Pvt Ltd., & M/s. Toyota Kirloskar Motor India Pvt Ltd., to export cars. In order to provide required terminal link facilities within the port, Port has constructed the berth as well as a car parking yard on its own with internal resources.

The length of the berth is 250 m and width is 27.5 m. There is an extension of 28 m on the eastern side to retain the earth slope. The berth was designed to handle the largest car carrier with 8,000 car units capacity, of 230 m overall length and 32 m beam. It has a backup yard of 250 m × 100 m for transit parking of cars. The regular car parking yard has been provided initially in a 14.4 Ha plot located about 1.5 km from the berth, opposite to the tank farm of MLT-1, which can accommodate about 10,000 car units.

Subsequently, developed additional parking area of 5.5 Ha plot located adjacent to the existing car parking yard which can accommodate additional 4,000 car units.

3.6 Common User Coal Terminal 2

The License to develop Iron Ore Terminal was awarded to M/s SICAL Iron Ore Terminals Ltd. (SIOTL) in 2006 for a thirty-year concession period on (BOT) basis. The terminal was completed during 2010-11. However, due to ban on export of iron ore, the terminal was never put into use. All these years the terminal could not be put into alternate use because of the exclusivity clause in the agreement with the other terminal. Since this period is over now, KPL has taken action to convert this into a common user coal/iron ore import terminal (Non TANGEDCO) capacity on Design, Build, Finance, Operate and Transfer (DBFOT) basis. The modifications/additions to the existing system to meet this dual requirement will be decided by the licensee based on the market demands.

The iron ore berth is located in an East-West direction parallel to the existing TNEB coal berths. This is in the form of a finger jetty with berthing face on the northern side. The berthing face of this finger jetty is located at a distance of 465 m from the northern face of the TNEB coal berths. The berth is of 347.5 m long and 30 m wide with a return berth of 50 m. It has been designed to accommodate a cape size vessel of 1,50,000 DWT.

The terminal has been provided with cargo handling facilities like tippler, conveyor system, stacker cum reclaimer, loader etc. The stackyard is of nearly 1,700 m long to provide space for 8 no. of stock piles of trapezoidal shape each with a length of 145 m and width of 40 m on either side of the Stacker/Reclaimer tracks.

4.0 PERFORMANCE, OPTIONS FOR DEBOTTLENECKING & CAPACITY ASSESSMENT

4.1 General

The total cargo handled through the existing facilities, during the past 5 years is presented in the following **Table 4.1**.

Table 4.1 Cargo Handled During Last 5 Years

(In MT/automobiles in numbers)

S. No.	Berth	Commodity	2014-15	2013-14	2012-13	2011-12	2010-11
1.	Coal Berth 1	TNEB Coal	11.01	9.76	8.02	7.88	5.94
2.	Coal Berth 2	TNEB Coal	4.06	4.33	1.81	1.77	2.92
3.	Common User Coal Berth	Coal	9.224	8.37	5.10	3.43	0.55
4.	MLT 1	Liquid	3.32	2.43	1.22	0.6	0.59
5.	GCB	Automobiles	2,15,071	2,01,981	1,45,053	1,03,667	54,264

CICTL – Chettinad International Coal Terminal Ltd. the licensee for common user coal terminal
** It has to be noted that while Coal berth 1 is equipped with ship unloaders, Coal berth 2 depends on ships' own gears to unload the coal but shall soon be equipped with ship unloaders.

4.2 BCG Benchmarking Study

BCG, as part of their benchmarking study, has looked into the operation of the berths and has suggested various measures for improving the performance. The report of BCG pertaining to Kamarajar Port is given in **Appendix-1**. Their study has covered CB 1, CB 2 and CICTL berths only. The key observations are as follows:

According to BCG, the coal berths at KPL are all operating at productivity much lower than their rated capacity. Coal berth 1 whose unloaders have a rated capacity of 4,000 TPH are operating at 34% and CICTL whose unloaders have a rated capacity of 3,500 TPH are operating at 37%. The best rate is 60% of rated capacity for unloading operations.

According to them, the performance norms at CICTL are not strictly followed.

The stipulated norms are

- 40,000 DWT vessels - 30,000 TPD
- 77,000 DWT vessels - 50,000 TPD
- 150,000 DWT vessels - 60,000 TPD

According to their observations, on an average about 38% of the total time spent by the vessels at the berth is non-working time. This has to be brought down.

In order to improve the overall productivity, they have suggested the setting up of a port governance system. For this purpose they have proposed a new data template. According to them, there is also a need to set up a team within KPL to take charge of audit of operations of terminals and identifying areas for further operational improvements within each terminal.

They have also suggested that the Marketing/Business development team at the port need to be activated to drive relations with end customers for the port. All the marketing activities of port terminals need to be integrated with the port BD team to derive the best results.

4.3 Performance of Coal Handling Berths

The performance of coal handling berths during 2014-15 is examined in **Table 4.2**.

Table 4.2 Performance of Coal Handling Berths During 2014-15

S. No.	Description	CB 1 & CB 2	CICTL
1.	Total volume handled	1,51,33,515	92,19,197
2.	Total number of ships	252	161
3.	Share of ships <60,000 dwt	52%	49%
4.	Average ship size	48,500	56,000
5.	Share of ships >60,000 dwt	48%	51%
6.	Average ship size	74,600	76,000
7.	Average productivity TPD - ships <60,000 DWT	33,310	31,380
8.	Average productivity TPD - ships>60,000 dwt	40,340	30,395

Since the TNEB second berth CB 2 was being equipped with ship unloaders, its performance was affected. However, since the same vessels chartered by TNEB / NTECL call at either of these berths the operation of these two berths has been combined for the analysis.

As indicated earlier, the capacity of the berth depends on the productivity, fleet mix and the allowable berth occupancy.

BCG, in their study report, have indicated the shortcomings in the productivity and suggested measures to improve. Assuming at least 25% improvement in the overall productivity, the average handling rate for the two categories of ship sizes could reach up to 40,000 TPD for ships < 60,000 DWT and 50,000 TPD for ships >60,000 DWT.(In this category the maximum ship size at KPL has been 87,000 DWT)

As regards fleet mix, TNEB, presently charters all size of ships from handysize to capesize (84,000 DWT). They can be advised to increase the ship size uniformly to panamax size to increase the capacity of the berths. On the other hand, CICTL serves multiple customers big and small and the fleet mix is not under their control. It is seen from BCG report that there are at least 25 customers each having a traffic volume of only 0.1 MTPA. Accordingly their ship size is likely to be small. Hence it is likely that the present fleet mix will remain.

During 2014-15, CB 1 had 97% berth occupancy with an average pre-berthing detention of 2.3 days/ship while CICTL had 84% berth occupancy with an average pre-berthing detention of 1.9 days/ship. As an international practice, it is customary to consider 350 operational days in a year and 65% berth occupancy. Even though with limited number of berths, there will still be pre-berthing detention; it may not be very high.

Based on the foregoing, the assessed capacities of coal berths will be as shown in **Table 4.3**.

Table 4.3 Existing Capacity of Existing Coal Berths

S. No.	Particulars	Unit	Coal Carriers	
			DWT < 60,000	DWT > 60,000
1.	Cargo Handled	MTPA	4.50	4.50
2.	Average Parcel size	T	48,500	74,600
3.	No. of Ship Calls per Annum	No.	93	60
4.	Average Handling Rate	TPD	40,000	50,000
5.	Time Required at Port Per Ship			
a.	Cargo Handling Time	Days	1.21	1.49
b.	Berthing / Deberthing & Miscellaneous Time	Days	0.17	0.17
	Total Time per Ship	Days	1.38	1.66
6.	Total Berth Days Required	Days	128	100
	Total Berth Days Required	Days	229	
7.	Berth Days Available per Berth	Days	350	
8.	Berth Occupancy	%	65.3%	
9.	**Capacity of Berths**	**65%**	**8.96**	

The assessed capacity could be rounded off to 9 MTPA. If the entire volume is brought in Panamax vessels only, the capacity will be about 10 MTPA.

Considering the possible fleet mix, the same capacity could be assumed for all the coal berths including the iron ore berth, which is being converted into a common user coal berth.

4.4 Performance of Liquid Bulk Handling Berth

The performance of the multi-user liquid terminal during 2014-15 is examined in detail in the **Table 4.4**. This terminal handles primarily POL, LPG and chemicals including CBFS.

The POL products are mainly MS, ATF, SKO and HSD for marketing purposes handled for IOCL, BPCL, HPCL, Reliance, Essar and Shell. Except for HPCL all the requirements of other agencies pass through the tankage terminal of ETTPL, the operator of the berth. HPCL have their own tank farm about 12 km from the berth and they take their products directly to their terminal. BPCL is also setting up their tank farm next to that of HPCL and they will also take the products directly to their terminal. IOCL is also planning to set up tank farms away from the port.

LPG is received for IPPL who have their tankage about 12 km from the berth. The product is pumped directly to their tanks.

All the chemicals are handled through the ETTPL tank farm which is about 4 km from the berth.

Table 4.4 Performance of Liquid Handling Berth (2014-15)

S. No.	Description	POL	LPG	Chemicals
1.	Total volume discharged	1,893,997	1,294,053	129,092
2.	No. of ships	133	56	54
3.	Average parcel size	14,241	23,108	2,391
4.	Total working time in days	188.2	82.25	38.3
5.	Average pumping rate in TPH	410	645	120.0
6.	Average productivity TPD	**10,007**	**15,733**	**3,515**
OVERALL AVERAGE PRODUCTIVTY - 10,719 TPD				

From the table, it can be seen that the average pumping rate is only 410 TPH. This is mainly because the bulk of the volume is handled for HPCL whose terminal is 12 km away. As regards LPG, here again the pumping distance is about 12 km. Moreover, it takes about 6 hours for pre-cooling the arms at low pumping rate before the full discharge rate is achieved. Chemicals are received in small parcels and are discharged through flexible hoses.

Adopting the current average productivity of about 13,500 TPD taking weighted average according to commodities handled, the capacity of the berth could be limited to 350×0.65×13,500 ≈ 3.0 MTPA.

4.5 Performance of General Cargo/Automobile Berth

The performance of the general cargo/ automobile berth during 2014-15 is given in **Table 4.5**. This berth primarily caters to the export of Renault-Nissan car units as also those of Ford and Ashok Leyland.

- Total volume handled - 2,15,071 units
- Number of ships - 123
- Average parcel size - 21,000 T
- Total working time in days - 75.5
- Average productivity - 2,850 units/day

Based on these key parameters, the capacity is assessed as follows:

Table 4.5 Existing Capacity of Multipurpose Berth

S. No.	Particulars	Unit	Car Berth
1.	Cargo Handled	Units	5,00,000
2.	Average Parcel size	units	21,000
3.	No. of Ship Calls per Annum	No.	24
4.	Average Handling Rate	Units per day	2,850
5.	Time Required at Port Per Ship		
a.	Handling Time	Days	7.37
b.	Berthing / De-berthing & Miscellaneous Time	Days	0.17
	Total Time per Ship	Days	7.54
6.	Total Berth Days Required	Days	179
	Total Berth Days Required	Days	179
7.	Berth Days Available per Berth	Days	350
8.	Berth Occupancy	%	51%
9.	**Capacity of Berth**	**65%**	**6,33,753**

The assessed capacity could be rounded off to 6, 00,000 units per annum or equivalent to about 1.0 MTPA.

4.6 Summary of Debottlenecked Port Capacity

Summing up the earlier conclusions, the capacity of the existing berths and the port after debottlenecking would be as shown in **Table 4.6**.

Table 4.6 Capacity After Debottlenecking

Berths	Capacities (MTPA)
Coal Handling berths CB 01; CB 02 (2× 8 MTPA); CICTL (8 MTPA) & SIOT (12 MTPA)	36.0
Liquid Handling berth MLT 1	3.0
General cargo/ Automobile berth	1.0
Total	**40.0**

5.0 DETAILS OF ONGOING DEVELOPMENTS

5.1 General

In recent times, in order to meet the growing traffic demands, Kamarajar Port has initiated action for creating additional terminal facilities. Two more coal berths for TNEB, one container terminal, one LNG terminal and one multi-cargo terminal are under construction. While the two TNEB berths are developed by KPL on its own, the container terminal and multi-cargo terminal are licensed to private agencies on DBFOT basis. The LNG terminal is being set up by IOCL on nomination basis. The locations of these berths along with their back-up areas are shown in the **Figure 5.1**.

Figure 5.1 Location of Ongoing Developments

The details of these berths are brought out hereunder:

5.2 Additional TNEB Coal Berths – CB 3 & CB 4

With the setting up of Vallur Thermal Power Station (VTPS) near Kamarajar Port, expansion of NCTPS, Ennore Power Station, Mettur Power Station and also with a proposal for a new Power Station at Kattupalli, there is growing demand for coal handling facilities at KPL for TNEB coal. Accordingly, KPL has taken action for construction of two more berths CB 3 & CB 4 on its own through internal funding. The port will provide the berth structure and all the topside facilities such as gantry type grab unloaders and conveyor system will be erected and operated by TNEB.

These berths are located within a dock basin created at the foreshore in between the berthing faces of CB 1/CB 2 (at south side) and CICTL (at north side). The basin will be 329.5 m wide and 342.0 m long and with dredged depth of 20 m below CD. The berths have been designed to accommodate capesize bulk carriers up to 180,000 DWT.

Coal Berth CB 3

The construction was awarded to M/s. ITD Cementation India Ltd. The construction work started during July, 2015 and is expected to be completed and commissioned by July, 2017, the berth is 354 m long and 34.8 m wide. The berth structure is made up of a 1,400 mm thick diaphragm wall founded at -30 m; 3 rows of 1,300 mm dia. and the front row of 1,600 mm dia. bored cast-in-situ piles, all founded at -40 m. The berth is provided with cell dock fenders with frontal frames and 150 T bollards, spaced at 20 m centres. The space between the existing conveyors of CB 1/2 and CB 3 will be hardened for 360 m × 10 m.

In addition, an earth retaining structure on the western side for a length of 207.3 m and 22 m wide is also being constructed. The structure is made up of a 1200 mm thick diaphragm wall founded at -30 m; 3 rows of 1,200 mm dia. bored cast-in-situ piles, all founded at -40 m. This structure is provided with 60 T bollards and v type fenders spaced at 20 m centres.

The berth will be equipped with two gantry grab unloaders, each of 2,000 TPH rated capacity. There will be a conveyor of 4,000 TPH capacity running along the entire length of the berth leading directly to NCTPS stackyard.

Coal Berth CB 4

The construction was awarded to M/s. AFCONS Infrastructure Ltd. The construction work started during August 2015 and is expected to be completed and commissioned by August 2017. The berth is 342 m long and 27.5 m wide. The berth structure is made up of a 1400 mm thick diaphragm wall founded at -30 m; 3 rows of 1300 mm dia. and the front row of 1600 mm dia. bored cast-in-situ piles, all founded at -40 m. The berth is provided with cell dock fenders with frontal frames and 150 T bollards, spaced at 20 m centres.

In addition, an earth retaining structure on the western side for a length of 184.6 m and 22 m wide is also being constructed. The structure is made up of a 1,200 mm thick diaphragm wall founded at (-) 30 m; 3 rows of 1,200 mm dia. bored cast-in-situ piles, all founded at -40 m. This structure is provided with 60 T bollards and V type fenders spaced at 20 m centres.

The berth will be equipped with two gantry grab unloaders; each of 2,000 TPH rated capacity. There will be a conveyor of 4,000 TPH capacity running along the entire length of the berth leading directly to NCTPS stackyard as well as to the stackyard of Kattupalli Power Station.

5.3 Container Terminal Phase 1 (Stage I & II)

The License to develop a Container Terminal was awarded to Adani Ports & SEZ Ltd. on DBFOT basis, who formed a SPV named M/s. Adani Ennore Container Terminal Private Limited for this purpose. The concession agreement for a thirty-year concession period was signed during May, 2014. This will be developed in two phases. The first phase of terminal construction started in October 2014 and should be completed and commissioned by January 2017. However, the licensee is planning to commission the terminal by mid-2016

The berth will be constructed on land and later the water front will be dredged. The berth will be 400 m long during the first phase and extended by 330 m during the second phase. It has been designed for handling post-panamax container vessels up to 14,000 TEU to suit -16.0 m CD dredge depth. The sub-structure consists of 1100 mm thick diaphragm wall in the front, a 1200 mm dia. bored cast-in-situ concrete pile in the middle and a 1100mm x 3000mm panel pile on the landside. The centre distance between these three units is 15m + 15 m. The 30 m gauge crane rails are supported by the diaphragm wall on the sea side and the panel pile on the land side.

The berth will be equipped with four rail mounted quay cranes each with 62 m outreach during the first phase and three more such cranes will be added during the second phase.

During the first phase, the back-up area is 400 m × 500 m accommodating the container parking areas, service roads, buildings, gate complex, utilities, weigh bridge and other service facilities. The container parking area will have 3590 TEU ground slots. This will be served by 12 no. eRTGs, one reach stacker and 24 ITVs. During the first phase Stage I, the terminal capacity will be 0.8 million TEUs.

During the first phase Stage II, the back-up area will be 330 m × 500 m. The container parking area will have 3,615 TEU ground slots. This will be served by 9 no. eRTGs, one reach stacker and 18 ITVs. During the first phase Stage II the terminal capacity will be 0.6 million TEUs.

Initially, the containers will be evacuated by road only. KPL is taking action for extending the railway lines to serve both the container terminal as well as the multi-cargo terminal. Once these railway facilities are commissioned, containers will move by rail also.

5.4 Multi-Cargo Terminal

The License to develop a Multi-cargo Terminal was awarded to a consortium of M/s. Chettinad Builders Pvt. Ltd. & South India Corporation Pvt. Ltd. on DBFOT basis, who formed a SPV named M/s. Chettinad International Bulk Terminal Private Limited for this purpose. The concession agreement for a thirty-year concession period was signed during March, 2014. Award of concession was granted during February, 2015. The terminal construction started in July, 2015 and should be completed and commissioned by July 2017. The terminal is expected to handle fertilisers – both finished and raw material, sugar, food grains, bulk cement, general cargo, dry bulk other than coal and project cargo. The capacity of the terminal is expected to be about 2 MTPA in the initial stages.

The terminal will have a 270 m long berth with 500 m deep back-up area. The berth sub-structure will consist of a diaphragm wall on the sea side, a central row of bored cast-in-situ piles and a rear row of panel piles of the same thickness as the diaphragm wall. The deck will be made up of transverse beams, precast and in-situ deck slabs.

The terminal will be served by two Harbour Mobile Cranes with two mobile hoppers, 12 dumpers, 3 front-end loaders, 5 trailers, 2 heavy duty and 4 normal fork lift trucks. The back-up area will have suitable transit sheds, service buildings, work shop, gate complex, Weigh Bridge etc. During initial stages the receipt and evacuation of cargo will be by road only. KPL is taking action for extending the railway lines to serve the multi-cargo terminal. Once these railway facilities are commissioned, cargo will be moved by rail also.

5.5 LNG Terminal

Indian Oil Corporation Limited (IOCL) had identified Ennore as a possible location for setting up its LNG Terminal with regasification facilities. KPL obtained “in principle” approval of the Government in July 2005, for IOCL to set up this LNG terminal. During May, 2013, Ministry conveyed the approval of the Government for leasing of land measuring 52 ha. to the Joint Venture led by IOCL for a period of 30 years for setting up of LNG Storage and Re-gasification Terminal of 5 MTPA capacity at the project cost of Rs. 5151 cr. Subsequently, KPL signed the Concession Agreement with the SPV company of Indian Oil LNG Private Limited (IOLPL) during 2015 for setting up of the LNG Terminal.

The LNG berth will be located near the root of the north breakwater. The centre to centre distance between the LNG berth and the next liquid bulk berth may be about 450 m the berthing face of the jetty will be located 235 m from the centre line of the breakwater. The minimum water depth at the berth will be 15 m below Chart Datum. This jetty will be designed to accommodate LNG tankers of 160,000 DWT with 290 m overall length and 48 m beam. This will be an open piled jetty with isolated dolphins basic layout of 4 berthing dolphins and 6 mooring dolphins.

The regasification plant will have 2 cryogenic storage tanks each of 180,000 m^3 capacity and regasification facilities.

IOLPL awarded the two packages i.e., Regasification terminal and Tankage Construction and mobilization work is in progress. The other package i.e. berth construction also awarded recently. The terminal is likely to be commissioned by 2018.

5.6 Captive Jetty for IOCL

KPL has granted Indian Oil Corporation (IOC) in principle approval to set up a captive jetty to handle imported Petroleum, Oil and Lubricants (POL) & LPG cargo. This facility would be of 360 m in length and shall have a design capacity of 3 MTPA. KPL has signed the MOU with IOCL on 30th November, 2015.. The terminal would become operational by early 2019.

5.7 Second Automobile Terminal/ Ro-Ro Jetty

The berth will be located adjacent to the existing automobile berth at its western end. The berth will be located within the proposed dock basin as shown in the Master Plan of the port. For serving the existing terminal, KPL has already developed an area of about 35 acres for parking the car units and another area of about 14.5 acres is under development. The combined parking area can accommodate about 10,000 car units and that should be sufficient to serve the second terminal also. The second terminal will have a transit parking area just behind the berth with an area of 250 m × 250 m.

The berth will be designed to accommodate the largest car carrier of 8,000 units capacity. This will have the following dimensions: 30,400 DWT; LOA 228 m; beam 32 m and a loaded draft of 11.3 m. The berth will be330 m long and 33.25 m wide.

KPL selected the Contractor i.e., M/s. L&T Geostructure LLP, Chennai for construction of RORO cum General Cargo Berth-II during March 2016.

5.8 Capital Dredging Phase III

In order to provide a water depth of -16 m CD for the proposed Container Terminal Phase 1 and Multi Cargo Berth and -18 m CD for the proposed Coal Berth 3 and 4, Phase 3 of the capital dredging is being taken up by the port.

Figure 5.2 Phase 3 Capital Dredging

KPL has issued the Letter of Award to M/s. International Seaport Dredging Ltd., Chennai during July, 2015. The work is expected to be completed by early March, 2017.

5.9 Capital Dredging Phase IV

Deepening the basin and channel to cater to capsize vessels is like a lifeline for the port in the absence of which there is every probability of losing its competitive position over neighbouring ports particularly in case of Coal and Container Cargo. While the increasing demand for import steam coal, the importers will prepare deployment of deep draft vessel to gain economics of scale. Considering the demand Port has initiated to deepen the basin and channel to cater to capsize vessels.

IPA has prepared the Feasibility Report, the channel length to be increased to 7,680 m from the existing length of 5,200 m. The existing channel has 270 m width at straight portion and 300 m at bend portion. The deepening may be done in the existing width only. The scopes of the proposed dredging works are given below:

Proposed depths in the basin and channel:

(i) Outer approach channel from -20 m CD to -23 m CD and extension of the channel from -20 m contour to – 23 m contour

(ii) Inner channel from -19 m CD to -22 m CD

(iii) The basin area will be dredged to -21 m CD.

KPL selected the Contractor i.e., M/s. International Seaport Dredging Pvt. Ltd., Chennai during March 2016.

6.0 TRAFFIC PROJECTIONS

6.1 General

Kamarajar is a major port in Tamil Nadu handling ~30 MTPA of cargo. Thermal coal forms the major share in the port traffic contributing ~80% to the total traffic. POL, coking coal and automobiles form the majority of the remaining share. Going into the future we expect to see the total traffic at the port to go up to ~70 MTPA by 2020 and 85-95 MTPA by 2025.

The origin-destination of key cargo (accounting for greater than 85% of the total traffic) for all Indian ports and development of traffic scenarios for a period of next 20 years has been carried out by **McKinsey & Co.** as mandated for this project. Accordingly, based on a macro-level analysis the future traffic for Kamarajar up to 2035 has be derived as presented in this chapter.

6.2 Major Commodities and their Projections

6.2.1 Thermal Coal

Ennore facilitates movement of thermal coal to TNEB-Ennore, North Chennai and Mettur Power Stations. The total coal requirement for all these power plants having an installed capacity of ~5200 MW is ~26 – 67 MTPA.

The capacities of these power stations are as follows:

- Ennore TPS 450 MW
- Mettur TPS 1440 MW
- North Chennai TPS 1830 MW
- Vallur TPS 1500 MW

In addition, TNEB is taking action for the following power plants, viz.

- ETPS expansion 660 MW
- NCTPS Stage III 800 MW
- Kattupalli TPS 1600 MW

These plants are expected to be commissioned before 2020. The total coal requirement for these power plants is about 13 MTPA. Accordingly the total thermal coal imports are likely to be 40 MTPA by 2020.

The split of the thermal coal traffic amongst the different power plants is as shown **Figure 6.1**.

Thermal coal volumes

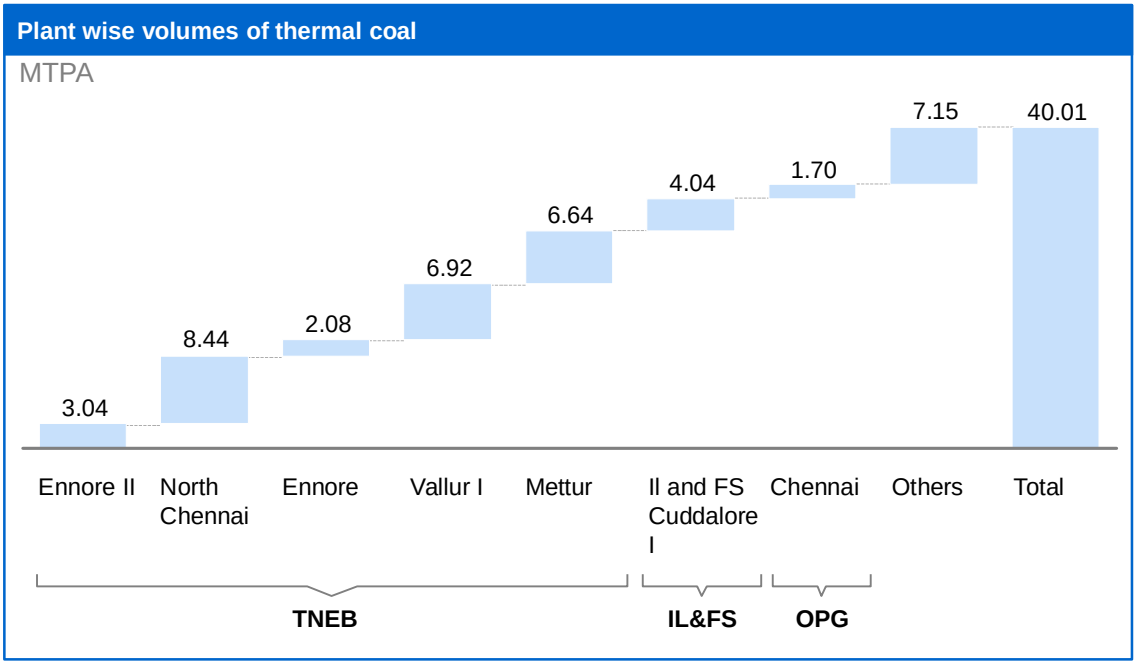


Figure 6.1 Plant Wise Volume of Thermal Coal

Earlier, Karnataka Power Corporation Ltd. (KPCL) for their Raichur Power Plant, (1.0 MTPA) and Andhra Pradesh Electricity Board (APGENCO) for its power plant at Muddanur (1.0 MTPA) were importing thermal coal through Chennai Port. Subsequently, they shifted to Krishnapatnam. It is possible to get these back to Ennore.

6.2.2 POL

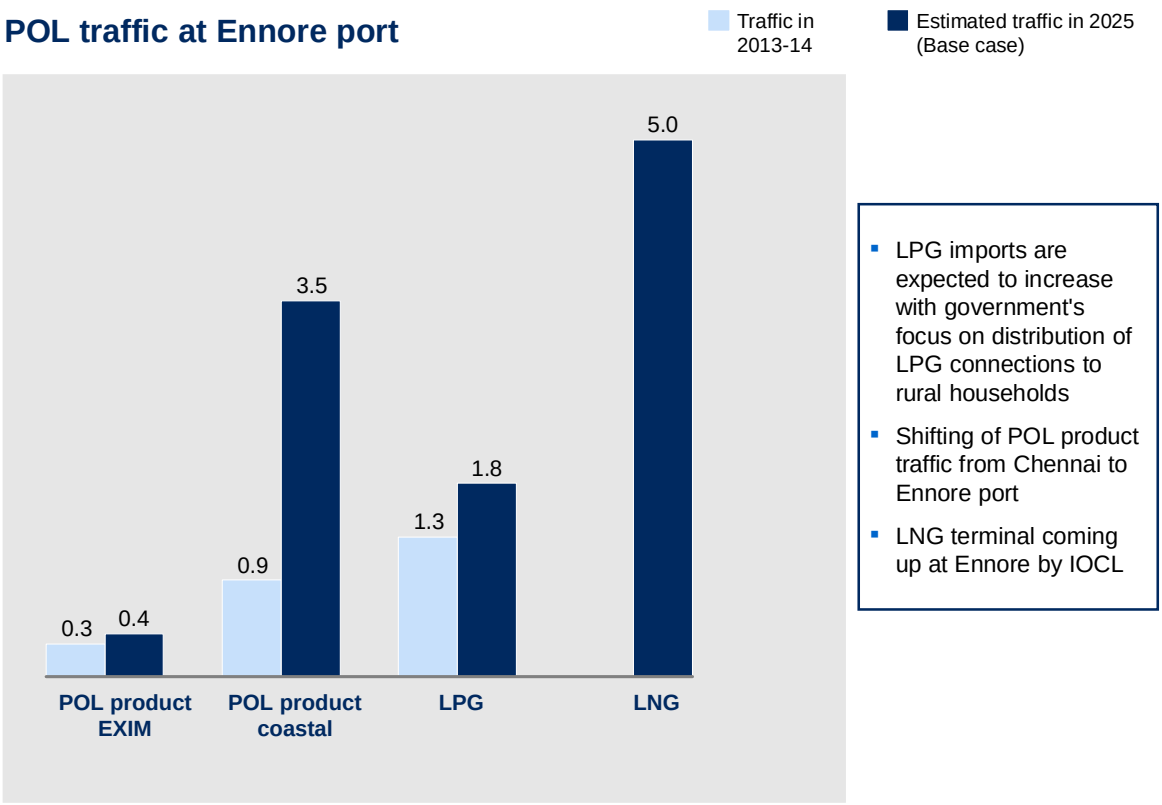
Current ~3 MTPA of POL handled at the Ennore port comprise of 1.80 MTPA of POL products (Coastal and EXIM) and 1.30 MTPA of LPG. It is understood from IOC that they are planning to shift incoming POL products at Chennai Port for marketing purposes to Ennore for which they have been given a captive berth. This volume will be about 2.0 MT. In addition they propose to handle about 0.7 MT of lubricants. They have also a proposal to bring in excess POL from Paradip for marketing purposes which will be moved through existing pipelines to Bangalore & Tiruchi/Madurai/Sankari. The volumes are not yet firmed up but could be over 1 MT. They have provisionally informed the port that their volume could be 3.5 MTPA.

BPC has acquired land near Ennore Port for shifting their existing marketing terminals from Chennai. They have already started getting POL products at Ennore in small quantities through MLT 1. Once their new terminal is fully commissioned, their volume could reach 1.0 MT.

Hence by 2020, the total POL traffic could reach 7.8 MT without taking into account the incremental imports by Shell/Reliance/Essar for marketing purposes and also the normal growth. For example LPG traffic grew from 0.6 MT in 2012-13 to 1.0 MT in 2023-14 and to 1.3 MT in 2014-15.

IOC has also initiated action for construction and commissioning of a LNG terminal at Ennore. Its capacity will be 5 MTPA. This terminal is likely to be commissioned by 2018.

The split of the current POL traffic and the projected volumes for 2025 is as shown in **Figure 6.2**.



SOURCE: Indian Petroleum and Natural Gas Statistics 2013-14; Basic Port Statistics of India 2013-14

Figure 6.2 POL Traffic – Ennore Port

6.2.3 Containers

Adani Ennore Container Terminal Private Ltd. (AECTPL), in the 1st Phase will construct a 400 m long berth with a capacity to handle 0.8 MTEU. In the 2nd Phase another 330 m long extension of the berth will be carried out with a capacity to handle another 0.6 MTEU. Even though the first phase is scheduled for commissioning by early 2017, they are planning to commission it during mid 2016 with the confidence of getting the required traffic. Development of container handling facility at Ennore would divert part of the traffic going to Chennai. It is estimated that Ennore would be able to attract 0.8 MTEU by 2020, 1.1-1.3 MTEU by 2025 and 1.8-2.2 MTEUs by 2035. However, it is to be noted that the exact potential to attract container traffic depends on a number of factors including tariff, operational efficiency, last mile connectivity, etc.

6.2.4 Other Localized Commodities (Automobiles)

Currently 2.15 lakh car units have been handled. (≈ 0.22 MT). According to a report prepared by JICA, the likely exports from Chennai & Ennore by 2020 will be around 1.5 Million car units. Accordingly, they have recommended additional berths at Kamarajar Port. Based on the present situation, Chennai Port may not be able to add any more Ro-Ro berths for want of parking space and also due to restrictions in the timing of cars arriving into the port. Taking a conservative look at the growth of the industry, it may be reasonably assumed that KPL will be required to handle at least 900,000 car units by 2025.

Table 6.1 summaries the traffic potential for key commodities for Kamarajar port.

Table 6.1 Traffic Projection – Kamarajar (Ennore) Port

Units: MMTPA (except Containers)

Ennore Port - Traffic Projections

xx Base Scenario xx Optimistic Scenario

Commodity	2014-15	2020	2025		2035		Remarks
Liquid Cargo*							
POL product (EXIM and coastal)		6.3	6.6	7.0	8.1	8.8	▪ Shifting of POL product traffic from Chennai
LPG		1.5	1.8	2.0	2.5	2.8	
LNG		3.0	5.0	5.0	5.0	5.0	▪ 5 MTPA LNG terminal by IOCL
Total POL (including LPG and LNG)	3.2	10.8	13.4	14.0	15.6	16.6	
Dry and Break Bulk Cargo							
Thermal Coal (Loading)	0.0	0.0	0.0	0.0	0.0	0.0	
Thermal Coal (Unloading)	24.0	40.2	46.5	51.4	77.0	92.0	▪ Coastal increase; could also capture traffic from Cuddalore and Katupalli
Coking Coal	0.3	0.5	0.6	0.7	1.1	1.3	
Iron Ore	0.0	0.0	0.0	0.0	0.0	0.0	
Fertilizers	0.0	0.0	0.0	0.0	0.0	0.0	
Containers and other Cargo							
Containers (MnTEU)	0.0	0.8	1.1	1.3	1.8	2.1	
Others	2.7	4.2	5.6	5.9	9.2	10.5	▪ Vehicle Exports and Other commodities
Total (MMTPA)	**30.2**	**71.1**	**87.3**	**97.1**	**137.6**	**160.1**	

Conversion Factor Used for Containers Projections: 1 TEU = 19.3 Tons
* For 2013-14, POL, LPG and LNG traffic split: POL (EXIM and coastal)- 1.3 MTPA, LPG-1.3 MTPA

6.2.5 Additional Traffic Potential from Proposed Coastal Clusters

Apart from the above mentioned traffic, there is additional opportunity of handling ~14-15 MTPA of coking coal by 2025 if the proposed 20 MTPA coastal steel cluster comes up at Ennore.

7.0 CAPACITY AUGMENTATION PROPOSALS

7.1 Port Capacity After On-Going Developments

The capacity of the existing berths and the new berths after on-going developments are shown in **Table 7.1**.

Table 7.1 Capacity of Existing/ Ongoing Berths

Berths	Capacity (MTPA)
Coal Handling berths CB 1; CB 2 (2 × 8 MTPA); CB 3 & CB 4 (2 × 9 MTPA)	34.0
Coal Handling berths CICTL (8 MTPA) & SIOTL (12 MTPA)	20.0
Liquid Handling berth MLT 1	3.0
General cargo/ Automobile berth (600,000 units)	1.0
Multi-cargo berth	2.0
Container berths Phases 1 & 2	27.02*
Captive jetty – IOCL	3.0
LNG Terminal – IOCL	5.0
Second Automobile Terminal/ Ro-Ro Terminal	1.0
TOTAL	**96.02**

Note: *1 TEU ~ 19.3 MTPA

7.2 Requirement for Capacity Expansion

Referring to **Table 6.1** and **Table 7.1**, even though prima facie it appears that the overall capacity is slightly more than the overall traffic, there is shortfall on facilities for handling specific cargo as seen in **Table 7.2**.

Table 7.2 Requirement of Capacity Addition Over Master Plan Horizon (MTPA)

Cargo Handled	Current Capacity and planned (MTPA)	2020		2025		2035	
		Projected Traffic (MTPA)	Capacity Augmentation required over current (MTPA)	Projected Traffic (MTPA)	Capacity Augmentation required over current (MTPA)	Projected Traffic (MTPA)	Capacity Augmentation required over current (MTPA)
Coal	54.0	40.7	0.0	47.1	0.0	78.1	24.1
Crude/ POL	11.0	10.8	0.0	13.4	2.4	15.5	4.5
Container	27.0	15.4	0.0	21.2	0.0	34.7	7.7
Other	4.0	4.2	0.2	5.6	1.6	9.2	5.2
Total	**96.0**	**71.1**	**0.2**	**87.3**	**4.0**	**137.5**	**41.5**

As regards all types of coal, the total available capacity is 54 MTPA as against the projected traffic of 47 MTPA in 2025 leaving a surplus capacity of 8 MTPA. However, over a period of master plan horizon there would be a requirement to build additional 2 to 3 coal berths.

With reference to liquid bulk, the capacity is far short of the traffic. While the projected traffic is 10.8 MTPA in 2020 and current capacity will be able to service this cargo. However, capacity augmentation of about 2.4 MTPA and 4.5 is required for years 2025 and 2035 respectively. The cargo numbers for 2025 and 2035 account for LNG traffic for IOCL, which may be catered with the planned captive jetty and LNG terminal for IOCL.

Similarly, for automobiles, there is a shortfall in capacity for 300,000 units, which may be met through Ro-Ro terminal being undertaken at the port.

Considering projected cargo and planned facilities, it is required to provide for an additional liquid terminal at Kamarajar port as detailed in further section.

7.3 Second Multi-User Liquid Terminal (MLT 2)

7.3.1 Background

The license for the construction, operation and maintenance of the Multi-user Liquid Terminal (MLT 1) was awarded by EPL to a consortium of Indian Molasses Company Ltd., and Larsen & Toubro through a global bidding process. A Special Purpose Vehicle named "Ennore Tank Terminals Pvt. Ltd" was incorporated for implementing the MLT Project on 30 years' Build, Operate and Transfer (BOT) License. The License was awarded during October, 2004 and the construction started during June, 2006. The complete terminal was commissioned by January, 2009.

The liquid bulk traffic handled at the Multi-user Liquid Terminal 1 during the past five years is presented in **Table 7.3**.

Table 7.3 Liquid Bulk Traffic Handled at the MLT 1 During the Past Five Years

S. No.	Product Handled	2010 - 11	2011 - 12	2012 - 13	2013 - 14	2014 - 15
1.	Pol Products	5,11,422	5,04,349	5,22,981	12,76,431	18,88,478
2.	Chemicals	77,518	94,356	92,739	89,326	1,34,612
3.	Liquefied Petroleum Gas (LPG)	0	0	6,03,533	10,65,247	12,94,053
	Total volume handled	**5,88,940**	**5,98,705**	**12,19,253**	**24,31,004**	**33,17,143**
	No. of Ship arrival during year	87	92	121	175	243
	Berth Occupancy	19%	22%	38%	65%	85%

It could be seen that the traffic, especially in POL products and LPG are growing in a past pace for the past 3 years. This sudden spurt is consequent to the market situation which is explained in the next section.

7.3.2 Market Overview

7.3.2.1 Petroleum Products

The three oil majors, viz. IOC, BPC & HPC are having their marketing terminals for POL products at Chennai and these terminals are located amidst the thickly populated Tondiarpet / Korukkupet areas in North Chennai. The location of these three terminals is shown in **Figure 7.1**.

Figure 7.1 IOC, HPC & BPC Terminals in Crowded Tondiarpet – Korukkuppet Area of Chennai

Though these terminals were in operation for many decades, the devastating fire at IOC terminal at Jaipur during October, 2009 rang a danger bell and the occasional oil leaks in the old pipelines were seen as potential danger signals. Soon after, these oil companies were instructed to shift their terminal operations to Ennore. The Chief Controller of Explosives of Petroleum & Explosives Safety Organisations issued directives to the terminals for moving out of Tondiarpet / Korukkupet area. Accordingly, the oil companies initiated action towards identifying a suitable land near Ennore Port and creating a new terminal. The first to move was HPC who commissioned its full-fledged terminal at Ennore during the later part of 2013. Reliance Industries Ltd. has already established their terminal at Ennore earlier. Now both IOC and BPC are in the process of shifting their operations to Ennore.

The HPC terminal at Ennore is shown in **Figure 7.2**.

Figure 7.2 HPC Terminal at Ennore

The new facility is located on 108 acres land belonging to the Salt Department on North Chennai Thermal Power Station Road at Ennore. The terminal has 20 above ground tanks with total capacity of 140,000 KL for storage and despatch of products of 4 × 10,000 KL (MS); 6 × 10,000 KL (HSD); 4 × 5,000 KL (SKO) and 4 × 10,000 KL Aviation Turbine Fuel. Three pipelines each spanning seven km have been laid from Ennore Port to HPCL terminal. It includes 20 inches for High Speed Diesel (HSD), 16 inches for motor spirit (MS) and super kerosene oil (SKO).

The terminal has facilities such as tankages, tank truck loading facility, tank wagon loading and receipt facility along with product receipt facilities from the Ennore Port and CPCL. The tank farm and tank truck loading operations are fully automated. This terminal is to supply diesel, MS, HSD and SKO to eight districts – Chennai, Thiruvallur, Cuddalore, Kancheepuram, Vellore, Tiruvannamalai, Puducherry and Villupuram. Progressively, this would reduce the company's dependence on Chennai Petroleum Corporation Ltd's Manali refinery as products for the new terminal would be shipped to Ennore from refineries of HPCL. It is expected that their total volume will be about 1.0 MTPA.

Bharat Petroleum Corporation Ltd (BPCL) is also fast tracking plans for establishing a terminal in Ennore, an installation that will be a bigger, better alternative to its Tondiarpet facility BPCL applied for 110 acres in Ennore in salt pan lands. The terminal, with latest facilities for improved handling and safety, in Ennore would be having a storage capacity of 1,55,000 kl. The company estimates that it would need two years, from the date of receiving all approvals, to commission the new terminal. With the new terminal in a relatively larger area at Ennore, they would like to expand their marketing activities. It is understood that their volumes will also be around 1.0 MTPA.

Indian Oil Corporation Ltd. has already acquired land at Ennore for setting up their marketing terminal. It is understood from IOC that they are planning to shift incoming POL products at Chennai Port for marketing purposes to Ennore. This volume will be about 2.0 MT. In addition, they propose to handle about 0.7 MT of lubricants. They have also a proposal to bring in excess POL from Paradip for marketing purposes which will be moved through existing pipelines to Bangalore & Tiruchi/ Madurai/ Sankari. The volumes are not yet firmed up but could be over 1 MT. They have provisionally informed the port that their volume could be 3.5 MTPA.

The POL imports of other players such as RIL, Essar etc. is likely to be around 0.5 to 0.6 MTPA.

The relative locations of Kamarajar Port and the installations of these oil companies are shown in **Figure 7.3**.

Figure 7.3 Relative Locations of Ennore Port and the Installations of Various Oil Companies.

7.3.2.2 Liquefied Petroleum Gas (LPG)

The demand for LPG in Tamil Nadu is more than the supply. In order to bridge the gap between demand and supply, IOCL was moving LPG by road from New Mangalore Port to Chennai traversing a distance of about 850 km as there was no LPG handling facilities at Chennai Port. IOC is already operating a bottling plant at Attipattu, near Ennore Port with LPG inputs from the refinery.

Indian Oil Petronas Private Limited, a JV of IOC and Petronas of Malaysia, has set up a LPG Bulk Plant at Ennore terminal adjoining IOC bottling plant. The terminal has 2×15,000 T refrigerated tanks connected to the port through 2×18" diameter pipelines. This terminal was commissioned during 2012. The LPG traffic is picking up fast in that during the start-up year, it was 0.60 MT which jumped to 1.07 MT the next year, 2013-14 and last year it was 1.29 MT. It is likely to grow further and could reach up to 1.5 MT.

7.3.2.3 Chemicals

It could be observed from the past statistics that the chemical traffic has not been significant. The average traffic is less than even 100,000 T. It is not expected to have a spectacular increase in the forthcoming years.

Taking into consideration all these aspects, the total POL traffic could reach 7.6 MTPA or say 8.0 MTPA by 2020.

It has to be noted that out of the projected 8.0 MTPA, 3.5 MTPA of IOCL products, 1.0 MTPA each of HPCL & BPCL products and 1.5 MTPA of IPPL LPG will all move through pipelines directly to their respective tankages outside the port. The balance 1 MTPA will need storage and evacuation facilities inside the port.

7.3.3 Performance of MLT 1 and its Optimum Capacity

A look at the traffic for the past 5 years indicates that the berth occupancy increases along with the increase in traffic. The acceptable berth occupancy is 65% which will have least pre-berthing detention. During 2013-14, the terminal handled 2.43 MT with the acceptable berth occupancy level of 65%. However, during 2014-15 the traffic increased to 3.3 MT and the berth occupancy also increased to 85%. This has resulted in a cumulative pre-berthing detention of more than 800 ship days. It has been reported that each LPG tankers had to wait for a period ranging from 6 to 10 days. All the users have been affected because of this situation.

The performance of the Multi-User Liquid Terminal 1 during 2014-15 is examined in detail in **Table 7.4.** This terminal handles primarily POL, LPG and chemicals including CBFS.

Table 7.4 Performance of the Multi-User Liquid Terminal 1 During 2014-15

Commodity	No. of Tankers	Total Volume	Berth Days	Productivity TPD	Parameter	Max.	Min.	Avg.
POL	131	1.89	198	9,545	DWT	1,15,418	10,313	42,623
					LOA	249	125	177
					Parcel Size	47,927	2,336	14,416
LPG	56	1.29	87	14,828	DWT	64,220	25,926	51,380
					LOA	230	167	221
					Parcel Size	33,579	8,428	23,108
Chemicals	56	0.14	42	3,333	DWT	44,401	3,799	16,244
					LOA	183	96	133
					Parcel Size	9,210	720	2,404

As regards the agencies using the terminal and the mode of evacuation, the following details are available for 2014-15;

- POL-HPCL 0.798 MT
- BPCL 0.685 MT
- 5 others 0.411 MT
- LPG-IPPL 1.290 MT
- Chemicals 0.140 MT

Out of the total traffic of 3.3 MT, the POL of HPCL & LPG of IPPL (totalling 2.088 MT) moved through pipelines directly to their respective tank farms outside. The balance 1.212 MT passed through the tankage of ETTPL.

The POL products are mainly MS, ATF, SKO and HSD for marketing purposes handled for IOCL, BPCL, HPCL, Reliance, Essar and Shell. Except for HPCL all the requirements of other agencies pass through the tankage terminal of ETTPL, the operator of the berth. HPCL have their own tank farm about 12 km from the berth and they take their products directly to their terminal. BPCL is also setting up their tank farm next to that of HPCL and they will also take the products directly to their terminal. IOCL is also planning to set up their own tank farm away from the port and its products also will be directly pumped to their terminal.

LPG is received for IPPL who have their tankage about 12 km from the berth. The product is pumped directly to their tanks.

All the chemicals are handled through the ETTPL tank farm which is about 4 km from the berth.

From the table, it can be seen that the overall average productivity is only 10,000 TPD. This is mainly because the bulk of the volume is handled for HPCL whose terminal is 12 km away. As regards LPG, here again the pumping distance is about 12 km. Moreover for LPG, it takes about 6 hours for pre-cooling the arms at low pumping rate before the full discharge rate is achieved. Chemicals are received in small parcels and are discharged through flexible hoses.

In view of the above, any dramatic improvement in the discharge rate cannot be expected. Adopting the current average productivity of about 10,000 TPD, the capacity of the berth could be ≈2.5 MTPA.

7.3.4 Need for MLT 2

The projected traffic by 2020 has been arrived at as 8.0 MTPA and the assessed optimum capacity of MLT 1 is 2.5 MTPA. This leaves a gap of 5.5 MTPA. KPL has signed a MOU with IOC for a captive berth. IOC has indicated that they propose to handle about 3.5 MTPA at their captive berth. Based on the analysis of MLT 1 it is felt that IOC will be able to handle only up to 3.0 MTPA at their berth. This could be possible by bringing in larger parcel sizes. Since IOC intends to move their products further off the city through their existing pipelines connecting Bangalore, Madurai, Trichirapalli, it is possible to bring in larger parcels. This still leaves a gap of 2.5 MTPA which establishes the immediate need for MLT 2.

7.3.5 Project Details

7.3.5.1 Siting of the Berth & Tankage

The berth will be located adjacent to the existing MLT 1 berth and south of it as shown in the Master Plan of the port. The associated tank farm will be located in a 33 acre plot north of the tank farm area of MLT 1 and this will be about 4.3 km from the jetty.

The berthing face will be located at about 150 m from the centre line of the breakwater and will be in line with the berthing face of MLT 1. The tentative location is marked in the **Figure 7.4**.

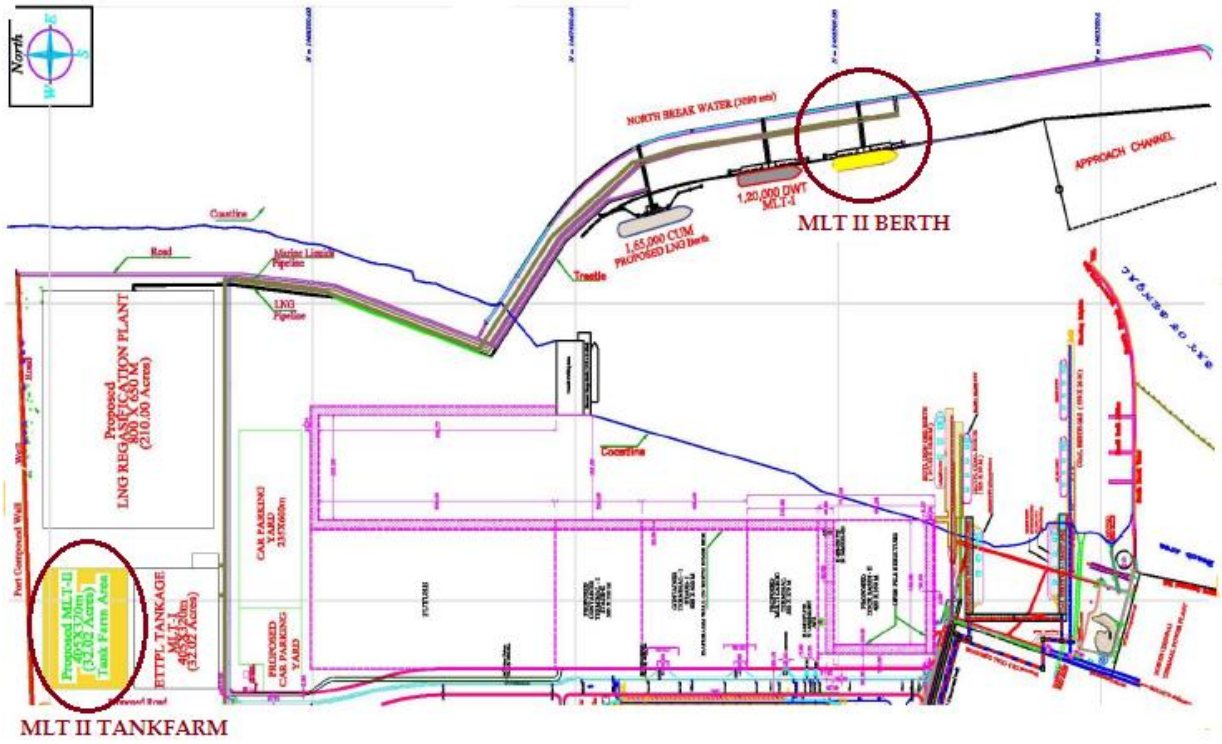


Figure 7.4 Tentative Location MLT 2 Berth and Tank Farm

7.3.5.2 Design Tanker Size

An analysis on the sizes of tankers – range of their DWT; range of LOA and the range of their parcel sizes – were carried out at MLT 1 for the past 3 years to get an idea. The details are furnished in the **Table 7.5**

Table 7.5 Analysis on Sizes of Tankers

Commodity	Year	Parameter	Maximum	Minimum	Average
POL	2014 - 15	DWT	1,15,418	10,313	42,623
		LOA	249	125	177
		Parcel Size	47,927	2,336	14,416
	2013 - 14	DWT	1,11,405	7,682	45,443
		LOA	247	118	181
		Parcel Size	45,081	1,023	14,672
	2012 - 13	DWT	1,07,505	9,210	44,064
		LOA	254	110	178
		Parcel Size	41,186	973	10,459
LPG	2014 - 15	DWT	64,220	25,926	51,380
		LOA	230	167	221
		Parcel Size	33,579	8,428	23,108
	2013 - 14	DWT	77,523	9,469	49,557
		LOA	266	126	215
		Parcel Size	34,707	3,301	23,158
	2012 - 13	DWT	59,421	13,663	48,158
		LOA	230	138	218
		Parcel Size	31,802	6,000	22,353

It could be seen that the maximum DWT was 115,418 and the maximum LOA was 266 m while the minimum DWT was 7682 and the LOA was 110 m.

The proposed jetty, being located in the deep basin which will be dredged to -18.0 m CD, it is suggested that this berth be designed to handle Suezmax tankers up to 150,000 DWT. Since the growth of the chemical traffic is not likely to be so much as to spill over the capacity of MLT 1, the small chemical tankers have not been considered.

The parameters of design Suezmax tankers are LOA 275 m, beam 48 m and loaded draft 16.5 m.

7.3.5.3 Jetty Structure

The berth will be of conventional type with a service platform, four berthing dolphins and four mooring dolphins. The berthing dolphins will be provided with rubber fenders and bollards while the mooring dolphins will be provided with quick release hooks. The service platform will be served by an approach trestle linked to the pipeline trestle of IOC captive berth which will be designed to accommodate the pipelines of MLT 2 also.

Normally the berthing dolphins will be spaced between 0.25 to 0.40 times LOA of the tanker to be berthed. Considering the wide variation of LOA between the largest design vessel and the smallest possible tanker i.e. 150,000 DWT with 275 m LOA and 9,000 DWT with 110 m LOA, it is proposed to integrate the two pairs of berthing dolphins and the service platform into a single platform of 100 m length. The mooring dolphins will be split into two groups – one pair on either side for larger tankers and a single one on either side to take care of the smaller tankers.

7.3.5.4 Integrated Service Platform & Berthing Dolphins

The integrated service platform cum berthing structure will be of size 100 m × 20 m. The deck level will be kept at + 5.0 m CD. The sub-structure will be of 1200 mm bored cast-in-situ RCC piles and capping beams and slab. This will be provided with dock fenders with frontal frames to absorb the berthing energy from the various sizes of tankers. These fenders will be provided at 20 m intervals. Bollards will also be placed at 15 m centres to take the spring lines. In addition, the platform will accommodate the pipelines manifolds with headers, marine unloading arms, firefighting tower monitors, fire hydrants and jumbo curtain nozzles.

7.3.5.5 Mooring Dolphins

It is proposed to have three pairs of mooring dolphins. The outermost pair of mooring dolphins will be at 165 m on either side of the centreline and 50 m behind the berthing face. The first pair of inner mooring dolphins will be at 120 m on either side of the centreline and 50 m behind the berthing face. The second pair of inner dolphins will be at 70 m on either side of the centreline and 30 m behind the berthing face. This pair of dolphins will be mainly used by smaller tankers. These dolphins will be of size 12 m × 14 m with the sub structure made up of steel tubular piles. This has been done considering the mooring loads, site conditions and the available soil data. The deck level will be kept at + 5.0 m. Each of the dolphins will be provided with a triple hook quick release hook assembly with capstans. All the mooring dolphins and service platform will be interconnected with walkways.

A general layout of the integrated service platform and mooring dolphins is shown **Figure 7.5**.

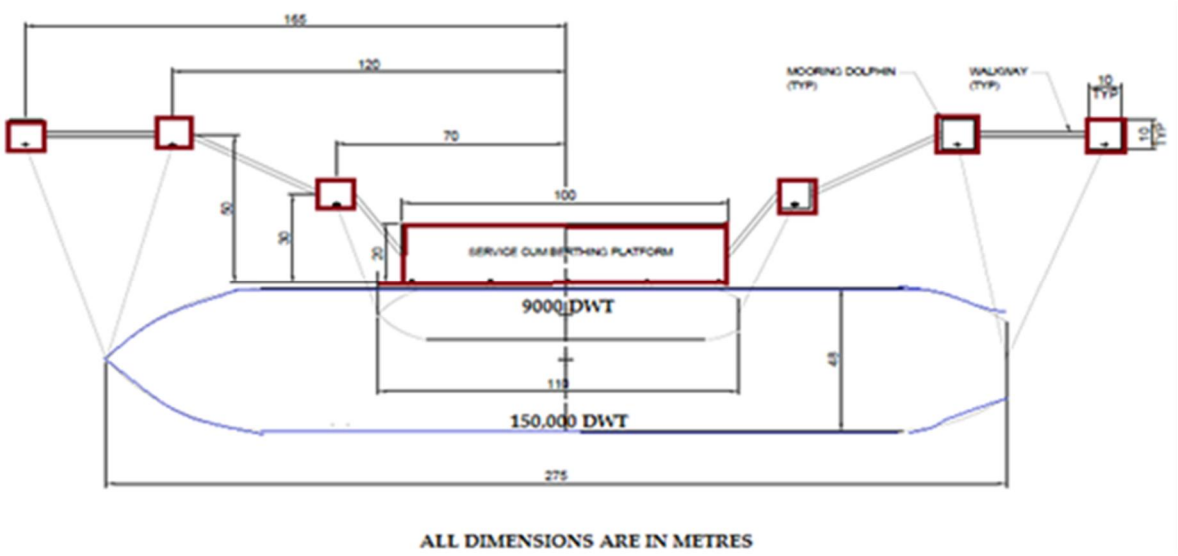


Figure 7.5 General Layout of the Integrated Service Platform and Mooring Dolphins

The approach trestle will be of 12 m total width comprising 6.5 m of carriageway and 4.5 m of pipe rack. It may be noted that the proposed location of the IOCL captive jetty will be further south of MLT 2 jetty. The relative locations of all the three jetties are shown in **Figure 7.6**.

Figure 7.6 Relative Locations of All the Three Jetties

It is understood from KPL that it has been agreed with IOCL that their approach trestle will be designed to accommodate the pipelines of MLT 2 also. It has been provisionally agreed with IOCL that their approach trestle will be independent of the existing approach trestle of MLT 1. Since there is no sufficient space in between the toe of the breakwater and the trestle of MLT 1, it has been decided to take the new approach trestle west of MLT 1 trestle as shown in the picture. The pipeline has to cross the existing trestle leading to MLT 1 jetty as also it has to cross the LNG pipelines. The location of the trestle further beyond MLT 1 is being discussed with IOC LNG group. Since the DPR of IOC captive jetty is under preparation, this alignment of the approach trestle will be decided in due course. The total length of the approach trestle up to the shoreline will be about 1.80 km from MLT 2.

7.3.6 Jetty Topside Facilities

7.3.6.1 Marine Unloading Arms

The service platform will be provided with two marine unloading arms of 12" dia. for handling POL products (white oil and black oil). These shall be designed and constructed according to OCIMF standards. The capacity of each arm shall be 2000 m^3/hr at an operating pressure of 10 kg/m^2.

7.3.6.2 Pipelines

The following pipelines will be provided. These will be connected to the unloading arms through pipeline manifolds. The total length of the pipelines up to the tank farm will be about 1.8 km on trestle and about 2.5 km on land.

- 1×24" white oil line going up to the tank farms outside the port
- 1×24" black oil line going up to the tank farms outside the port.
- 1×12" white oil line leading to the tank farm inside the port
- 1×12" black oil line leading to the tank farm inside the port
- 1×6" slop oil collection line leading to the tank farm inside the port
- 1×8" freshwater line

7.3.7 Fire Fighting System

The berth will be provided with fire-fighting system comprising tower monitors, jumbo curtain nozzles and hydrants as per OISD 156. The firefighting system shall be based on seawater which is available immediately adjacent to the berth. The facilities shall comprise two separate systems – tower monitors & water curtains, hydrants and ground monitors. Accordingly two separate sets of pumps shall be provided one for each system.

The tower monitors shall be mounted on steel towers, 18 m high. They will have a horizontal range of 100 m for water and 50 m for foam. The monitors shall be auto operated from the control room located on the pump house building. Local operating station shall also be provided at the berth. The monitors can operate either with foam or with water as required. The capacity of each monitor shall be 6000 lpm.

Four water curtain nozzles shall be provided at the jetty for protection of critical equipment from heat radiation - two for the protection of towers and two for the protection of unloading arms. Curtains of capacity 1500 lpm and with a range of 12 m radius shall be provided. Water is delivered to the curtains at a pressure of 7 to 8 kg/cm^2. The angle of spray is approximately 170°. A curtain is created by high-pressure water passing through a circular nozzle, having fine holes/notches along half its periphery.

Two double-headed hydrants shall be located on the unloading platform. The double headed hydrants, at 1.4 m height are two valve units connected to the main hydrant ring. Near each hydrant, there shall be an FRP box containing two 15m long rubber lined hoses and one triple purpose nozzle. This nozzle can provide water in the form of a jet or spray. It can also provide foam compound supply. Each hydrant can discharge 2 × 36 cum/hr water at 7 kg/cm^2 pressure.

Two additional water/ foam monitors shall also be located on the Platform. They will be installed on three metre high structures. The capacity of each monitor will be 2400 lpm.

The fire water pressure system shall be designed for a minimum residual pressure of 7 kg/cm^2 at the hydraulically remotest point of application in the terminal. Centrifugal type fire water pumps shall be provided to meet the design fire water flow rate and head. These will have flooded suction and capable of discharging 150% of its rated discharge at a minimum of 65% of the rated head. It is proposed to have one electrically driven pump with a stand by diesel engine driven pump set for tower monitors and hydrant system separately. Also jockey pumps of adequate capacity to maintain minimum pressure 7 kg/cm^2 in fire water distribution network will be provided.

The Fire water pump house will be located at least 100 m away from the jetty.

7.3.8 Tank Farm

As indicated earlier about the evacuation of the projected traffic, only 1 MTPA of products will pass through the terminal tankage while the balance 7 MTPA will move through pipelines outside the port to the respective terminals. It has also been indicated that during 2014-15, the existing MLT 1 had handled 1.2 MT through its terminal. Considering all these, it may be concluded that there may not be any need for tankage for MLT 2.

However, it has to be noted that MLT 2 will be developed as a competing facility under PPP mode with freedom to handle any type of liquid cargo depending upon its capacity to attract new customers. With this contingency, it may necessary to have at least a minimum tankage to serve the customers who are interested. For this purpose only it has been proposed to lay 2 ×12" pipelines from the jetty to the tank farm one each for while oil and black oil.

It is proposed that, initially, 5 × 5000 kl tanks (25,000 kl total capacity) can be provided which will be able to handle about 0.3 MTPA of products. These will be supported by 3 bays of TLF for evacuation by road. Further addition of tanks and pipelines shall be provided later based on market demand.

The tank farm will have all other infrastructure and service facilities required for the effective functioning of a tank farm. It will have an administrative office building with a control room; weigh bridge; TLF sheds; Security house and gate complex; interconnecting pipelines; transformers for power supply; slop tank; effluent treatment plant; DG set etc.

The tank farm will be located north of the existing MLT 1 tank farm as shown in **Figure 7.7**.

Figure 7.7 MLT 1 Tank Farm

The tank farm will be laid out according to OISD 118. The terminal firefighting facilities shall be designed as per OISD-117

7.3.9 Project Cost

7.3.9.1 Capital Cost

Block cost estimates have been prepared for the scope of the project as detailed in earlier section. The estimated capital cost of the project works out to Rs. 393 crores.

7.3.9.2 Operational & Maintenance Costs

The operational & maintenance costs have been worked out grouping the project components as civil and mechanical. These costs are derived as percentage of capital costs, the percentage based on industrial practice. The annual operation and maintenance costs work out to about Rs. 10.6 cr.

8.0 PORT INTERNAL NETWORK, EXTERNAL CONNECTIVITY AND INFRASTRUCTURE

8.1 General

For the efficient performance of a port, the effective internal network of road and rail as well as external connectivity to the national highway and trunk railway routes are essential to ensure faster receipt and evacuation of cargo. Accordingly, the existing situation at KPL and their proposals are described in the following sub sections. The internal road and rail network is presented in the **Figure 8.1**.

Figure 8.1 Internal Rail Road Network of Kamarajar Port

8.2 Internal Network

8.2.1 Road Network

8.2.1.1 Existing Port Access Road (VOC Road)

From the existing coal berth a road, developed during port construction, links the coal berth to the Port Access Road though the Port Main Gate. The Port Access Road joins the NCTPS road which in turn joins the TPP road. This is being widened to four lanes and will continue to be the main link for the next few years.

8.2.1.2 Additional Internal Roads

8.2.1.2.1 Road Along the Compound Wall (Security Road)

There is a security road along the compound wall inside the Port premises with total length of about 5 km.

8.2.1.2.2 Principal Road (East-West) South of the Liquid Storage from the Compound Wall

This principal port road runs for a length of 1.6 km inside the Port area and the road is extended outside beyond the port premises.

8.2.1.2.3 Connectivity Road for POL/Chemical Tankage and LNG Regasification Plant

The road branches off from the principal road to provide access to MLT and LNG tank area.

8.2.1.2.4 Road Along the Shore East of Liquid Storage Area up to Root of North Breakwater

The road along the shore to the root of the north breakwater for a length of about 1.8 km has been formed with black topping for access to the General Cargo Berth and North Breakwater.

8.2.1.2.5 North-South Road

This is a proposed road connecting the proposed container terminal and multi cargo terminal to the western and northern gates of the port. The contract for construction of two lane concrete road with paved shoulders on either side has been awarded and is expected to be completed in the mid of 2016. This would be about 2.6 km long.

8.2.1.3 External Roads in Immediate Vicinity

8.2.1.3.1 Kattupalli Road

Kattupalli road that has a length of about 3.8 km has developed for evacuation of liquid cargo and car carriers with two lane bitumen road. Till the completion of Northern Port Access Road, the present Kattupalli road is being widened for handling the projected volume of traffic.

8.2.1.3.2 Access Road to Iron Ore / Coal Stackyard

The existing BOT Operator of CICTPL under the CSR activity developed a two lane concrete road from the Stackyard to the Port Access Road. The trucks carrying the coal from the stackyard are being evacuated through this road.

8.2.1.3.3 Road Connecting NCTPS Road to Iron Ore / Coal Stackyards

The road provides connectivity to coal and iron ore yards and recently KPL developed as a concrete road. The road stretch between NCTPS road and northern end of the coal yard is about 6 km long. This road crosses the existing railway track for which RUB has been planned and construction work is in progress.

8.2.2 Rail Network

8.2.2.1 Holding Yards I & II

Presently Kamarajar Port is connected by rail to the mainline at Attipattu and Attipattu Pudunagar Stations located in the Chennai – Gudur section of the Southern Railway on the Chennai – Delhi/Kolkata route. The southern connectivity takes off from Attipattu Pudunagar Railway Station. The northern connectivity takes off from Attipattu Railway Station. These two lines merge at the Apex Point and run as a single line to the NCTPS Yard.

The siding was developed and is being used by TNEB for dispatch of thermal coal by rail from NCTPS to their power plants located at Mettur and Ennore. KPL developed the railway facilities connecting the stackyards of the coal and iron ore terminals to the existing NCTPS railway line. Subsequently, KPL has developed two more R&D lines on the Northern side of the existing NCTPS Yard.

8.2.2.2 Railway Layout and Operations at the Coal and Iron Ore Yards

The planning and rail operations are being executed by the respective BOT operators.

8.2.2.3 Connectivity to the Container & Multi Cargo Terminals

An independent railway line is proposed for the ongoing container terminal and multi cargo terminal. These lines take off from the one line branch of NCTPS line to KPL premises. The DPR has been approved by Railways in December 2014 and the work has been entrusted to RITES for construction on deposit basis. KPL signed the MOU with RITES 14.02.2015. Subsequently, RITES prepared the tenders for different packages such as embankment formation, procuring rails and sleepers, laying of railway track, OHE, etc. The contracts for the works of embankment formation and construction of culverts and the supply of pre-stressed concrete sleepers, slack gauge sleepers and turnout sleepers, etc., have been awarded. Construction work is in progress and the work is expected to be completed by end of 2016

8.3 External Connectivity

8.3.1 General

The external road and rail connectivity to the National Highways and the railway trunk routes are shown in the **Figure 8.2** hereunder.

Figure 8.2 External Rail and Road Connectivity to Kamarajar Port

8.3.2 Upgrading the Southern Port Access Road

Present road connectivity of Kamarajar Port to the three National Highways (NH5, NH4 & NH45) is through the **Port Access Road, the NCTPS approach road**, Tiruvottiyur – Ponneri – Panchetty (TPP) Road, the Inner Ring Road (IRR) and the Chennai bypass.

Considering the increasing road traffic movement of import / export of cargoes, KPL has envisaged interest for widening of the existing two lane road starting from Vallur Junction (TPP road) to Kamarajar Port Main entrance to four lane road. The proposal comprising the 4.8 km length of North Chennai Thermal Power Station (NCTPS) road belongs to Tamil Nadu Generation and Distribution Corporation Ltd (TANGEDCO) and the 2.3 km length of port access road which belongs to Kamarajar Port.

KPL appointed Tamil Nadu Road Development Corporation Ltd. (TNRDC) as a consultant for preparation of Detailed Feasibility Report (DFR) and implementing the said project. The consultant submitted the DFR and the proposal in 2 stages.

- Stage 1 – Widening and strengthening the existing 2 lane road to 4 lane road from Vallur Junction to KPL Main Gate to a length of 7.1 km at the block estimate of Rs. 160 cr.
- Stage 2 – Construction of dedicated 2 lane exit road from Port Main Gate to the NCTPS road with a length of about 1 km at the block estimate of Rs. 30 cr.

Initially, it is planned to develop the Stage 1 proposal i.e., widening and strengthening the existing 2 lane road to 4 lane road from Vallur Junction to KPL Main Gate at an investment cost of Rs.160 cr. and Stage 2 will be taken up subsequently.

The funding mechanism for Stage 1 will be done through IEBR which is subject to discussion and finalization with L&T Shipbuilding and L&T Kattupalli Ports either by collecting the user fee for the trucks or sharing the expenses.

The proposal for developing the Southern connectivity of the Port from Vallur Junction at TPP road to KPL Main Gate – Widening and strengthening the existing 2 lane road to 4 lane road (Stage 1) at the block cost estimate of Rs.160 cr. by funding through Internal and External Budgetary Resources (IEBR) is awaiting the Board approval.

8.3.3 Proposed Northern Port Access Road

The Government of India conveyed in-principle approval for inclusion of New 4 lane road to provide direct connectivity to Kamarajar Port from NH-5 under NHDP Phase-VII in 2004. A new 4 lane road is proposed from Kamarajar Port to Thatchur on NH-5 with a length of 21.148 Km and a link to TPP Road with a length of 4.35 km for providing seamless evacuation of cargo from Kamarajar Port.

As per the original proposal, this road is an exclusive access controlled road linking Kamarajar Port to NH-5. Accordingly, the Feasibility Report was prepared by NHAI at a total cost of Rs. 271 cr. As on date, the Government of Tamil Nadu has taken over the project from NHAI during January 2012. Now state Government has finalized the alignment of road and DPR is in the approval stage from State Ministry. This is one of the components of Chennai Peripheral road alignment which is now in the planning stage of State Government. TNRDC is the implementing Agency for the Northern Port Access road.

Alignment has been finalized and the project has been approved by State Government. NPAR to be developed in two stages.

- Stage 1 – Spur Road starts from Port to TPP Road near Minjur
- Stage 2 – Starts from the Spur Road to Thatchur on NH-5

Now Govt. of Tamil Nadu issued the G.O. for acquisition of land and allots the provisional amount for land acquisition. TNRDC is the implementing Agency for the Northern Port Access road.

8.3.4 Proposed Northern Rail Connectivity

KPL initiated action for development of Northern Rail Link connecting north of Minjur to KPL which is parallel to the proposed Northern Port Access Road. The DFR has been prepared and approval was obtained from Southern Railways during September, 2013. KPL appointed a Consultant for the preparation of DPR and obtaining approval from the Railways. The consultant has submitted the draft DPR and is in the process of preparing the final DPR after incorporating the comments of KPL and detailed engineering study. To firm up the alignment, Additional Chief Secretary, Industries Department held a meeting with the stakeholder during April, 2015. KPL forwarded the alignment drawings to TIDCO & L&T for their comments and their comments were received during July, 2015. KPL propose to convene a joint meeting with the stakeholders i.e., TNRDC, TIDCO and L&T Kattupalli Port. The tentative project cost is Rs.244.438 crores. The DPR has been submitted to Railways on 24.11.2015 for approval. Totally 160.46 acres of land is required for the Rail Connectivity. KPL is pursuing with the State Government for acquiring of land from the Private Owners and also give ROW permission for Govt. land for construction of the proposed NRL. The project is identified as one of the critical projects for Ponneri node under Chennai Bangalore Industrial Corridor (CBIC).

8.4 Proposed Infrastructure Projects

8.4.1 Container Truck Parking Yard & Yard for Parking Car, Trucks and Road Tankers

KPL is initiating action for setting up a container truck parking yard outside the port which will be custom bound. Container trailers will be parked here, inspected and cleared by the Custom authorities. There will be a six lane road connecting this yard with the container terminal inside which will be exclusive for the container trailers only with restricted entry. There will be a ROB to cross the railway line. This yard will be provided with necessary office accommodation for the terminal operator as well as the Custom authorities. The yard will also have rest rooms and canteen for the trailer operators.

Adjacent to this yard, there will be another yard open for trucks carrying car units for export as also road tankers waiting to receive POL products and chemicals. This yard will ease the present congestion on the road leading to the port gates. A consultant has been appointed to prepare the detailed project report.

8.4.2 Development of Free Trade and Warehousing Zone

Keeping in view, the envisaged growth objective of KPL, the port proposes to undertake the development of FTWZ offering State-of-the-Art logistics infrastructure through the following:

- Warehousing and forwarding facilities
- Free trade zones/export processing areas
- State of the art communications infrastructure
- Transport facilities
- Support facilities for Social / Commercial / Institutional
- Any other facilities as required for making it as the State-of-the Art FTWZ.

KPL has appointed a consultant to prepare a Master Plan. The Consultant carried out the Topography survey of the proposed FTWZ during February, 2015 and collected the relevant data. They Consultant submitted the draft Master Plan during June,.2015 and KPL has given in-principle approval During the Board Meeting held during August, 2015, the Consultant made a presentation and the Board directed the Consultant to suggest measures to reduce the capital cost. Further, the Board suggested to have the development through Private Sector Investment and thus a concession or Joint Venture based development can be considered by KPL.

The Consultant submitted the various Investment Models. KPL Board has approved the Consultant's proposal for developing the FTWZ on DBFOT basis by March 2016. KPL is in the process of appointing Transaction Advisor for bidding process of the project.

9.0 SCOPE FOR FUTURE EXPANSION

9.1 Development Possible within the Existing Harbour

Even after creating the new facilities, the existing harbour basin will be able to accommodate 7 more berths as shown in the marked zones 1, 2 & 3 in the Layout presented in **Figure 9.1**.

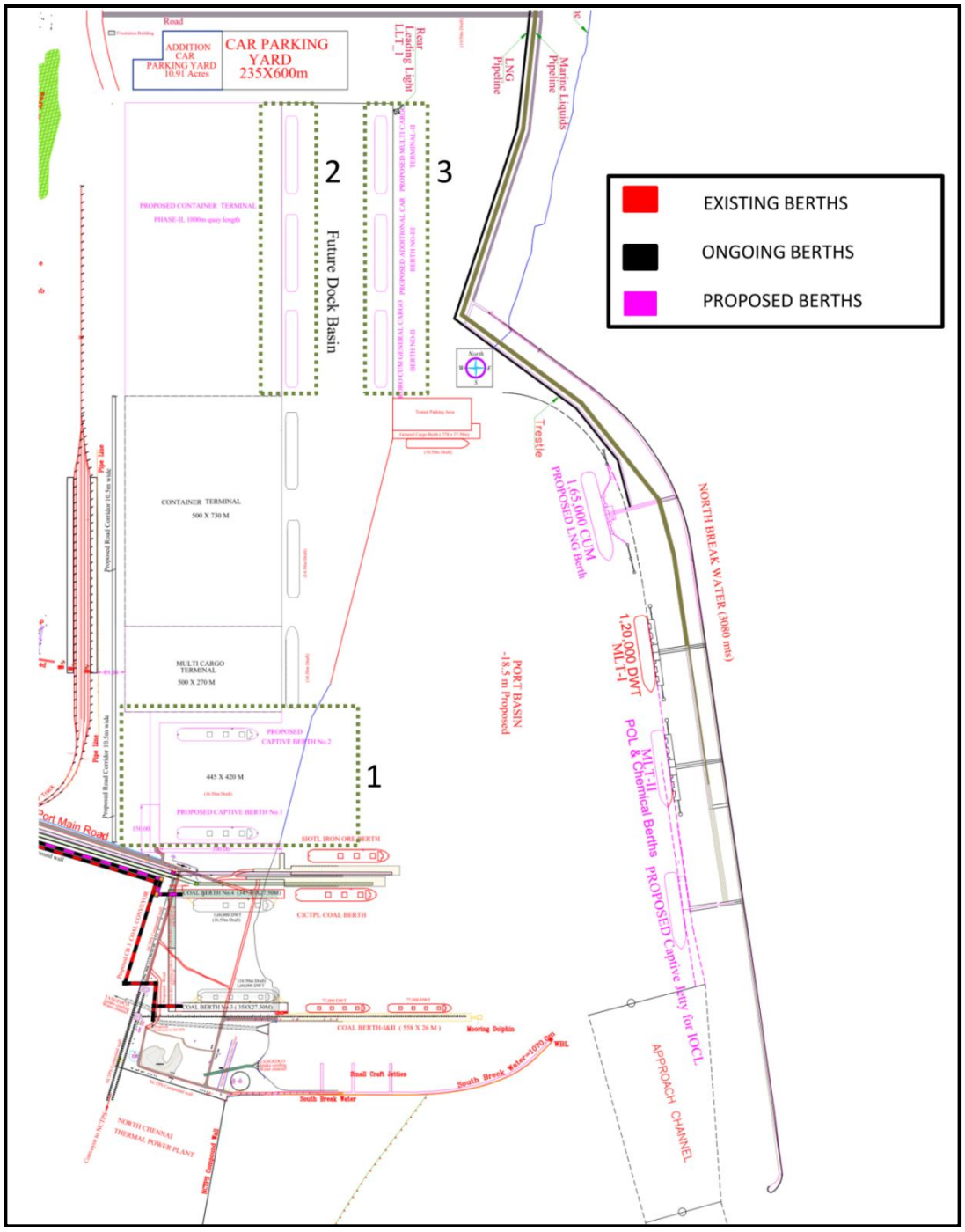


Figure 9.1 Development within the Existing Harbour

In zone 1, the port has made provisions for creating a dock basin of 400 m × 445 m to accommodate two berths capable of handling Cape size bulk carriers. These are proposed to be set apart for captive users. These berths could have a combined capacity of 18 MTPA.

In zone 2, the port has plans to develop a second container terminal with 1000 m of quay length. If this terminal materialises, this can handle about 2 MTEU equivalents to 38.6 MTPA.

In zone 3, two more berths for handling general and break bulk cargo could be developed. The combined capacity of these two berths could be about 3 MTPA. KPL has initiated action for developing one more Marine Liquid Terminal (MLT 2) on DBFOT basis with a capacity of 3 MTPA on the Lee side of the breakwater.

Thus the existing harbour basin would be able to handle an additional 62.6 MTPA (apart from 96 MTPA as indicated in **Table 7.1**) and the gross capacity will be about 158.6 MTPA.

The growth of traffic with regard to the type of cargo that needs to be handled will decide the development of these berths according to the need. This trend will be known once all the ongoing schemes are completed and commissioned.

The expansion plan of the existing harbour with related back-up area is shown in the **Figure 9.2**.

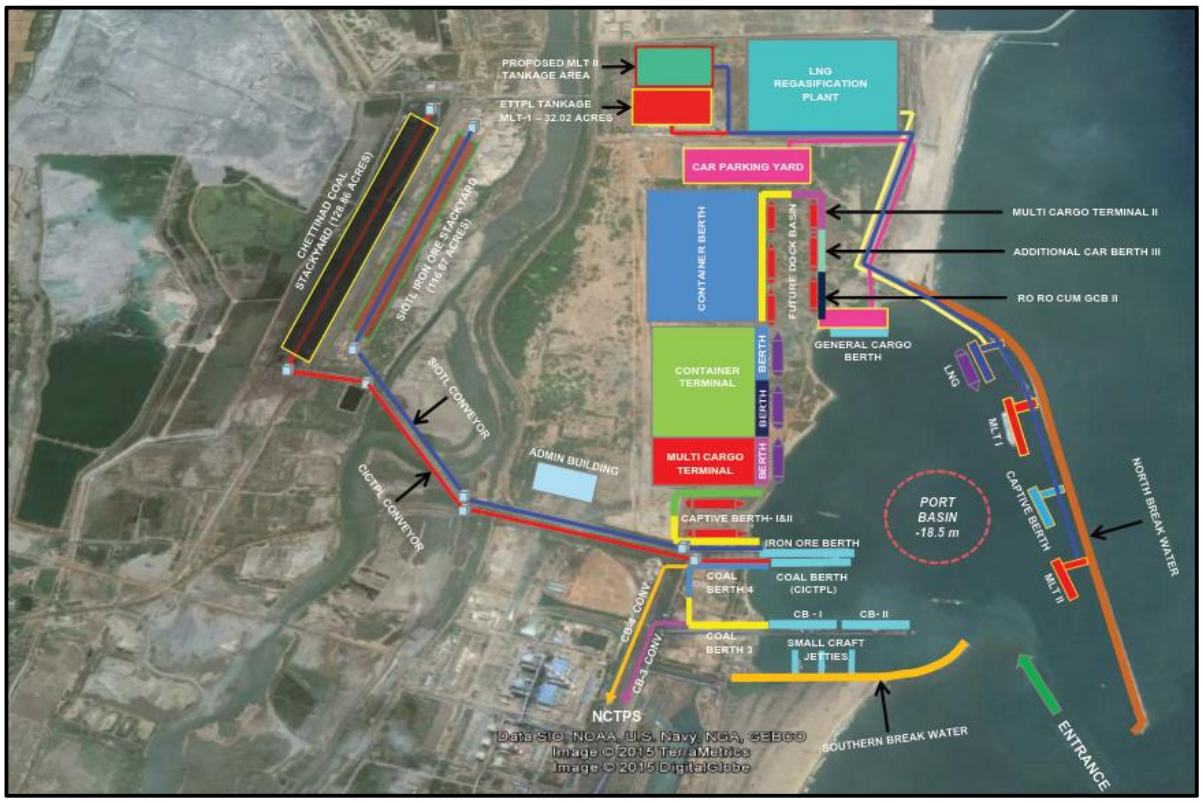


Figure 9.2 Expansion Plan of the Existing Harbour with Related Back-Up Area

9.2 Development Potential Outside Harbour

9.2.1 General

Kamarajar port has the ownership of the coastline between the north breakwater of the port and south breakwater of the Kattupalli port. The area behind the coastline is also available with the port. This area could be used for in case any expansion potential is needed beyond what could be developed within inner harbour.

9.2.2 Alternative Layouts

With a view to assess the development potential of the outer harbour various alternative layouts were developed as mentioned below:

9.2.2.1 Alternative Layout 1

This layout has been developed so as to provide facilities for ship repair and ship building as part of the Kamarajar Port. Though a shipyard already exists at Kattupalli, these facilities could be part of a ship building cluster that could be built in this area. This layout is shown in **Figure 9.3**.

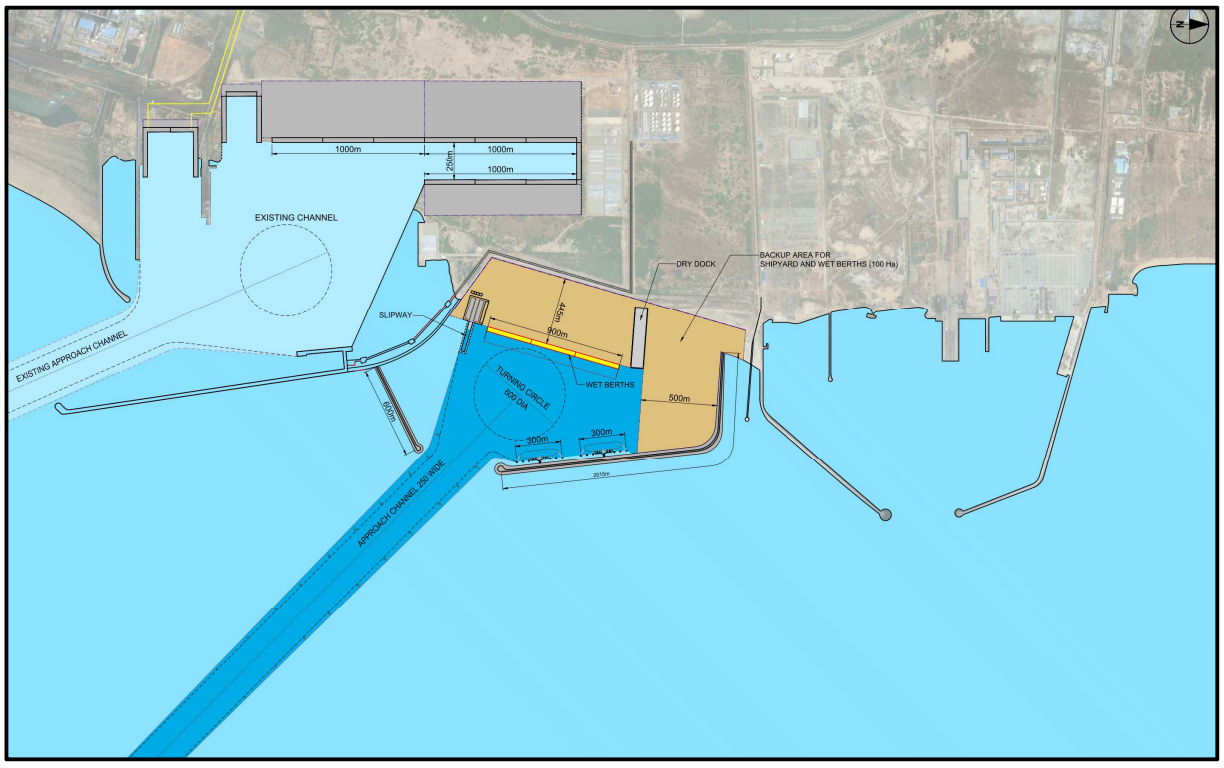


Figure 9.3 Potential Outer Harbour Development - Alternative Layout 1

9.2.2.2 Alternative Layout 2

This layout has been developed to provide additional cargo handling facilities in a new harbour located outside the existing one. The layout has been prepared such that part of the approach channel to the existing port shall be utilised for the outer harbour also. This layout is shown in **Figure 9.4**.

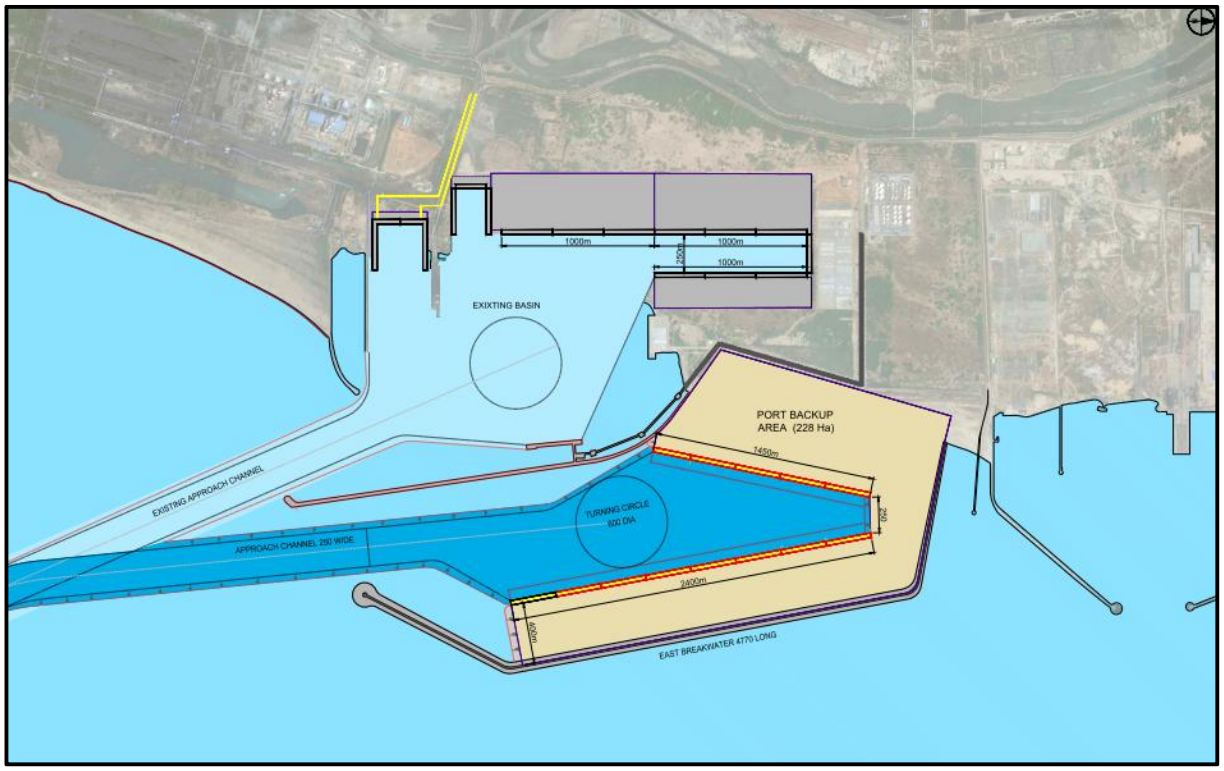


Figure 9.4 Potential Outer Harbour Development - Alternative Layout 2

As could be seen from **Figure 9.4**, it would be possible to provide a quay length of about 2.8 km for handling breakbulk and bulk cargo. An area of 230 ha shall also be created by way of reclamation for storage of cargo and port operations. The breakwater of length 4.75 km shall need to be provided.

9.2.3 Suitable Layout of Outer Harbour

It is established that the space within inner harbour is adequate to provide the required berths for the master plan horizon of year 2035 and even beyond. Therefore the requirement of outer harbour from cargo handling point of view would come much later.

The growth of traffic with regard to the type of cargo that needs to be handled will decide the development of these berths according to the need. This trend will be known once all the ongoing schemes are completed and commissioned.

9.3 Land Use Plan

At present, Kamarajar Port Limited has a land area admeasuring 2771.50 acres, where 1392.2 acre is inside port (Zone A) and 1379.30 acres is outside port (Zone B).

Under Zone A the port has facilities like storage for terminals, administrative buildings, guest house, CISF barracks, car parking, road, sub-station, and plantation, which occupy a total of 786.81 acres of land. Land in the Zone B is majorly utilized for Railway siding, access road, conveyor, staff quarter, coal and Iron stack yard, totalling to 594.5 Acres.

At present a total of 605.390 acres of land is available in Zone A and 785.39 acres in Zone B is available.

In 2015, the port has entrusted a study to Ravi associates to prepare a future land use plan. The new land use plan has been prepared to accommodate all future expansions, i.e., 2 TNEB coal berths, Container terminals, LNG terminal and multi-cargo terminals. The new land use has also left about 414 acres of land as Green belt and avenue trees, which is about 30% of total land inside the port.

Zone B, that is outside port limit is planned along a creek. It is proposed to develop several activities including FTWZ, cargo storage, office buildings, parking, truck terminals etc. A CRZ map of the area has been prepared by IRS, Anna University, which classified this either as CRZ 1B or CRZ III.

The Coastal Zone Regulation, 2011 suggests that no activity except storage of non-hazardous cargo, such as edible oil, fertilizers and food grain is allowed in CRZ 1B (area between LTL and HTL). CRZ III is defined from HTL to about 100 m or width of the creek (whichever is less) is categorized as 'No Development Zone' and storage of some of the petroleum products/ liquefied natural gas petroleum can only be taken up in this zone.

It may be noted if a suitable distance (i.e., 100 m) is be left along the creek all the facilities may be developed without requiring CRZ as CRZ along creek is defined only from HTL to about 100 m or width of the creek (whichever is less). However, the natural path of the creek shall not be hindered and all the mangroves or its associated species in this zone shall be protected in this zone.

Based on the analyses above a new land use plan has been proposed for Kamarajar Port (**Figure 9.5**). New land use plan demarcates entire area on the eastern and western side of the creek (under CRZ 1B and marked as '6') for development of warehouse, where clean cargo could be stored. However, in case there is demand in future for using this land parcel for storage of dirty cargo like coal, this entire area would need to be notified as port land for which KPT will need to take necessary action for approvals. In addition this land may also be utilised to develop required Green Belt. Beyond this region about 100 m buffer is kept designated as CRZ III (marked as '5'), may be used for liquid cargo storage.

In the proposed Land Use map, Zone 2 and 3 are designated for FTWZ and logistic park, while Zone 4 is for Truck Parking yard.

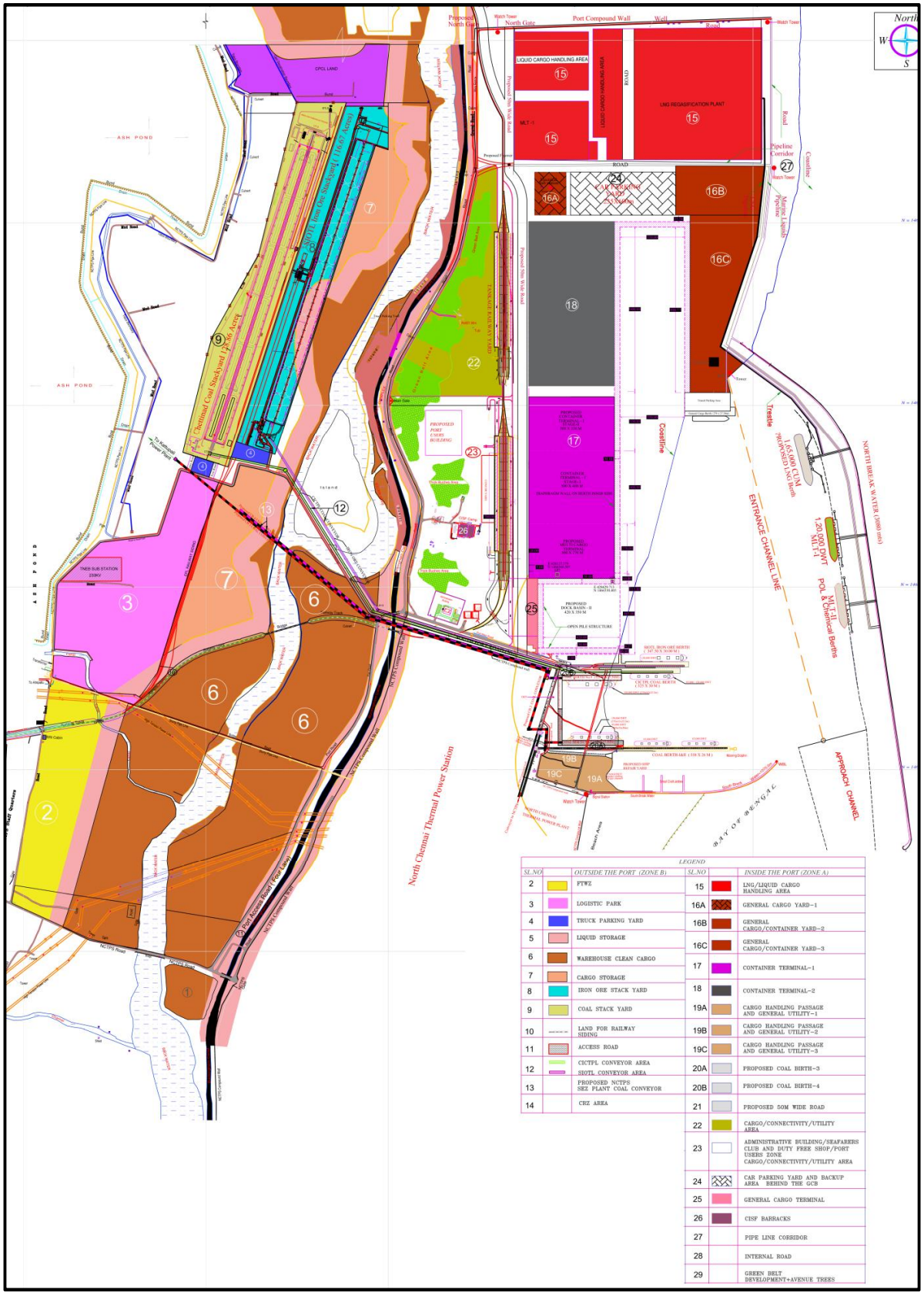


Figure 9.5 Proposed Land Use Plan

10.0 SHELF OF NEW PROJECTS AND PHASING

It has been established in the earlier sections that the Port will have a surplus capacity of about 8 MTPA for handling coal and that two new liquid bulk terminals and an automobile berth have to be established to meet the projected traffic up to 2020.

As part of the Kamarajar Port Master Plan several projects have been identified which need to be taken up in phased manner with the built up in traffic. The proposed phasing, capacity addition and the likely investments are discussed in paragraphs below.

It is observed that facilities that are possible within the existing harbour are adequate even for the projected throughput for year 2035. However, the growth of traffic with regard to the type of cargo that needs to be handled will decide the development of these berths according to the need. A higher traffic growth may also require advancement of Greater Kamarajar port development. However the trend will be known once all the ongoing schemes are completed and commissioned.

Therefore apart from these projects there could be several other projects which port would be implementing as part of the routine operations and maintenance of the port facilities. Further the phasing proposed is not cast in stone but could be reviewed periodically and revised based on the economic scenario and demand for port at that particular point of time.

10.1 Ongoing Projects

The details of the projects which have already been awarded and development is ongoing are given in **Table 10.1**. The port layout after completion of ongoing projects shall be as shown in **Figure 10.1**.

Table 10.1 Ongoing Projects

Projects	Capacity Addition (MTPA)	Investment Required (INR in Cr)	Mode of Implementation
Development of LNG Terminal	5.0	5,151	PPP
TNEB Coal Berth CB 3	9.0	250	Port's funds
TNEB Coal Berth CB 4	9.0	250	Port's funds
Multi Cargo Terminal	2.0	151	PPP
Construction of Container Terminal Phase 1 Stage 1	15.4	800	PPP
Development of Ro-Ro Terminal	1.0	150	Port's funds
Capital Dredging Phase III	-	300	Port's funds
Capital Dredging Phase IV	-	300	Port's funds

Figure 10.1 Projects Awarded / On Going

10.2 Projects to be Completed by Year 2020

The details of the projects which are envisaged to be completed by year 2020 are given in **Table 10.2**.

Table 10.2 Projects to be Completed by Year 2020

Projects	Capacity Addition (MTPA)	Investment Required (INR in Cr)	Mode of Implementation
IOC-POL Captive Jetty	3.0	465	PPP
Multi-User Liquid Terminal 2 (MLT 2)	3.0	393	PPP
Construction of Container Terminal Phase 1 Stage 2	11.62	470	PPP
Modification of Existing Iron Ore Terminal to handle coal (SIOTL)	6	220	PPP
Capital Dredging Phase-V for providing water depth of -16 m CD for the proposed Ro-Ro cum GCB 2, LNG, MLT 2 and IOCL Captive Jetty berths	-	250	Port's funds
Development of Northern Port Access Road (4.35 Km)	-	271	State Govt./ Stakeholders
Development of Northern Rail Connectivity	-	244	Port's funds / IPRCL

Projects	Capacity Addition (MTPA)	Investment Required (INR in Cr)	Mode of Implementation
Upgrading The Southern Port Access Road	-	200	Port's funds
FTWZ	-	850	PPP

The port layout after completion of projects mentioned above shall be as shown in **Figure 10.2**

Figure 10.2 Port Layout with All Facilities Up to 2020

10.3 Projects to be Completed by Year 2035

The details of the projects which are envisaged to be completed by year 2035 are given in **Table 10.3**.

Table 10.3 Projects to be Completed by Year 2035

Projects	Capacity Addition (MTPA)	Investment Required (INR in Cr)	Mode of Implementation
Container Terminal Phase II	38.6	2,000	PPP
Coal Berths / Bulk Terminal (2 × 9 MTPA)	18	700	PPP
Ro-Ro and General Cargo Berth	1	350	Port's funds
2nd Multi Cargo Terminal	2	200	PPP

The port layout after completion of projects mentioned above shall be as shown in **Figure 10.3**.

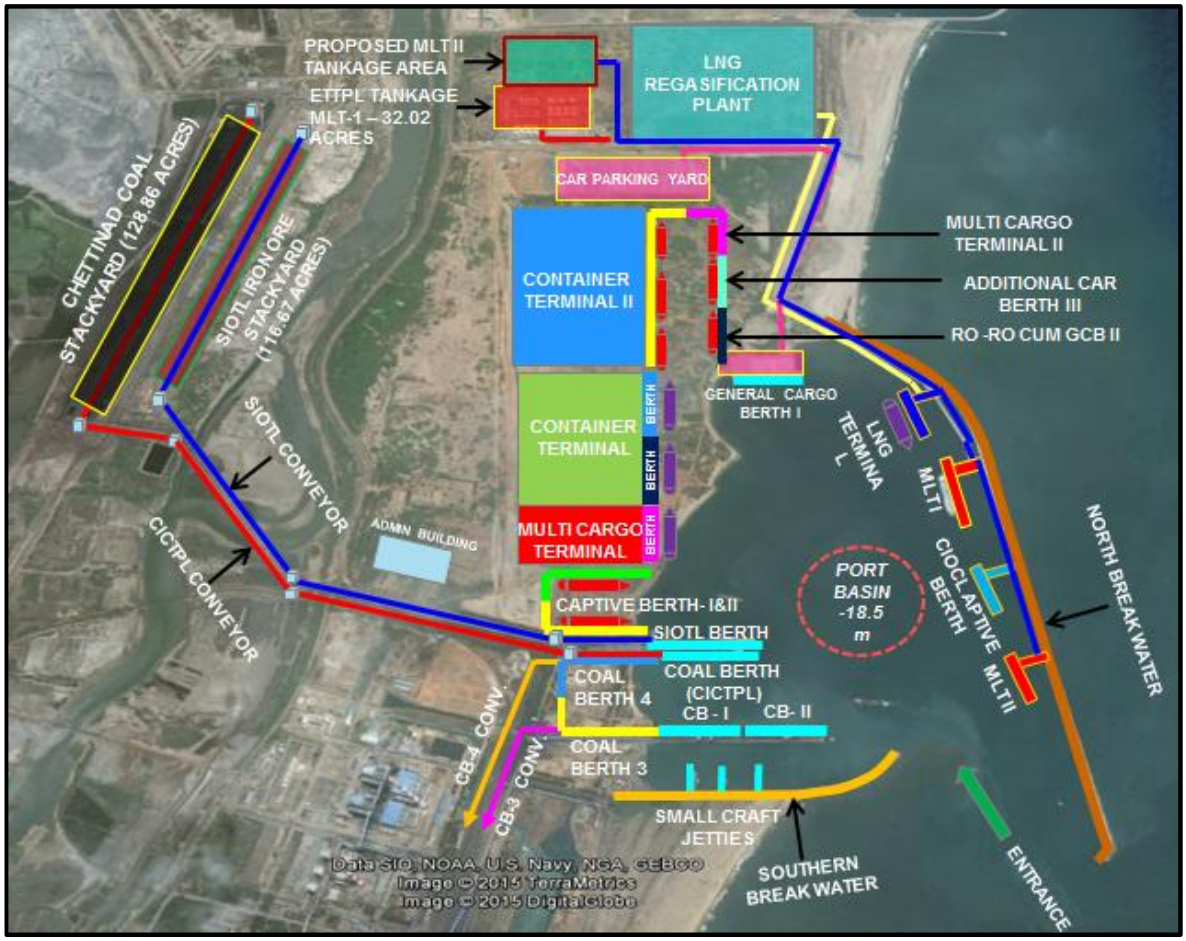


Figure 10.3 Port Master Plan with All Facilities Up to 2035

Appendix 1 - **BCG Benchmarking Study for Kamarajar (Ennore) Port**

13 Ennore (Kamarajar) Port Deep-dive

13.1 Port overview

Ennore Port, now officially renamed as Kamarajar Port Limited (KPL), is located on the Coromandel Coast, north of Chennai Port in Tamil Nadu, India. It is the only corporatized major port and is registered as a company. It has 2 coal berths operated by TANGEDCO, a mechanized coal terminal operated by Chettinad (Chettinad International Coal Terminal – CICTL), 1 marine liquid terminal for POL and chemicals, 1 general cargo berth, and 1 iron ore berth developed by SICAL.

Figure 382: Berths at Kamarajar port

Volumes have increased by ~25% over the last 5 years. Operating revenues have increased from Rs. 167 Crs in FY11 to Rs. 564 cars in FY15, a CAGR of 36%. Operating expenses have increased from Rs. 55 Crs to Rs. 180 Crs in the same period for a CAGR of 35%. The operating margins have varied from 66–75% in the same period.

Coal remains the most important cargo commodity for KPL. Out of ~30 Mn MT of cargo handled in FY15, ~24 Mn MT of coal cargo was handled across 3 berths. Another ~3.4 Mn MT of POL and Bulk chemicals cargo was handled at the liquid terminal, and the remaining ~2.6 Mn MT of vehicles was handled at the General cargo berth.

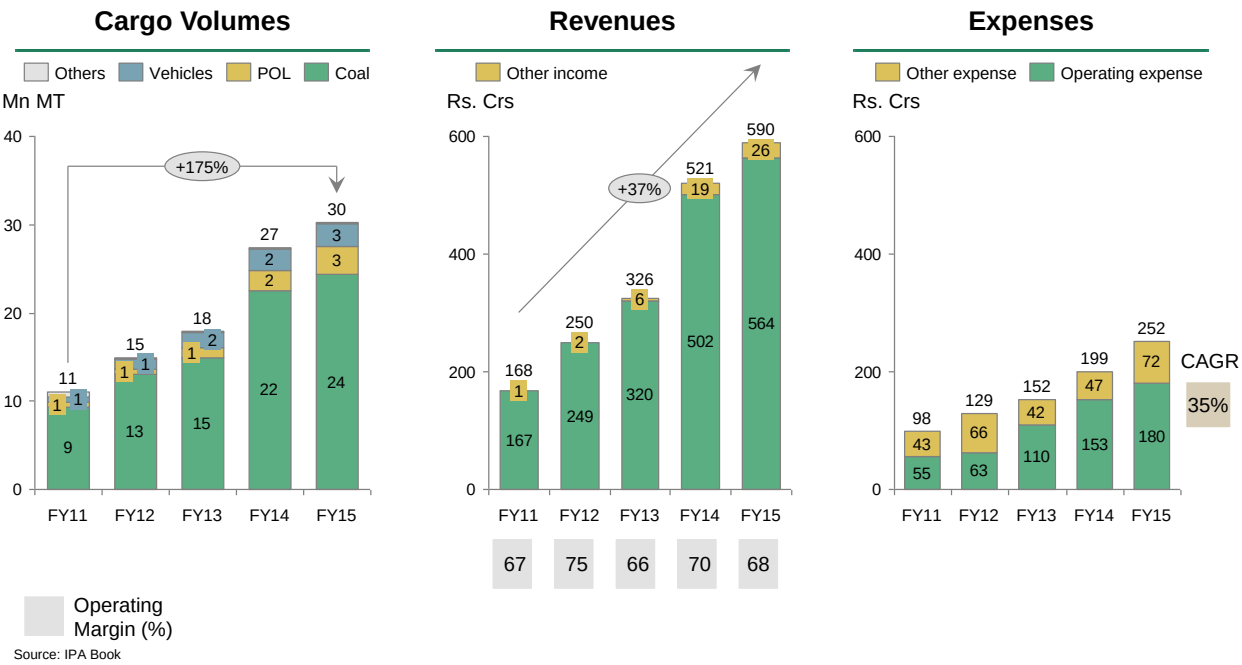


Figure 383: Cargo volumes, revenue and expenses of Kamarajar port

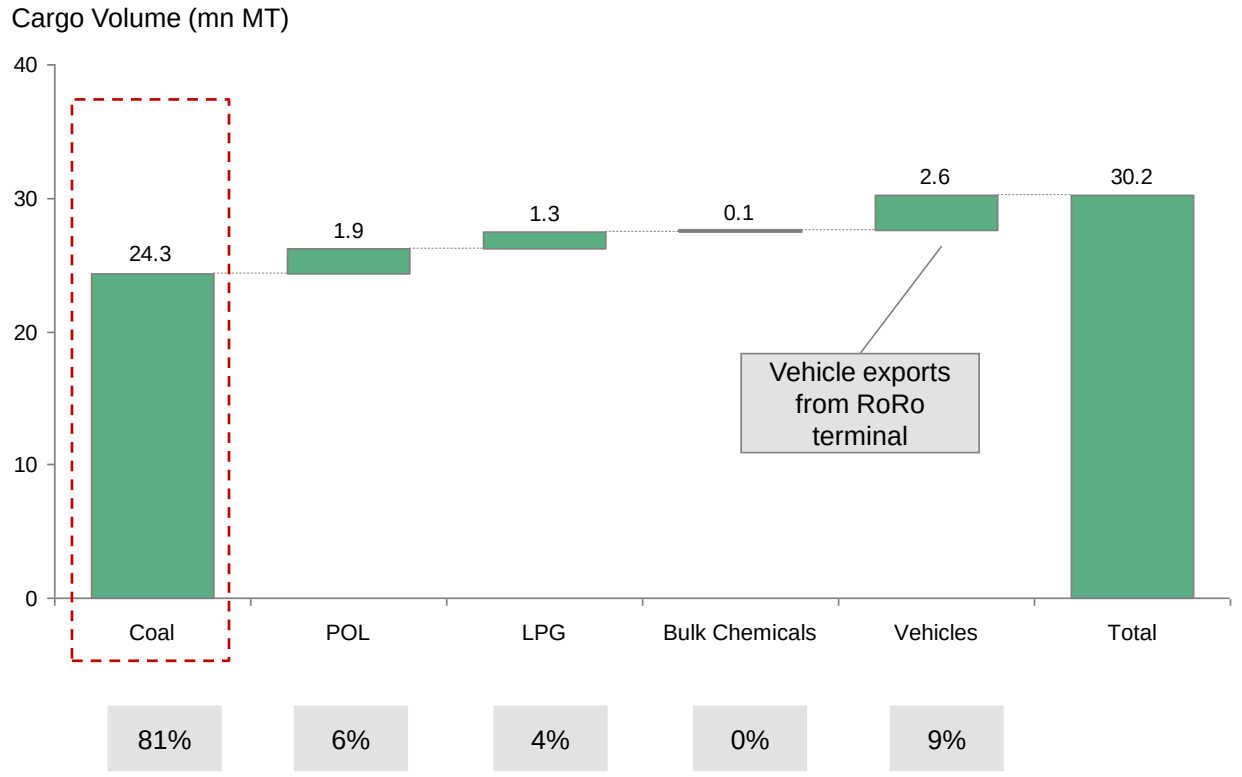


Figure 384: Commodities handled at KPL in FY15

KPL is a different from all other ports because of its Landlord Port model. Therefore, it does not have a lot of legacy issues like many other ports. KPL also has the highest operating margin across all major ports.

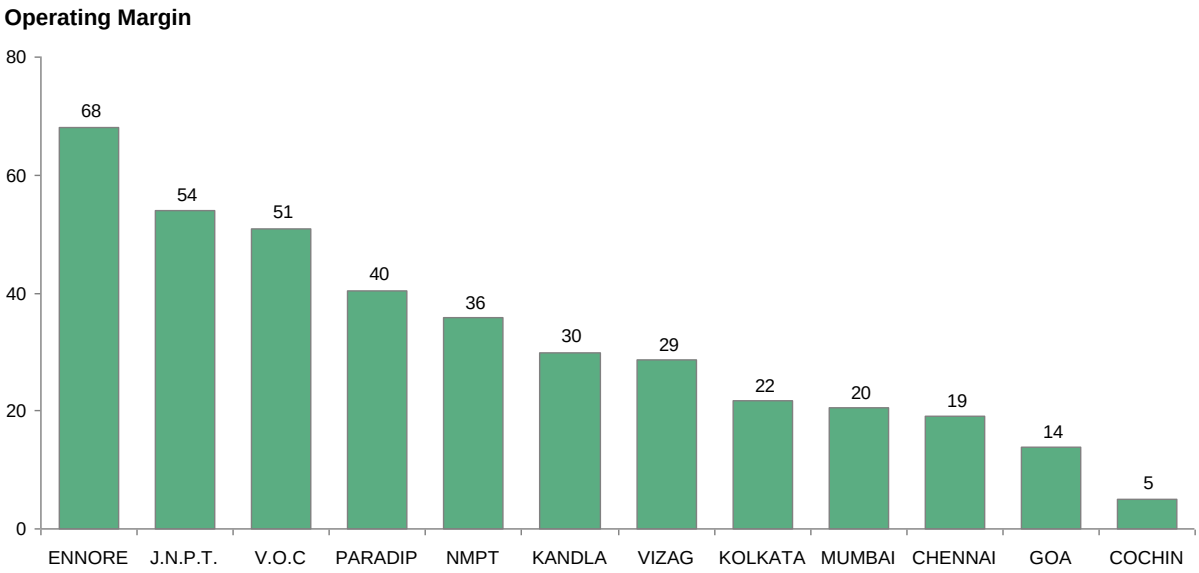


Figure 385: Operating margin across major ports in FY15

In terms of its productivity, coal cargo unloading productivity at KPL is the highest. However, berth productivity at KPL is much lower than Global best-in-class performing ports and private Indian ports.

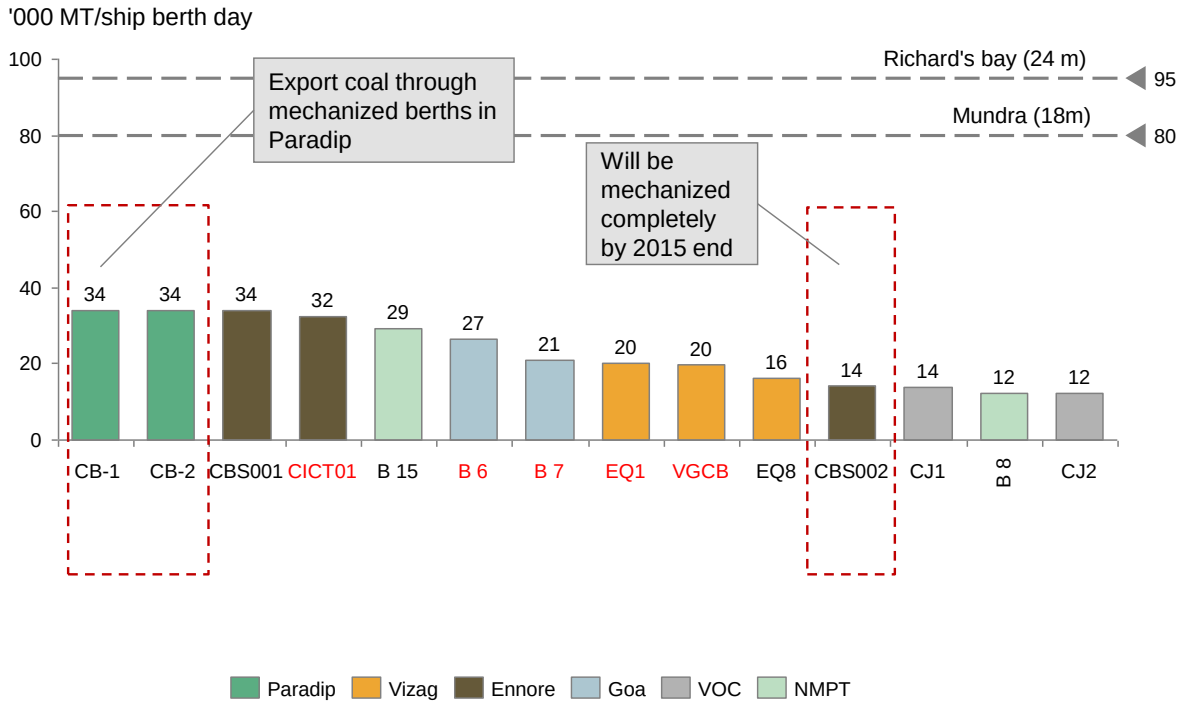


Figure 386: KPL has highest productivity among mechanized coal handling unloading terminals across all major ports in India

Berth occupancy at KPL is very high. Occupancy in coal berths varies from 82% to 97%. Liquid terminal occupancy is 87%. However, capacity utilization for the berths is low and indicates potential to handle additional cargo at existing terminals.

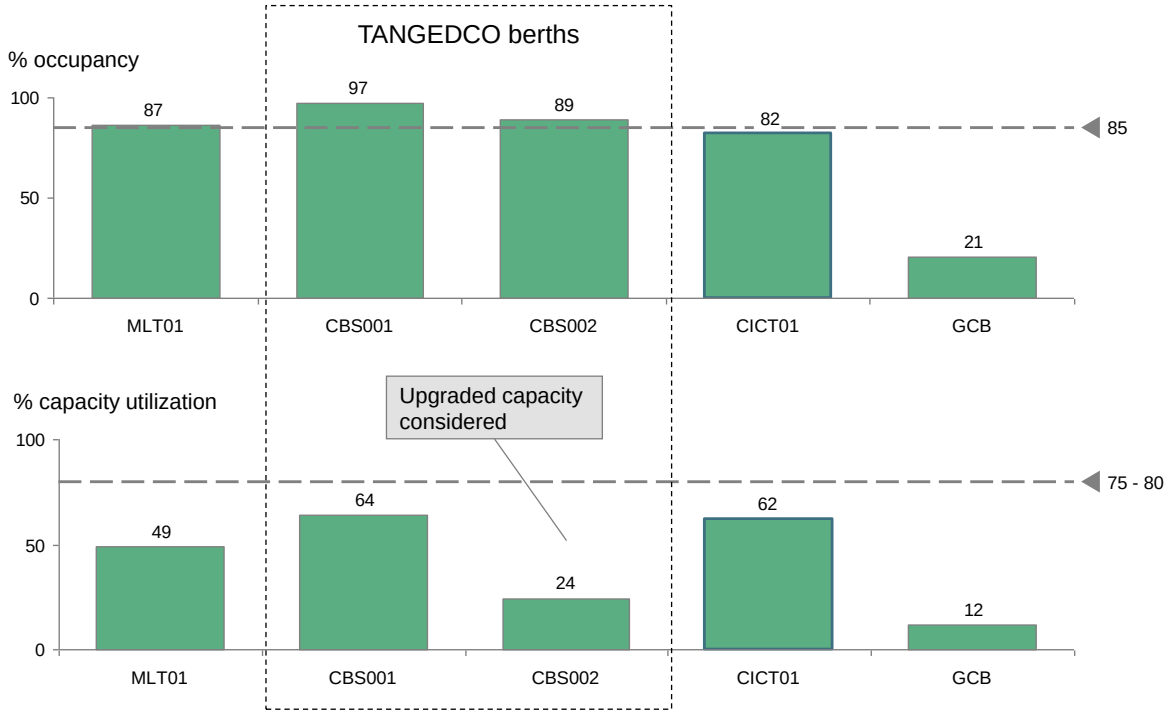


Figure 387: Capacity utilization for terminals at KPL

A top-down benchmarking of rated equipment capacity indicates potential to handle more from existing berths.

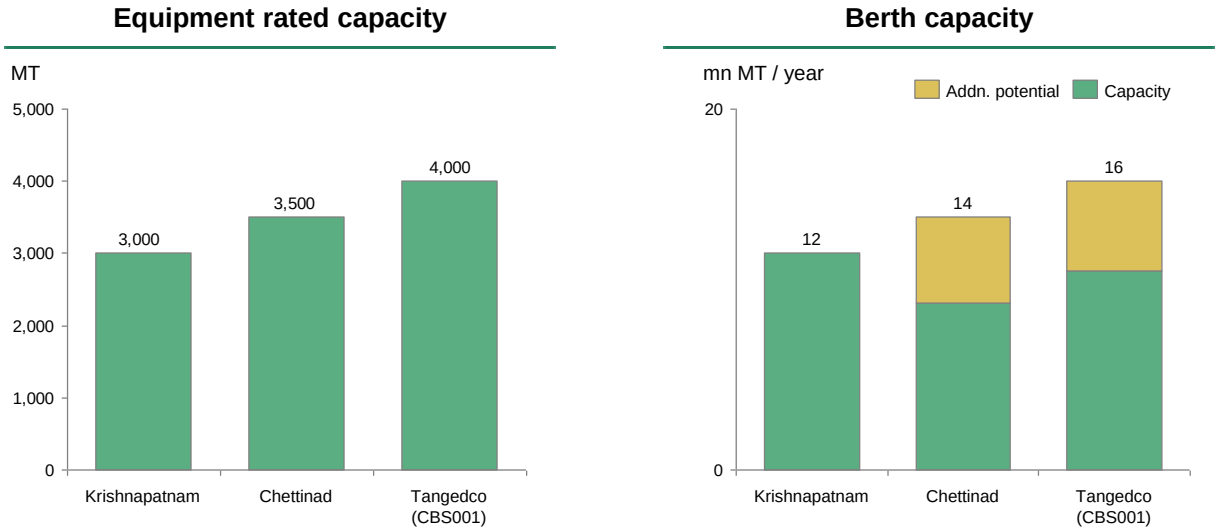


Figure 388: Top-down estimate of capacity at each terminal

Actual potential capacity that can be handled at the same terminal is dependent on the constraints each terminal would be facing individually—it can vary from vessel quality, conveyor maintenance and efficiency, or even the mix of customers occupying land allocated for private terminal operations.

13.2 Key findings and initiatives from deep-dive

All the coal berths at KPL are operating at productivity levels much below their rated capacity. CBS001, operated by TANGEDCO, is operating at a productivity of 34% of its rated capacity. CITCL, operated by Chettinad, is operating at a productivity of 37% of its rated capacity. Best-in-class operations typically involve operating at ~60% of the rated capacity for unloading operations.

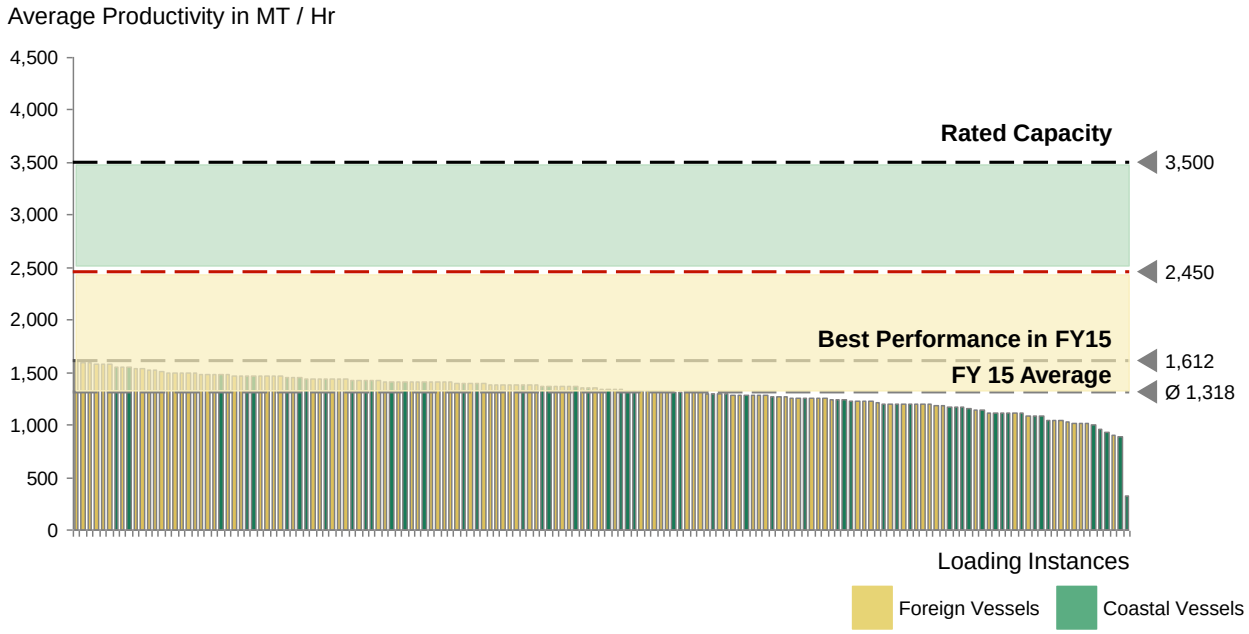


Figure 389: Vessel productivity at Chettinad terminal in KPL

The vessel productivities achieved at the Chettinad terminal are much below the norms mentioned in their contract. In fact, in FY15, productivity norms were not met in ~95% of the vessels. However, there are no penal provisions linked to these productivity norms.

Existing contract performance norms

Performance requirement of vessels contracted between Chettinadu and Ennore port are as follows:

DWT of vessel	Tones Per Day (TPD)
40,000 DWT	30,000 TPD
77,000 DWT	50,000 TPD
150,000 DWT	60,000 TPD

However, norms not enforced during operations

Figure 390: Productivity norms at Chettinad terminal, only 5% of the vessels meeting norm requirements

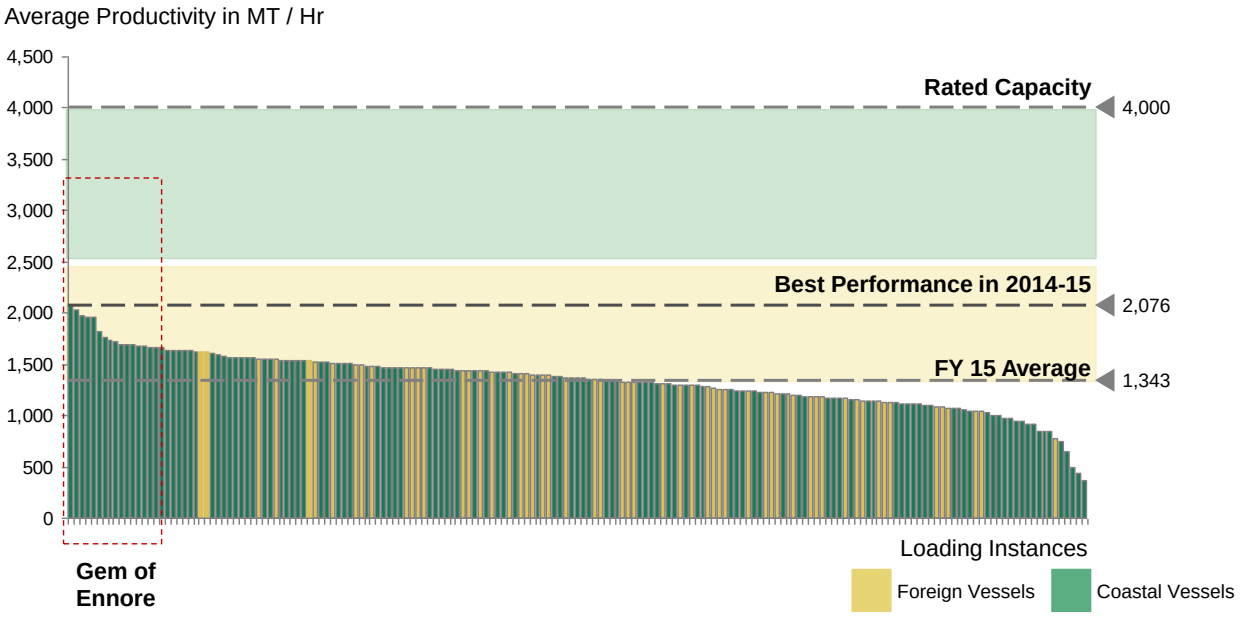


Figure 391: Vessel productivity at TANGEDCO terminal (CBS001) in KPL

In addition, there is high variance in the productivity performance of the same vessel. This is again due to absence of any operations norms for the vessels.

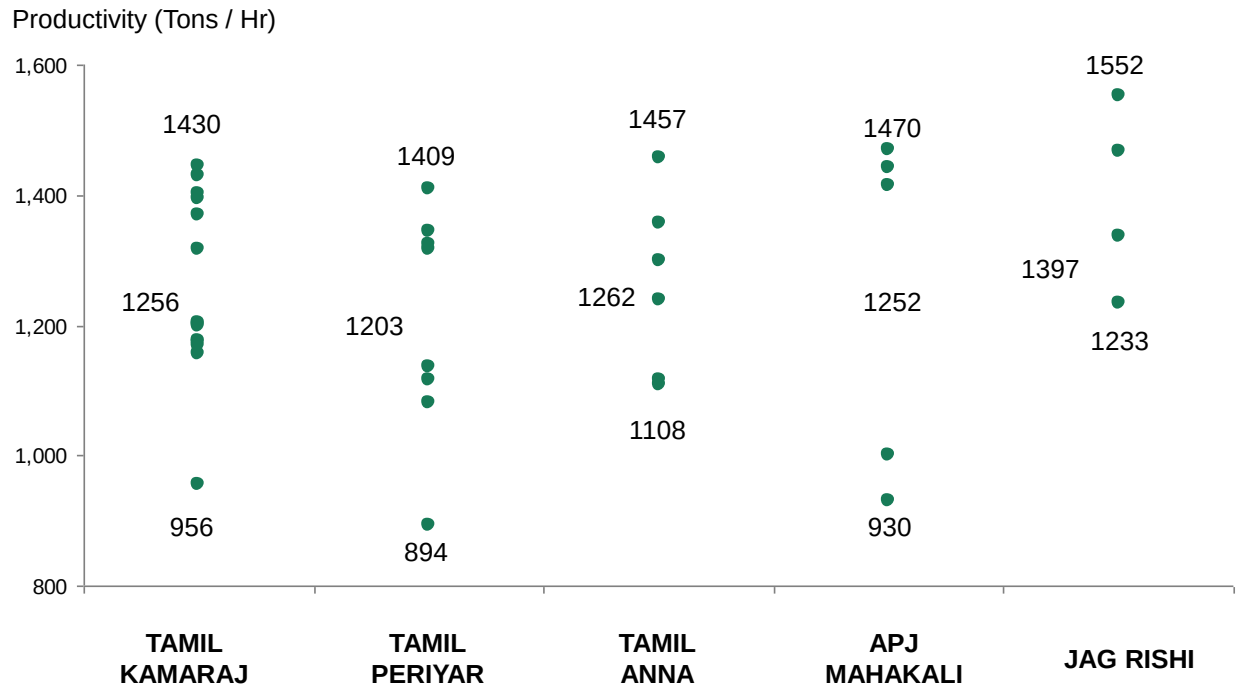


Figure 392: Vessel productivity for the same vessel unloading same cargo quantity at different instances at the Chettinad terminal in KPL

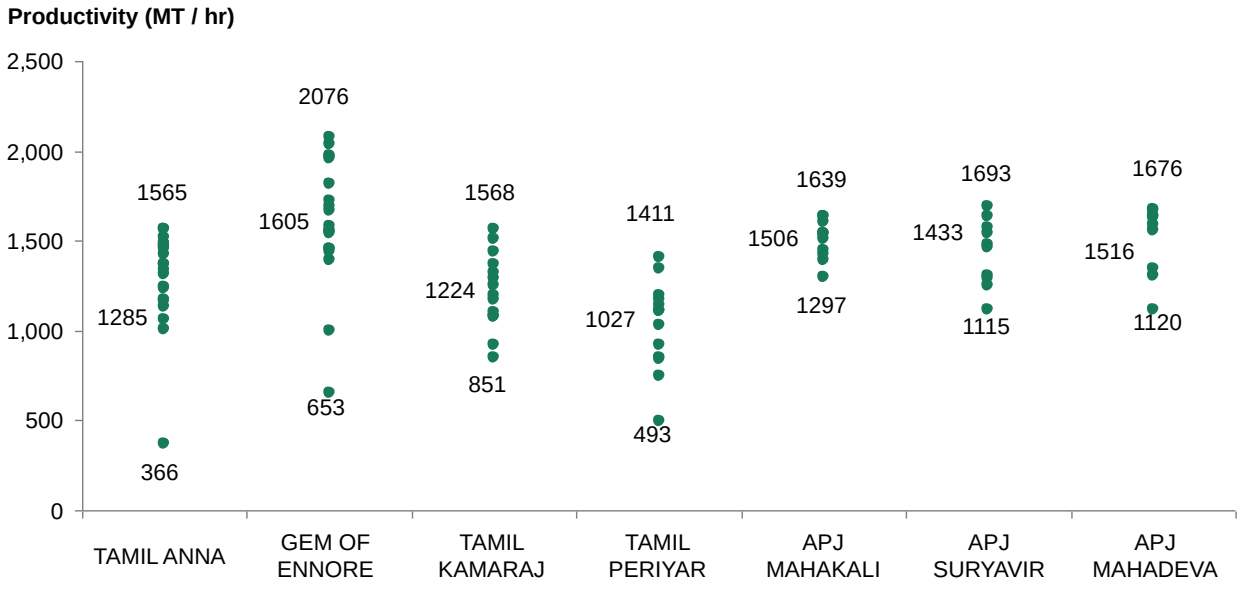


Figure 393: Vessel productivity for the same vessel unloading same cargo quantity at different instances at the TANGEDCO terminal in KPL

Currently, detailed records of where the vessel is losing time during operations are not being maintained at the port. Therefore, it is difficult to estimate exact causes due to which vessels are losing time on the berth.

However, some vessel records were present in hard copy reports supplied by ship masters. On the basis of these samples of 18 vessels in the month of August 2015, the following key reasons for losses were identified on the

berth. These losses are more relevant for TANGEDCO operated berths (CBS001). On an average, 38% of the total time spent by the vessel on the berth is non-working time.

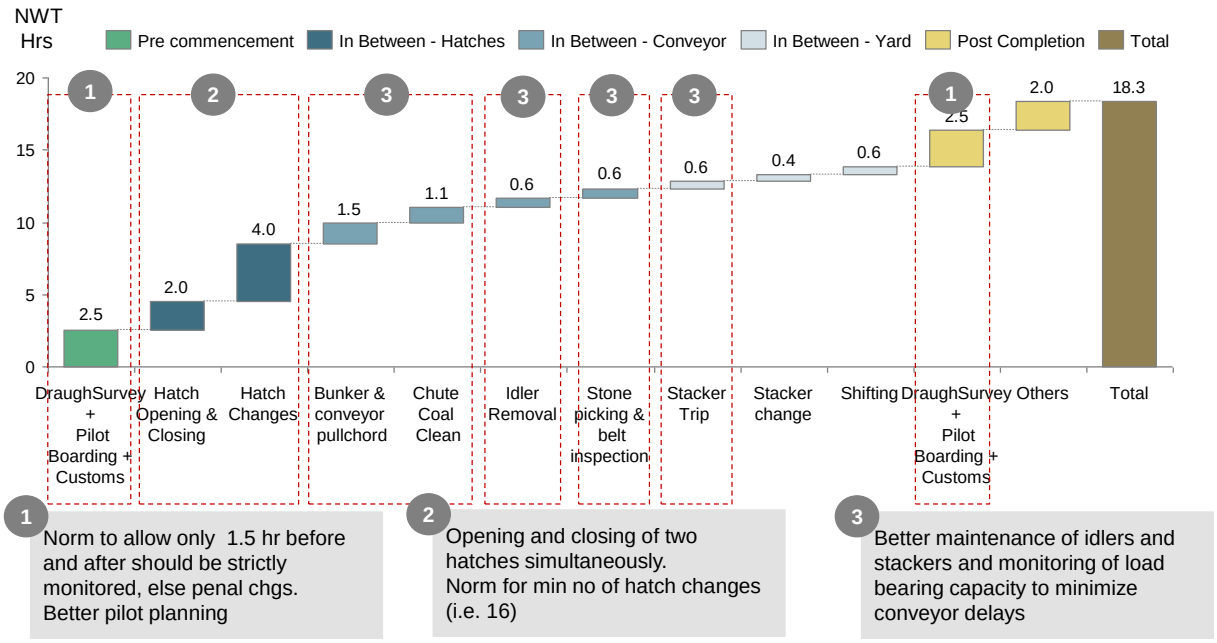


Figure 394: Key reasons for non-working time at the TANGEDCO berth (CBS001)

Also, as CBS002 is expected to be upgraded, CICTL will lose cargo equivalent of ~3.9 Mn MT. Thus, there is a need to create additional cargo for the CICTL berth.

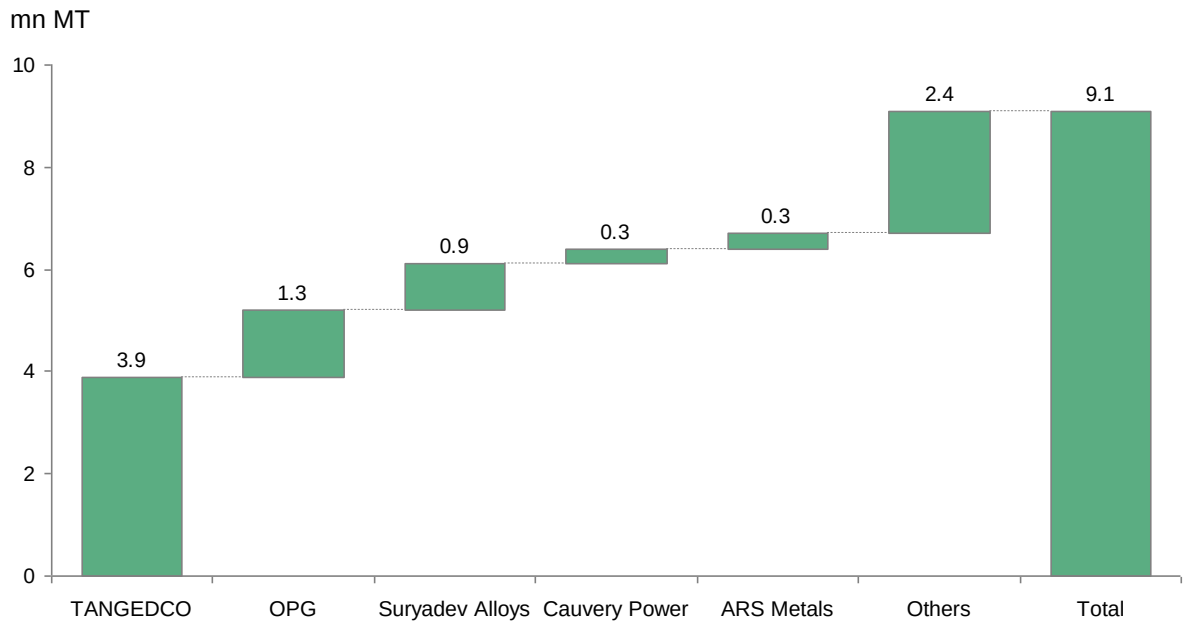


Figure 395: Current customer volumes at CICTL

13.2.1 Port performance

13.2.1.1 Initiative: KPL 1.1 Set up port governance system to manage port operations

Initiative Overview

KPL, being a landlord port, has not been involved in direct operations of its terminals. An appropriate port governance model needs to be set up for effective administration of port operations, and to ensure KPL can play a more active role in port operations.

Key Findings

Currently, there is lack of an effective governance model to manage individual private terminals at the port. Key gaps observed are as follows:

- Absence of detailed data from the terminal players to record vessel performance
- Absence of a formal forum to discuss port performance, track initiatives taken by each terminal and resolve issues faced by different stakeholders
- Absence of regular audits of terminal operations
- Absence of integrated marketing / sales function
- Absence of an integrated IT system for ensuring single source of truth for all data

Recommendations

In order to set up a governance system, the following steps need to be conducted. New data templates need to be crseated and launched to record appropriate vessel level details.

Month	Vessel ID	Vessel Name	Flag	End Customer	Berth ID	DWT	LOA	Beam	GRT	Cargo Size	Discharge Rate	Arrival Time	Inward Pilotage Start	Inward Pilotage End	Unloading Start	Unloading Complete	Outward Pilotage Start	Outward Pilotage End

Month	Vessel ID	Vessel Name	PBD	Inward pilotage	Outward Pilotage	Berthing Time	Working time	NWT	TAT	Hatch changes proposed	Hatch changes done	Draught checks	Gross Productivity	Remarks
			-	-	-	-		-	-					
													-	

Figure 396: Template for recording vessel related data

	PBD				Pre Commenecemnt				Unloading Operations					
Vessel ID	Vessel not ready	Berth unavailable	Waiting for pilot	Others	Draught check	Customs	Extra discussions	Others	Hatch Opening	Hatch Changes	Payloader Placement	Crane failure/una vailibility	Conveyor Stoppage	Bunker pullchord

	Unloading Operations										Post Completion				
Vessel ID	Chute coal choked	Stone picking	Belt inspection	Stacker Change	Yard change	Stacker-Wagon Shifting	Any other shifting	Yard space unavailibiit y	System Failure	Others	Draught check	Customs	Extra discussions	Waiting for pilot	Others

Figure 397: Template for recording non-working time for each vessel

In addition, there is a need to create a governance forum where issues related to the port and terminals are taken up.

Meeting objective

- Review of terminal performance for previous month
- Monitoring of port improvement initiatives by Ports and terminals
- Raising of issues and decisions on resolution steps & timelines for unresolved issues

Meeting agenda

- Review of MIS
- Overview of issues from each terminals
- Review of port initiatives and projects

Expected output / decisions

- Action plan for all unresolved issues (with owner & timelines)
- Decision steps for issues identified in each terminals and port level issues

Participants

Chair— Director – Operators, KPL
Lead discussion : Traffic Manager, KPL
Participants: TANGEDCO, NTECL, ETTPL, CICTL

Cadence

Cadence—Monthly (10 - 15 of each month)

Duration— 2 – 4 hours

Inputs

Pre-work	Responsibility
Monthly review of MIS	TM, KPL
MIS review for discussion	TM, KPL
Summary of projects and initiative status	Each terminal

Figure 398: Governance forum for KPL

There is also a need to setup a team within KPL that will be in charge of audit of operations of terminals, and identifying areas for further operational improvement within each terminal.

Also, the Marketing / Sales or Business Development team at the port needs to be activated to drive relations with end customers for the port. All marketing activities of port terminals need to be integrated with the port's BD team to drive the best results.

Expected Impact

Improvement in port governance will lead to an overall increase in productivity, thereby creating additional capacity for cargo handling at the port.

13.2.1.2 Initiative: KPL 2.1 Improve operations at Chettinad through new governance mechanism

Initiative Overview

Multiple improvement areas have been identified for the Chettinad terminal. KPL needs to drive these improvements through a new governance mechanism.

Key Findings

There is a potential to improve the following elements at the Chettinad terminal:

- Application of productivity norms and penal berth charges to drive improvement in vessel performance
- Identification of additional large volume customers to handle excess cargo at Chettinad terminal
- Assisting Chettinad terminal with the right pricing structure to make it competitive and attractive for the end customer

Absence of productivity norms is a key reason for high variance in vessel performance. Hence, setting up of productivity norms is critical to improve terminal performance.

Also, operationalization of upgraded TANGEDCO / NTECL berth (CBS002) will lead to a loss of ~3.9 Mn MT of cargo. Hence, there is a need to attract additional cargo and put in place the appropriate pricing strategy at the berth.

Recommendations

An approach to derive productivity norms as per best-in-class practices has been designed. The framework should be used to derive productivity norms and penal berth charges for Chettinad terminal.

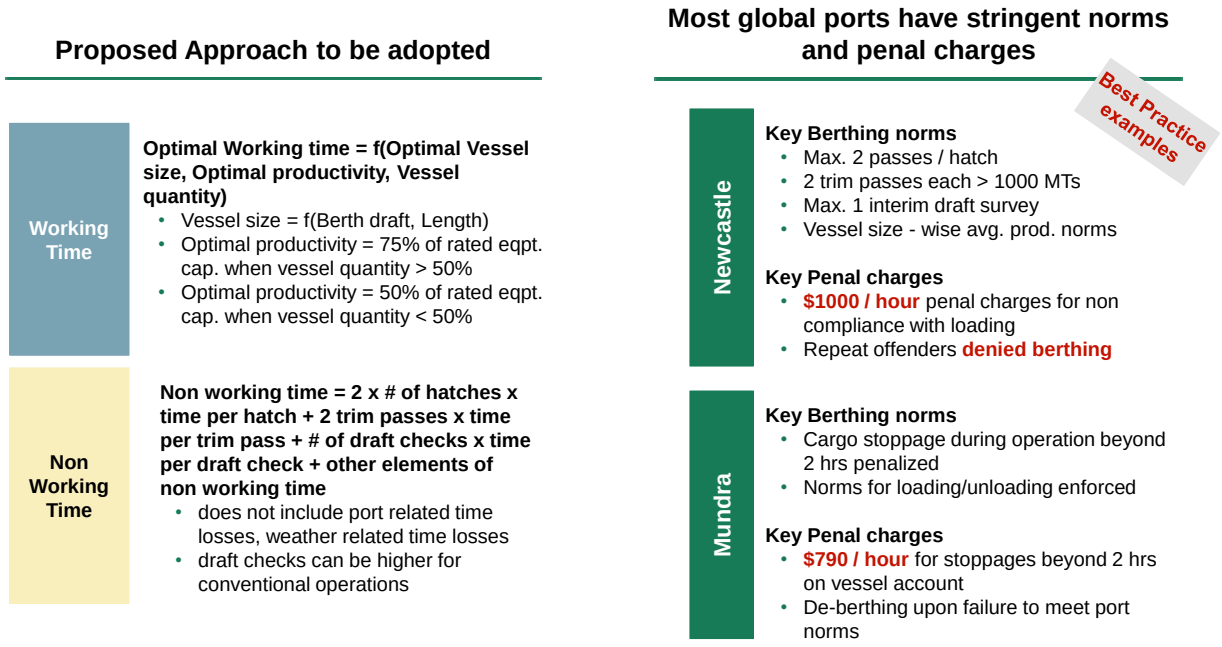


Figure 399: Framework for deriving productivity norms and penal berth charges

This initiative can be expected to drive a productivity improvement of ~20–25% at the existing terminal. This will create additional capacity that needs to be filled up with cargo.

Pricing at CICTL is currently very similar to cargo handling rates at Krishnapatnam. Therefore, for customers closer to Krishnapatnam, there may be a need to devise appropriate pricing structure and identify exact discounts rates. Such discounts rates can vary from 0–20% for customers.

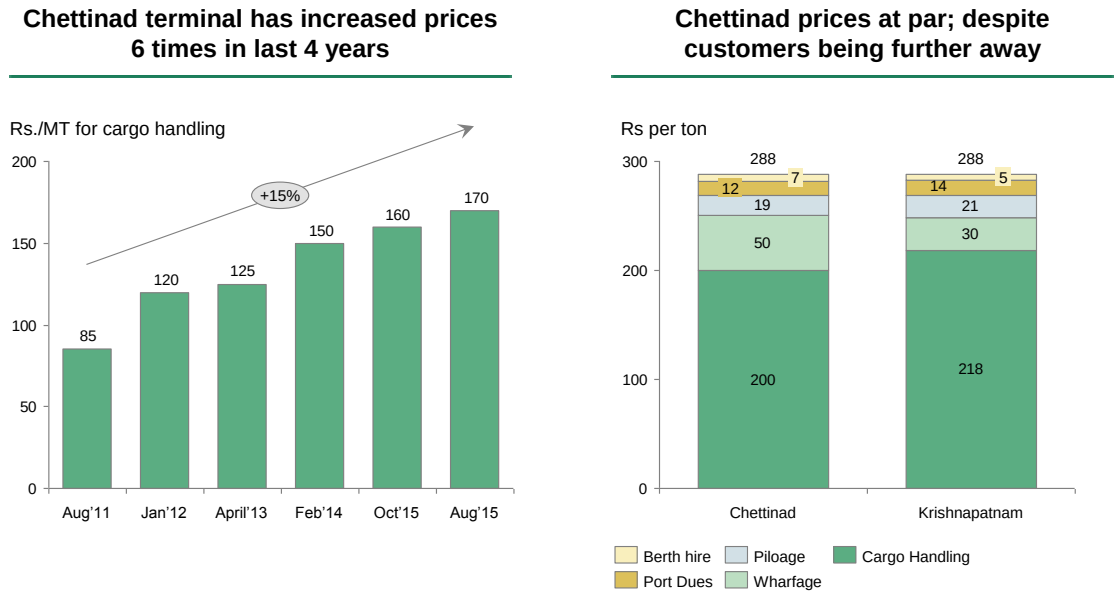


Figure 400: CICTL has increased prices 6 times in the last 4 years; currently, prices are very similar to cargo handling rates at Krishnapatnam

In addition, an initial list of potential customers has been identified, which can be targeted through the new pricing strategy.

Area	Destination	Customers	Plant Name	Ennore Port (Kms)	Krishnapatnam Port (Kms)
Salem	Pottaneri	JSW	Salem	353	435
Chickballapur	Thondebhavi	ACC	Thondebhavi Cement Works	430	514
Rayalseema village	Kadapa	APPGCL	Rayalseema Thermal Power Station	349	306
Shakthinagar	Raichur	KPCL	Raichur	592	548
Kudatini Village	Bellary	KPCL	Bellary Thermal Plant	521	478

Figure 401: Potential customers

Expected Impact

Competitive pricing strategy will enable CICTL to attract additional cargo of 6–7 Mn MT. This can create ~Rs. 70 Crs of additional revenue share and, hence, operating surplus for the port.

13.2.1.3 Initiative: KPL 3.1 Complete tendering and drive construction for additional coal terminal

Initiative Overview

KPL has a SICAL iron ore berth lying empty, which has not handled any cargo.

Key Findings

Conversion of the berth to a coal handling terminal can create additional coal handling capacity for KPL. However, there are existing contract conditions with CICTL that prevented a competing berth for handling common coal cargo from coming up at KPL. This restrictive clause expires in March 2016. KPL has already taken steps to convert this berth into a coal handling terminal.

Recommendations

KPL is going ahead with auctioning of the revenue share of the iron ore terminal to identify the appropriate revenue share. SICAL will be given a Right of First Refusal on the auctioned result. After the auction, minor modification of terminal equipment may be needed to handle import coal cargo. This is expected to be complete in 6 months–1 year.

Expected Impact

Once complete, the berth will be in a position to handle between 10–12 Mn MT of additional coal cargo. This will create an operating surplus of Rs. 100–120 Crs for KPL.