M/s KSR MARITIME PROJECTS PVT. LTD.,
TANDAVA MARITIME INFRASTRUCTURE COMPLX (TMIC),
Kummarapuram village, Payakaraopeta mandal,
Visakhapatnam district, Andhra Pradesh

Pre - Feasibility Report

A GRASSROOT PORT, ASSOCIATED ONSHORE AND OFFSHORE INFRASTRUCTURE AND FISHING HARBOUR

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Executive Summary

The consortium led by M/s KSR Maritime Projects Pvt. Ltd (KMPPL) proposes to establish a multi terminal grass root port complex along with a fishing harbour, South of the location wherein the Tandava river confluence with Bay of Bengal.

The promoters for the project are well versed in the field of marine technology and development of marine infrastructure.

M/s. KSR Maritime Projects Pvt. Ltd. is an organization which is well versed in the development of land resources and infrastructure for establishment of major industrial projects, like thermal power plants and major housing projects. They have been associated in establishment the green valley energy power projects of 2x660MW and Yashwant power of 6 x 660 MW power plants based on imported coal and sea water cooling purposes.

These organizations have an MOU with technical consultants of repute like INDOMER, Chennai, Teamlabs and consultants, Hyderabad and the Institute of Development and Policy Studies, Visakhapatnam.

Proposal

The proposed Tandava Maritime Infrastructure Complex (TMIC) comprising of four major terminals for handling of different cargos along with a fishing harbour is to be established along the Eastcoast of Andhra Pradesh in Payakaraopet mandal, Visakhapatnam district. A number of sites have been examined including the existing minor ports for possible location of the proposed complex. On assessment of the alternative sites, the preferred location is selected at South of Tandava river and between an irrigation drain and the coast line.

The site has many advantages including location in a non cyclone prone area detailed by IMD on evaluation of 300 year old of cyclonic track data.

The site has many positive factors for implementing such a major project which is

estimated at over 15,000 crores for the various phases of development in a investment period of six years.

The port is designed to handle 60 million tons of cargo per annum in about six years of time and ultimately would handled 103 million tons of cargo by the year 2050.

An innovative aspect of the port is the facility it provides for coastal shipping which is a priority item of maritime agenda of the Ministry of Shipping, Govt of India. It has also an innovative facility of Ro-Ro handling in the coastal shipping terminal. Further, the port complex would also offers facilities under the programme of sheltered waters of the International Maritime Organisation for vessels in distress and for possible prevention against oil spill operations.

INTRODUCTION OF THE PROJECT & BACKGROUND INFORMATION

The Indian economy is at the threshold of a golden age of growth. Goldman Sachs economists say that over the next 50 years, what they call the BRIC economies (Brazil, Russia, India and China) could become a much larger force globally. The Goldman Sachs economists predict that India will overtake Italy in 2015, France in-2020, Germany in 2023 band Japan in 2032. China's economy will be larger than everybody else by 2016 and even larger than the US economy in 2041. Also they say: -India has the potential to grow the fastest over the next 30 to 50 years. Its GDP growth rate will stay above 5 per cent till 2050; China's will drop to 5 per cent by 2020 and to around 3.5 per cent in the mid - 2040s.

Indian economy has proved its strong fundamentals with a consistent growth-rate over 9 percent during the period from 2005-06 to 2007-08 and a growth rate of 7.4 and 6.7 during 2008 & 2009 respectively. For the year 2010-11, the GOP granted rate was 9 per cent.

During 2009-10, the Major and the Non-major ports in India together accomplished a total cargo throughput of 849.89 million tonnes reflecting an increase of 14.27% over 2008- 09 compared to a marginal increase of 2.5% in 2008-09. The growth in

cargo handled at Major and Non-major Ports in 2009-10 was 5.76% and 35.44% respectively compared to 2.16% and 3.31% achieve in of 2008-09. The robust overall growth in India's seaborne cargo traffic in 2009-10 reflects fairly strong recovery in India's growth during the course of 2009-10.

There are 176 non-major ports situated along the peninsula coast-line and islands. These ports are located in maritime' states of Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamilnadu, Andhra Pradesh, Orissa, West Bengal and Union territories of Pondicherry, Daman & Diu and Lakshadweep. Out of these ports, only 29 new ports are well developed and provide all-weather berthing facilities for cargo handling. In 2008-09, only 60 Ports (including ports of Andaman & Nicobar Islands) were reported to have handled cargo traffic.

The Cumulative Annual Growth Rate (CAGR) growth in traffic during 2000-01 to 2009-10 achieved by Non-major ports was 14.2% as compared to 9.7% achieved by all the ports in the country. The share of cargo traffic of Non-major ports in the total cargo traffic handled by all ports in India has increased from 10.9% in 2000-01 to 34% in 2009-10. This trend definitely shows the level of competition which major Ports has faced during the last few years and is likely to continue in years to come and as per current indications, non-major ports will have an edge over major ports due to their growth rates as a number of green field ports are coming up with huge capacities through private sector in non-major ports.

The effectiveness of non-major ports in meeting the growing volume of cargo traffic cannot be overemphasized. Recognizing the importance of non-major ports, many maritime states have launched initiatives for their development, through the participation of private sector. This has led to significant growth in the cargo capacity and cargo traffic handled by the non-major ports in the past few years.

As per the Maritime Agenda issued by the Ministry of Shipping, Govt. of India, the capacity at 12 major ports is likely to increase to 1214.82 million tonnes by 2020 from the present level of 616.73 million Tonnes. The capacity at non-major ports is poised to increase by 2020 to 840 Million Tonnes from the present level of 288

Million Tonnes. Thus, the Indian Ports are aiming at a surplus capacity of above 25% over the projected demand, and this will enable the ports to provide berthing facilities on arrival of the ships, thus achieving zero waiting time for the vessels. The proposed investment during the next ten years is expected to be Rs. 2.77 lakh crore - 1.09 lakh crore for Major Ports and Rs.1.68 lakh crore for non-major ports.

Maritime Policies / Regulations & Guidelines

The Maritime Agenda 2010-20 is an effort of the Ministry of Shipping, GOI to identify the areas for attention during the 10 year period from 2010-11 to 2019-20. This 10 year period covers the last two years of the Eleventh Five Year Plan, the full five years of the Twelfth Five Year Plan and the first three years of the Thirteenth Five Year Plan of the strategic developmental plan periods.

The Government has been encouraging private sector participation in port development since1996. The major areas which have been thrown open for private investment, mainly on Build, Operate and Transfer (BOT) basis with revenue sharing mechanism which include construction of cargo handling berths, container terminals and warehousing facilities, installation of cargo handling equipment, construction of dry- docks and ship repair facilities, etc.

An International consortium of organizations from India and Abroad having duly assessed the potentiality of establishing a major maritime infrastructure in India have decided to establish a multi terminal grass root port and a fishing harbour on the Eastern coastline of India.

The consortium has come to the conclusion that numerous opportunities also co-exist with such an endeavour in the maritime sector and it could confidently support the establishment of a multi terminal port.

Project Description

The design of the proposed facility essentially attempts at optimum utilisation of resources and providing ultimate user satisfaction. The functional efficiencies are

to be of international standards to be obtained through the introduction of latest technologies, strategic diversification of services with concern for users and to ensure optimum return on investment.

The master plan of the proposed port and fishing harbour would aim at

- Safe navigation of ships and vessels in and out of the various offshore installations/ terminals forming the various facets of the complex.
- Maximisation of the turn-round time of vessels and cargo throughput at its onshore installations.
- Provision of well coordinated and efficient services and adequate storage and' transport facilities to the complex users for quick movement of cargo in and out of the offshore installations.
- Statutory requirements of the respective regulations and acts of the State and Central Governments.
- Required infrastructure and related services for implementation of safety standards;
- Collection of revenue pertaining to vessel related cargoes and cargo related charges;
- Anti pollution measures and environmental aspects;
- Achievement of the physical targets besides expenditure control on O & M and maintenance of cordial client relationships.
- Promote establishment of a multiproduct special economic zone and an integral component of the maritime infrastructure complex adopting the SEZ guidelines issued by the Govt. of India.

Tentative Design

There is an imperative need to build modern storage complexes which could have

facilities for storing various raw materials required for industry including PLO products, LPG/LNG and other materials. Parallel development of transportation network is necessary to move the materials, cargo and goods to and from these storage complexes. This transportation network could be additional road and rail systems or inland and Coastal waterways.

The norms for designing and planning the various units of port infrastructures such as entrance channel, turning basin, approach to turning basin, manoeuvrability widths, berths, and waterways of the proposed Southern extension for safe and smooth navigation of ships and their manoeuvrability considerations are based on the ISI Code 4651 Part-V.

The design of the proposed maritime complex comprises of a number of terminals for different utilizations and a fishing harbour.

- A fishery terminal for all the fishing related operations
- Bulk cargo terminal essentially designed for bulk cargo operations
- Container terminal essentially for container cargos and also for petrochemical product vessels.
- Ro-Ro and coastal terminal essentially designed for operation of RO-RO vessel and for coastal shipping.
- The coastal terminal also includes the trestle which permits cargo handling operations in the open sea conditions at depth of 20.00 m and has direct on trestle closed conveyor system for cargo handling.
- There is also a proposal to establish island break water or alternatively to divide the coastal terminals in to two components with a divider break water and a helipad at the terminal point. These options are being examined to ensure optimum capacity operation of the coastal terminal
- The pilot launches, the tugs and other harbour craft would be located in the coastal terminal.

- Supply vessels for offshore oil and gas operations also would be provided the required facilities for operation from the coastal terminal

By adopting the design of separate terminals for each of the cargos, the following advantages are taken note off in the design.

- Different terminals have different depths of operation depending on the requirement of the vessels which operate the cargo movements. This would reduce the quantum of dredging to minimal requirements.
- The fishing harbour requires depths of 5 to 6 m only and this mostly exists except for minor operation at the berths and in the entrance channel.
- The bulk cargo terminal which would enable operation of 80,000 dwt vessels would require depths of 15.00 m and the dredging would be carried out the required depths in the terminal and along the entrance channel. Thereby restricting the quantity of dredging.
- The container terminal would require depths of around 13.00 m only and the dredging quantities would be accordingly arrived at for economical operation.
- This terminal would also have the facilities for operation of gas and petro chemical product vessels.
- The coastal terminal essentially involves operation of coastal vessels which may require depths of around 8 to 10 m and the quantum of dredging is further reduced.
- The selection of formation of terminals for various products and cargos also enables development of the harbour in phases.
- It is proposed to construct the harbour in four phases and also to suit the requirement of cargo handling for various end users.
- Each phase would be constructed in a time period of 3 years including all its utility infrastructure and mechanical cargo handling equipments as well as

required storages. Six months of this tenure would be telescope to the earlier phase in the initiative of construction.

- The trestle operations are most economical for bulk cargos as large vessels of around 200,000 dwt could be operated as a trestle. This has been shifted to the second phase of development in consonance with the developments that takes place and consequential demand for coal in the proximal thermal power plants.

- It has further operational advantages as the required infrastructure support of tugs; pilot launches and fire fighting equipment are readily available in -the coastal terminal.

- Till such time, the demand for coal in the thermal power plant reaches the requirement of trestle operation; the bulk cargo terminal is developed along with the fishery terminal in the first phase itself. The bulk terminal and the fisheries terminal have common break water.

In addition to the conventional cargo handling facilities, the facilities are proposed to be established could serve varied users with very positive economic benefits compared to their present operations. Some of these are listed:

SITE ANALYSIS

A detailed survey has been undertaken along the Eastern Coastline of the country and particularly along the coastline of Andhra Pradesh to locate the proposed Maritime Infrastructure complex and the associated multi products special economic zone. The survey was conducted with the following objectives.

- Offshore areas of the coastline have adequate depths to reduce the quantum of capital dredging to establish the proposed port facilities.

- The site selected is not in the identified zones of vulnerability and erosion defined by the Ministry of Environment and Forests, GOI which has placed a ban on the consideration of sites which are located in those zones.

- Displacement of fishermen communities and other populations is negligible and

if not marginal in the establishment of the proposed facility.

- There is a good connectivity to the national road and rail network as well as to the hinterland from which the raw materials and products are expected to be transferred for export ad for consumption in the proposed multiproduct SEZ.
- The site is generally free from cyclonic activity and has not faced the tsunami or tidal wave incursions in the recent past as evidenced from the data available with Indian meteorological department.
- The area is essentially a single crop area if not a waste land for location of the multiproduct SEZ as Ministry of Environment has given a mandatory requirement that no double crop area could be utilized for establishment of these infrastructure complexes.

The following studies would be undertaken including the review of the following databases.

- Climatic setting
- IMD Database on Cyclones
- Oceanographic conditions
- Hydrographic Studies
- Ecological and vulnerability Concerns
- Sea Level Rise Database
- Mangroves / Wetland database
- Shelter belt Database
- Infrastructure
- Recent Concepts in Shipping Sector
- Policy Guidelines
- Land Resource Data
- Hinterland Connectivity

PLANNING BRIEF

The planning of infrastructure and associated warehouse complexes must

necessarily take into consideration long term perspectives and provide for changing scenarios, patterns of cargo flows, technological improvements in the vessels as well as new cargo handling methods:

There is an imperative need to build modern storage complexes which could have facilities for storing various raw materials required for industry including PLO products, LPG/LNG and other materials. Parallel development of transportation network is necessary to move the materials, cargo and goods to and from these storage complexes. This transportation network could be additional road and rail systems or inland and coastal waterways.

The location where such storage complexes could be established would depend upon the availability and close proximity to the terminals.

The proposed integrated storage facility would have tile following -

- Enclosed open yards
- Enclosed covered area
- Transit sheds
- Storage sheds
- Ware Houses
- Horton spheres
- Tankage systems
- Container Park
- RO -RO vehicle parking areas
- Cold storages
- Weigh bridges.

Further the port and harbour would be in inconsonance with the following regulations for policies of GOI / GOAP.

- State Policies & regulations
- Central Government Policies & regulations
- Zonal & Master Plan Guidelines For TCPO

- Environmental Laws and Regulations
- Fiscal Regulations
- International Funding Requirements &- approaches
- Private Public Partnerships / SPV
- National Maritime Policy Guidelines
- National Tourism Policy

The viability of the proposed development has been examined from the point of view of cargo that is to be handled in the port and harbour is presented in the chapter on viability and competing parts.

The project is to be notified as Tandava Maritime Infrastructure complex (TMIC). It takes the name from the Tandava River which flows along the Eastern boundary of the complex and is a well notified and well known land mark in the state of Andhra Pradesh.

Proposed Infrastructure

The coastal and offshore infrastructure of the harbour and port includes not only the offshore infrastructure, but would also include the land based facilities of warehousing, fishing harbour infrastructure, seafront based industrial activity and such others.

The operational aspects of the infrastructure for the whole terminal are presented. A number of facilities are proposed to be established to meet the operational requirements envisaged in the proposed maritime complex. The utility infrastructure is provided.

Railway connectivity

Railway connectivity would established connecting the various terminals in the Maritime complex to the main broad gauge national network of Indian Railways on the Chennai-Visakhapatnam-Howrah rail corridor at an appropriate existing station yard may be Payarakaraopeta.

The internal railway system in the complex may have the following rail

infrastructure yard with interchangeable lines for receipt and dispatch of rakes, coal sidings for placing. Full rakes for mechanized wagon loading, pre-tippling lines, two post-tippling line, two in-motion weighbridges for weighment of rakes, two locomotive for shuttling of rakes within the port area, a separate siding for sick wagon repair and a loco shed for attending to minor repairs of shunting locomotives. The exchange yard can handle trains hauled by electric and diesel traction.

Road connectivity

The hinterland connectivity to the maritime has been provided by a 4 lane express way of 3.8 km connecting with the NH5 (Chennai-Kolkata). From the port entrance, 5 km long four lane road to the berth area has been provided. In addition to this, secondary roads connecting the various terminals and storages have been provided.

The transportation network includes both rail and road as well as conveyor system for cargo / water and power along with the revenue plantation for greening for dust suppression.

Area statement for various terminals/ facilities in TMIC			
S. No.	**Terminals**	**In ha**	**In acres**
1	Bulk Cargo Terminal	113	288
2	Oil and gas terminal	173	439
3	Container terminal	237	601
4	Coastal Terminal	186	473
5	Fishing Harbour	20	51
6	Infrastructure of road and Rail Networks/ Conveyor Belts/Drainage	328	833
	Sub total	**1057**	**2685**
7	Environmental greening programme at 33% OF project area	348	883
	Grand Total	**1405**	**3568**

Land requirement estimate

Water Requirement and Source

Estimates of total water supply requirements for various buildings are based on the occupant load, consistent with the provisions of 4.1 clause of NBC.

The following is the consolidated estimate of water supply requirement.

	Projected demand in MLD
Container terminal	0.31
Bulk terminal	1.04
Coastal Terminal	0.37
Technical Space	0.05
Fishing harbour	0.23
Sub total	**2.0**
Total Requirement	**3.7**
Transmission losses	0.74
Net supply available after above requirements	3.0
Supply to ships	12.0

There is a requirement of supply of water to the ships that call at the port and this demand is also expected to increase with various developments taking place in the port in the coming years. The supply is to be obtained from GVMC.

Power Requirement

The 11KV HT supply received from AP TRANSCO will be converted to 415 V through transformers. A spare VCB panel has been catered for SBW/FFF, Electric supply from Substations would be carried to individual entities through LT cables.

The nearest source of reliable power is AP TRANSCO situated at 15 km from the site. It is proposed to tap electric power from AP TRANSCO grid by a dedicated 33KV double circuit OH line from the 33kv bus bar extension Bay in switch yard.

Storages

There is an imperative need to build modern storage complexes which could have facilities for storing various raw materials required for industry including PLO

products, LPG/LNG and other materials. Parallel development of transportation network is necessary to move the materials, cargo and goods to and from these storage complexes.

This transportation network would require strengthening of road and rail systems or inland and coastal waterways if possible, developing from the maritime complex.

The location where such storage complexes could be established onshore would depend upon the proximity to the terminals.

The proposed integrated storage facility would have the following - Enclosed open yards / Enclosed covered area /Transit sheds/ Storage sheds/ Ware Houses / Horton spheres/Tankage systems/ Container Park /RO -RO vehicle parking areas /Cold storages/ Weigh bridges.

Cargo-Handling Equipments

The summary of the average cargo handling rates proposed achieved at the berths is presented.

PRODUCTOIVITY NORMS FOR EQUIPMENT FOR USAGE IN VARIOUS PHASES IN VARIOUS TERMINALS							
S. NO.	EQUIPMENT	UNIT NO	HANDLING RATE PER DAY OF ONE UNIT	75% OPERATIONAL EFFICIENCY	NO.OF DAYS OF OPERATION	TOTAL OUTPUT FOR ONE UNIT (MTPA)	TOTAL OUTPUT FOR ALL THE UNIT (MTPA)
PHASE-I							
1	Continues grab unloader-2000TPH for coal	2	36000	27000	275	7.425	14.825
2	Continues Grab unloader-2000 for Lime Stone	2	18000	13500	275	3.713	7.43
3	Continues Grab Unloader for Fertilizers-1000 TPH	1	18000	13500	275	3.713	3.71
4	Warf cranes - 150 Tonnes Capacity for Steel product	3	8100	6075	275	1.671	5.01
PHASE-2							
5	Continues Grab Unloader-2000 TPH for coal	2	36000	27000	275	7.425	14.85
6	Warf cranes - 15 Tonnes Capacity	3	8100	6075	275	1.671	5.01
PHASE-3							
7	Continues grab unloader-2000TPH for coal	2	36000	27000	275	7.425	14.85
8	Continues grab unloader -1000TPH for Lime stone	1	18000	13500	275	3.713	3.71
PHASE-4							
9	Warf cranes of 15 tonnes capacity	2	8100	6075	275	1.671	3.34
10	Continues Grab Unloader for Fertilizers-1000 TPH	1	18000	13500	275	3.713	3.71
11	Aluminium Warf crane-15Tonnes	1	8100	6075	275	1.671	1.67

	capacity Aluminium						
12	Warf cranes of 15 tonnes capacity for food products	2	8100	6075	275	1.671	3.34
13	Continues Grab Unloaders @ 1000TPH for Dry Bulk Cargo	2	18000	13500	275	3.713	7.43
14	Container crane of 50.00Tonnes capacity	2	27000	20250	275	5.569	11.14
Note: Higher capacity cargo handling equipment proposed, contemplating faster handling of ships simultaneously, avoiding ship detention / waiting time. Spare capacity of berths / cargo handling equipment will also be utilised for transhipment of dry bulk cargo							

Berths

The deck level of proposed berths shall be +4.50 m CO, same as that of the existing berths in Visakhapatnam and Gangavaram ports.

Marine Operations

Port conservancy is an act of overseeing the maintenance and up keep of the port infrastructure with regard to safe navigation of vessels in and out of the port and other' related activities. Port conservancy is governed by the Indian Ports Act, 1908 (15 of 1908). A Harbour Master has to be appointed under the act and approved by the competent authority.

The following areas are governed under the port conservancy schedule as per the Act.

- Marine surveys and hydrographic surveys
- Requirement of dredging operations
- Maintenance of navigational aids
- Pollution control
- Marine casualties
- Safety regulations
- Cargo related regulations Pollution related regulations Personal safety Emergency regulations
- Vessels traffic management Pilotage Rules and regulations for safe movement Communications
- Auxiliary Services Fire services Water supply Bunkering Diving services Ferry services Salvage operations
- Regulation of craft navigation
- Enquiry into marine causalities
- Formulation of recruitment rules
- Licensing
- Training.

- Security
- Establishment of Port Control Centre

Utilities and Management

The green field minor port would requires infrastructure in the areas of power, water supply, rail and road networks, fire fighting, land management and environment. Many of these sectors and their operations are desirable to be offloaded.

The following utility infrastructure is provided for each of the terminals.

Fire station / Canteen /Parking unit / Generator hall / Transit storages /Hazardous waste storages / Terminal maintenance unit I water treatment plant /sewage treatment plant / Effluent Treatment Plant / Special storages / Admin. Office & bank / Conservator office & Tech unit / miscellaneous items.

The following infrastructure is provided exclusively for fishing terminal

Fire station/Canteen/ Parking unit/Generator hall/Auction hall/net mending hall workshop/ water treatment plant/ sewage treatment plantEffluent Treatment Plant/cold storage plant/ SHG outlets & retail shops/Admin Office & bank/ Conservator office & Tech. Unit/ miscellaneous items.

Rehabilitation & Resettlement

There is no rehabilitation and resettlement involved in the establishment of the proposed port and multi-terminal harbour. The project is being established on vacant land which is under CRZ and the most of the land belongs to government. Further, the land holders who have lands and whose lands are also vacant lands have been acquired by the project through direct negotiations of one to one. They have willingly given the lands to the project.

Keeping these aspects in view, there is no rehabilitation or resettlement.

Project Schedule and Cost Estimates

The project is proposed to be implemented in four phases including the required'

onshore infrastructure for each of the terminals.

Various phases of construction are as follows.

The Tandava Maritime Infrastructure complex would include the development of the following - Marine / Offshore installations and the developments / establishments would be carried out in different phases extending over a six year period. The phasing from one to four would be' telescopic in nature.

1st phase - The following are the initiatives to be implemented during the first phase of establishment of the Tandava maritime infrastructure complex.

- It is proposed to take up the immediate steps to obtain all the clearances required for establishment of the complex.
- It is proposed to acquire the required land from the identified areas through direct negotiations with the land owners.
- It is also proposed to acquire the available government land within the CRZ 500 m. Delimitation which have been identified and located within the complex.
- It is proposed to take up the establishment of the fishing harbour and the bulk terminal with the required onshore infrastructure and material handling systems.
- It is also proposed to design the shore protection works to be taken up all along the coastline of the complex to ensure that shore line within the port area is protected from unforeseen natural adverse conditions.
- It is also proposed to establish the road connectivity as per the design parameters in the complex.

The first phase of the development as envisaged above is to be completed within 24 months after obtaining all the clearances.

2nd phase - The following are the initiatives to be implemented during the second' phase of establishment of the Tandava maritime infrastructure complex.

- It is proposed to develop the coastal terminal along with the trestle structure for a length of 1300 mts. from the end of the break water for handling coal, crude

and sea water and for establishing a necessary infrastructure of conveyor systems for transmitting the products and cargos to the respective plants.

- It is proposed to take up creek revetment and protection works all along the length of the creek located within the complex.
- It is proposed to establish the required infrastructure for operation of RO- RO's and also the supply vessels as well as marina development.

The construction programme for the 2nd phase would be of 24 months duration out of which 6 months would be telescope activity of 1st phase.

3rd Phase" The following are the initiatives to be implemented during the third phase of establishment of the Tandava maritime infrastructure complex.

- The onshore infrastructure of warehouses, logistic hubs would be taken up for all the harbor sites. The connecting road at the landward boundary of the complex as a multilane zone would be completed.
- The utility infrastructure in all sectors would be established in both the areas of complex and the zone would be thrown opened for development and establishment of sea port based industries.

The construction programme for the 3rd phase would be of 24 months duration out of which 6 months would be telescope activity of 2nd phase.

4th phase - The following are the initiatives to be implemented during the fourth phase of establishment of the Tandava maritime infrastructure complex.

- The activity that is proposed to be taken up would include the onshore infrastructure, transportation networks, hinterland connectivity, offshore establishment, operational details and establishment of administrative and monitoring structures.

- The activities in the fourth phase would require 24 months out of 'which 6 months would be telescoped activity of the third phase.

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CONSOLIDATED ESTIMATE OF COSTS FOR ALL PHASES OF DEVELOPMENTS OF OFFSHORE STRUCTURES AND ONSHORE INFRASTRUCTURE						
Description	Phase-I in Rupees millions	Phase-II in rupees Millions	Phase-III	Phase-IV	Total amount Rs. in Millions	Total amount in Rs. Crores
CIVIL WORKS INCLUDING OFFSHORE MARINE WORKS & ONSHORE INFRASTRUCTURE & STORAVES	22405	12947	20912	4295	60560	6039
ELECTRICALS & FIRE SAFETY SYSTEM	363	313	325		1001	100
HARBOUR CRAFT	1157	671	536	51	2415	242
NAVIGATIONAL AIDS & COMMUNICATIONS	95	15	95	95	300	30
MECHANICAL & CARGO HANDLING EQUIPMENT	4640	5090	555	470	10755	1076
POLLUTION CONTROL & ENVIRONMENTAL MANAGEMENT	296	50	246	0	594	59
GRAND TOTAL	**28956**	**19086**	**22669**	**4911**	**75625**	**7545**

ANALYSIS OF THE PROPOSAL

The viability of the complex has been examined from the point of view of cargo that is to be handled in the complex. This includes bulk cargo for the feed stock for power plants and the container movements and various types of cargo including containers which would be transported through coastal shipping route.

There is a double positive effect for the -dernand for tonnage. It is a - result of important structural changes in world economy and trade, which most likely will continue for at least the rest of this decade. The liberalization of international trade in this decade has been of significant importance to the sharp rise in seaborne trade. If the policy is continued, then the most important premise for a continued strong expansion in global seaborne trade is established. A dynamic and open Indian' economy would have an important impact on the world economy.

A summary of the projected traffic, estimated capacity and investments proposed by the Major Ports and Maritime States under three phases up to 2020 is enclosed.

Traffic Projection (in million tons)

Ports	Existing Level 2009-10	Projections			CAGR(%) between 2009-10		
		2011-12	2016-17	2019-20	2011-12	2016-17	2019-20
Major Ports	561.09	629.64	1031.50	1214.82	5.93	9.09	8.03
Non-Major Ports	288.80	402.50	987.81	1280.13	18.05	19.21	16.06
Overall	849.89	1032.14	2019.31	2494.95	10.20	136.16	11.37

Capacity Estimation (in million tons)

Ports	Existing Level 2009-10	Projections			CAGR(%) between 2009-10		
		2011-12	2016-17	2019-20	2011-12	2016-17	2019-20
Major Ports	616.73	741.36	1328.26	1459.53	9.64	11.58	9.00
Non-Major Ports	346.31	498.68	1263.86	1670.51	20.00	20.31	17.04
Overall	963.04	1240.04	2592.12	3130.04	13.47	15.19	18.34

Regional Gao-graphical Assessment

In formulating the Tandava Maritime Infrastructure complex, the regional factors have also to be taken into account .There are three states in addition to parts of Andhra Pradesh which have a major role to play in the development of the cargo loads to be handled at the complex and associated infrastructure. These in turn would provide the viability for the proposed port.

Three states in India are of special interest to the port of TMIC, Orissa, Chhattisgarh and the home state of Andhra Pradesh

The sea-borne trade of a country primarily emanates from the economic growth of the country and accessibility of the international market, as Stated earlier. The flow of the sea-borne trade of the country through a port, to a large extent, depends on the economic development of the primary service area of the port, the regional economic development and the location of the port.

In order to forecast the cargo throughput by 2020 AD from the North Coastal Andhra Ports, an endeavour has been made to understand the current environment for economic development of the service area, in particular, the primary service area. In the wake of the economic reforms and liberalisat.ionpolicy of the

Government of India, encouraging and positive trends have emerged. During the past 18 months, proposals for an investment of more than Rs.50,000 crores have been approved for the establishment of a number of large industrial units in the vicinity of the two ports.

The long term forecasts are based on a combination of trend extrapolation and likely developments' in specific commodity groups. The following assumptions and considerations' underlay the forecast:

- Due to capacity constraints in the refineries, the group of petroleum, oil and other liquids is not going to limitations of the refineries. POL will therefore see a growth until 2013, before stabilizing on an output matching the refineries in the service area.
- Other liquids, which include raw materials for fertilizers and alumina plants, will see a high growth rate. This is due to the potentially high growth in the fertilizer sector.
- Due to the increased domestic demand for steel, the growth in export of iron ore will decrease.

The potential for the complex is estimated at around 140 Mt by 2025/26. However, this potential would be realised in stages in the Maritime Infrastructure in consonance with the development.

While some of the long term projections are based on CAGR growth trends and where appropriate specific circumstances are taken into account. The factor per commodity could be the following

- In the case of POL, traffic will be restricted by refinery capacity in the service area. The crude/ gas movement is limited in this reach.
- Other liquids include raw materials for fertilizers and alumina plants and will register matching growth
- Iron ore exports will see a slow' down on account of domestic steel industry growth and hence a growth of only 10 million tons beyond 2013 is projected
- Thermal coal requirements cannot be based on trends as it is dependent on

establishment of thermal power plants producing the additional power as a proportion of total power and the imported coal is expected to be as an important fuel for power generation.

- Coking and steam coal imports will also continue to increase at the same pace in the light of domestic steel industry growth
- In the case of Fertilizers too the current growth trend is likely to continue on the back of the emphasis being given by GOI to agriculture growth flattening out of fertilizers demand as has happened in the developed world is not expected to occur in India within the period the projections are made.
- Other dry bulks include alumina and limestone. With the likelihood of several of the alumina mining projects coming through in Orissa and the mines being predominantly being in southern Orissa, TMIC will attract the cargoes for these plants However, the growth beyond 2017 may not be as significant as between 2013 and 2017 when the mining leases and plants reach optimum levels
- General cargo / break bulk growth will be limited by the growing trend in containerization of general cargo
- Container traffic is bound to grow at a rapid pace on account of the vibrant economic growth that will trigger a higher growth in manufacturing sector than at present.

Cargo projections for the port

PROJECTIONS OF CARGO TO BE HANDLED IN VARIOUS TERMINALS AND TRESTLE IN MILLION TONNES						
S. NO.	**Description**	**Phase-I**	**Phase-II**	**Phase-III**	**Phase-IV**	**Total**
	IMPORTS					
1	Coking Coal(i}	1	1	1	1	4
2	Thermal Coal (IMPO)	2	12	16	20	50
3	Lime Stone (i)	1	1	1	1	4
4	Fertilisers	1	1	1	1	4
	EXPORTS					
5	Products (Steel/Others)	1	1	1	1	4
6	Cement	1	1	1	1	4
8	Alumina	1	1	1	1	4
	IMPORTS/ EXPORTS					
9	P.O.L (Transhipment)		0	4	8	12
10	Dry Bulk Cargo	0	1	1	r	3

11	LNG/P.O.L	0	1	1	1	3
12	Container Cargo	0	0.5	0.5	1	2
13	RO-RO For O.D.C.	0	0.5	0.5	r	3
14	Food Products including Rice	1	1	1	1	4
15	General cargo at Multipurpose Berths	1	1	1	1	4
Total		**10**	**23**	**31**	**40**	**105**

Financials and Implementation

It is proposed to establish Tandava Maritime Infrastructure complex along with fishing harbour as an integral component and the project is detailed for establishment South of Tandava River in the Visakhapatnam District of Andhra Pradesh, India.

The complex would have a number of offshore terminals along with a fishing harbour and other onshore infrastructure facilities. The Maritime Infrastructure is located between the coastline and the creek located Northward from the coastline.

The proposed complex is to be established under Public Private Partnerships with Govt. of Andhra Pradesh. There is also a possibility of participatory involvement of Govt. of India as per the new policy agenda released by the Ministry of Shipping, Govt. of India.

A world class Maritime infrastructure as envisaged out will naturally attract port based industries. The sea terminals become the captive resource for transporting finished products and importing raw materials under preferred rates contracts. Therefore, one side the seaport has captive industry clients, and on the other side of the Industries' have a captive transportation facility for global connectivity.

In order to augment revenue from captive industries, it is proposed to create a Government of India approved Special Economic Zone (SEZ) by converting the majority of the acquired hinterlands as an Industrial area where seaport based industries will enjoy certain preferred tax concessions and holidays.

Some of the identified seaport based industrial SEZ are the following

- Energy (Power Plants based on Coal & Natural Gas)
- Metallurgical Coke Plant (by products Coke Breeze, Pitch Tar, Benzene and Sulphur.)
- Steel Plant (Specialized Steels, Alloys, Open Forgings, Alumina Refinement)
- Advanced Materials Technology Providers (Pultrusion, Superstructures, Continuous Filament, winding, Thermoforming, Extrusion, Rotational Moulding and injection Moulding)' ,
- Agro Industries, (Food Processing, Edible Oil Refinement, Marine Food)
- Coastal shipping to Bangladesh, Rangoon, Sri Lanka, Singapore etc)
- Cement Manufacturing Plant.

Key Growth Drivers

Seaport traffic mainly consists of petroleum products, coal, iron ore, containers and other commodities such as fertilizers. Some of this traffic is driven by imports and some by exports. With the increased in number of seaports, there is significant scope for passenger ferry and coastal cargo as a viable alternative for coastal connectivity and regional connectivity with countries due East.

All these aspects make the entire project endeavour assured of good rate of return.

SWOT ANALYSIS

SWOT Analysis carried out fully supports to proposed establishment of a complex.

Strengths

- High Growth
- Strategic Location
- Multi modal connectivity -
- Bigger size and multiple productivity
- Provision of infrastructure facilities in processing as well as in non processing area(Social structure)

- Liberal Economic policies and incentive packages
- Proper planning and management
- Administrative framework
- Flexible Labour laws
- Market size plus Import and Export Potential
- Total investment recovery possible in less than a decade
- Perpetual revenue opportunities

Weakness

- Funds
- international tie-ups and associations
- Coastal Supplies
- Fulltime pre-operational activity management
- Organisational Set Up

Opportunities

- Ideal located voluminous raw material imports
- Unexploited coastal and regional water transport potential
- Market for high speed bulk carriers and work boats
- Market for Maritime Infrastructure Solutions
- Tremendous and for energy industries
- Ports Reform, More Autonomy
- Introduction competition

Threats

- Limited availability of coastal land
- Escalating real estate costs
- Limited window of opportunity for participating in infrastructure building of a free nation
- Delays will increase the cost of investment, as the US dollar is losing parity against other currencies

The factors taken into consideration for the above SWOT analysis are as follows:

- Drivers for Industry
- Ports handle approximately 95% of India's total trade in terms of volume and 70% in terms of value so that one could to see what actually drives the port industry.
- Passenger Traffic (Tourism)
- Coastal shipping
- Cargo Traffic (EXIM)

Proposed Terms of Reference

Preparation of REIA/EMP and Risk Assessment studies as per EIA notification, 2006 and its requirement for the establishment of Tandava Maritime Infrastructure complex with multi terminal port and fishing harbour at Kumarapuram village in Payakaraopeta mandal of Visakhapatnam district is to be taken up as follows.

The EIA study will include determination of baseline conditions surrounding to the proposed area, assessment of the impacts on the environment due to the construction and operation of the proposed project and making recommendations on the preventive measures to be taken, to minimize the impact on the environment to acceptable levels. The field data around the proposed project will be collected in the core and buffer zones. The EIA documentation would be as per the generic structure issued by the MOEF in their notification of 2006.

The components of the EIA study will include:

- Determination of baseline conditions using primary data generation and secondary data available from various governments published reports;
- Detailed description of all elements of the project activities during pre-construction, construction and operational phases will be considered. The elements to be analyzed will include the infrastructures of the project including drainage features, roads, waste collection, disposal and management and utility requirements;
- Identifying the sources of pollution and assessing the impacts on the

environment due to proposed port project.

- Preparation of EIA and EMP documents with recommendations on preventive and mitigative measures for limiting the impact on environment to the desired level during various stages of project. Development of a suitable post study monitoring program to comply with various environmental regulations; and
- Risk Assessment (RA) and Disaster Management Plan (DMP) describing the probable risks and preventive & precautionary measures to be followed in the event of emergency situations such as accidents, fire etc.

Baseline Environmental Data Generation

Field assessments of the physical, ecological and socio-economic aspects of the site and surrounding environs of the proposed port project will be conducted during non-monsoon season. These assessments will be used to determine the potential impacts of the proposed port project. The survey includes a photo-inventory of the physical and biological features of the site and environs.

The data generation will be done for the following attributes:

Physical

Climate, air and noise quality, geology, topography, groundwater/surface water quality and hazard vulnerability.

Ecological

Terrestrial and aquatic communities; presence of rare, threatened, and endangered species.

Socio-Economic

Demography, regional setting, location assessment and land uses.

The baseline monitoring on physical parameters will be carried out during non-monsoon season for assessing the environmental quality. The reconnaissance survey will be conducted prior to commencement of sampling to select the locations by a team of technical experts from M/s. Team labs and Consultants.

The sampling requirements will be established based on the standard scientific methods.

Terrestrial Environment

The details of monitoring to be carried out on environmental attributes are presented below:

S. No.	Attributes	Scope of work
1	Ambient Quality	Air The baseline air quality will be monitored at 8 Locations twice a week for 13 weeks for TSPM,RSPM, S02, NOx and CO. AAQ monitoring locations will be selected as per guide lines specified in GSR 176 (E) notification (selection of AAQ sites), 1 Location - 90 days
2	Meteorological data	Micro-meteorological survey will be carried out at project site for 3 months. Data will be generated for temperature, Wind speed and Wind direction, R.H and rain fall. This will be further supported by the meteorological data for the area of interest collected from IMD Station Visakhapatnam and Trend analysis of micro meteorological data generated at the site.
3	Water Quality	Four Surface water and Six Groundwater samples will be collected and analysed covering 10-km radius area during the study period. The samples will be analyzed as per IS-10500/13-2296 and EPA Act as applicable.
4	Soil Quality	6 soil samples will be collected from three different levels up to a depth of 90 cm and analyzed for the physico-chemical parameters.
5		by using Integrated noise meter on hourly observations for 24 hours at each location The observed data will be compiled' and, statistical analysis done for L_{10}, L_{50}, L_{90}, L_{eg}, L_{day}, L_{night} and L_{dn}.
6	Land use	Land use as per data collected from India *Census-2001* will be analyzed to identify the present land use of buffer zone. Various land use classifications have been computed. This study will be carried out using secondary sources of information only. The land use analysis will also be made using satellite imagery

S. No.	Attributes	Scope of work
		of the region.
7	Geology Hydro-geological aspects and Traffic Study	These aspects will be covered for the study area based on the secondary data. Traffic survey will be carried out at one location on like present total daily traffic, peak' hourly traffic and traffic compositions will be analysed, one location on: 24 hourly basis once during the study period. The parameters like present total daily traffic, peak hourly traffic and traffic Compositions will be analysed.
8	Aesthetic/Cultural aspects. Ecological Studies (Terrestrial Aquatic)	Identification of all historical Archaeological sites/ monuments in the study area will be carried out. Primary as well as secondary data will be collected for flora and fauna of the study area. The survey will also include assessment of the species diversity, density, abundance etc and formulation of ecological indices, assessment of likely changes on flora and fauna due to the project related activates. Suggestions for conservation and protection of flora and fauna. in the study area.
9	Socio-Economic and Health aspects	Socio-economic and health aspects of the buffer zone population will be covered for the project area based on the Census documents and NIC database. Data from local and district administration will also be collected. Primary studies will be carried out.

MARINE ENVIRONMENT

The following is the scope of the studies that would be undertaken as supporting studies to the terrestrial rapid EIA studies in respect of Maritime complex with port and fishing harbour.

Indomer, Chennai would be undertaking all the studies in regard to marine EIA component for establishment of the proposed port complex. The National Institute of' Oceanography would be undertaking the detailing in respect of CRZ notification for 7 km on either side of the port site.

PART I-Seabed surveys

- to carry out bathymetry survey covering 10.00 km along the coast and 2.00 km into the sea at 50 m spacing,
- to carry our seismic survey covering 10.00 km along the coast and 2.00 km into the sea at 50 m spacing to identify the presence of rocks if any,
- to carry out side scan survey covering 10.00 km along the coast and 2.00 km into the sea -at 100 m spacing to understand the geology of the seabed and to identify submerged obstructions if any, and

PART II- Marine EIA study

- to use the field data collected on currents and tides for a period of 15 days,
- to collect the available data on waves, wind, temperature, salinity etc.,
- to collect water samples at ten locations and analyse for water quality parameters on salinity, temperature, pH, dissolved oxygen, bio-chemical oxygen demand, nitrate, nitrite, ammonia, phosphate, total phosphorous, total nitrogen, cadrnium, chromium, lead, mercury, petroleum hydrocarbons and phenols.
- to evaluate seabed sediment quality parameters at ten locations on texture, total phosphorous, total nitrogen, total organic carbon, calcium carbonate, phenolic compounds, cadmium, chromium, lead and mercury,
- to evaluate at ten location on biological quality parameters on phytoplankton biomass and group diversity, zooplankton biomass, population and group diversity, benthic biomass, population and group diversity, coastal vegetation. including mangroves, fisheries based on experimental trawling and available statistics and microbial population in water,
- to study the environmental assessment based on the collected data and the type of development in coastal water,
- to assess the impact of the proposed development of port project

- to enlist appropriate mitigation measures in order to minimize the impact,
- to draw an environmental management plan for keeping up the marine environment
- to assist the client in all aspects regarding filing up of application forms, submission and presenting to state and central authorities and

PART III- Modeling Study

- To conduct the mathematical modeling study for the impact of break waters and trestle structures on the wave actions and tranquility in the various terminals and- fishing harbour basin.

PART IV - Demarcation of CRZ line

- to carry out LT/HTL/CRZ demarcation survey along the open coast covering 1km stretch by one of the approved agencies like NIO including 7.00km .coastline on either side of the selected site.

PART V - Additional studies

REIA studies are to include the following.

- Coastal and estuarine fishery resources in 5.00km. radius
- Benthic productivity subjected to dredging towards inner (riverside) as well as outer harbour (sea ward side)
- Likely ecological changes based on earlier data and data obtained in the study period.
- Remedial measures to mitigate the impact after project implementation.
- Environmental monitoring during the project execution and thereafter.
- Oceanographic (air-sea interaction monitoring) studies.
- Socio economic study

Legislation and Regulatory Considerations

Government policies, legislation and regulations relevant to the proposal will be identified. Local plans and policies will also be evaluated. Project characteristics will be analyzed to ensure compliance with these policies, legislation and regulations. Appropriate recommendations will be provided to ensure regulatory compliance.

The legislation relevant to the project will be summarized and presented in the REIA Reports.

Identification of Sources of Pollution

This includes the following:

- Identifying the sources of pollution of air, water, land and noise;
- Quantifying the emissions from the pollution generating sources; and
- Quantification of solid wastes and likely disposal methods will be suggested.
- Sources of Pollution in the Project Area
- The likely sources of air and water pollution will be identified and quantified;
- The proposed pollution control measures envisaged in project area for fugitive dust, noise pollution and other environmental effects of each project activities will be assessed for their adequacy;
- The present and proposed changes in land use pattern will be identified; and Suitable greenbelt development plan will be prepared.

ENVIRONMENTAL IMPACT ASSESSMENT

The proposed port project to be developed from grass roots may have some impacts on the environment. The parameters likely to be affected are air quality, water quality, soil quality 'and noise levels etc on account. of gaseous emissions, liquid effluent discharges, resultant particulates, generation of solid wastes etc will

be discussed.

The impacts of project on various components of environment and the possible mitigation measures for mitigating the negative impacts were described in the following sections.

Impact on Land Use

The land use impacts due to proposed port project will be identified in terms of local land use planning. The change in land use pattern of project site will also be identified. This includes visual impact, impact on forest, impact due to industrial growth and growth due to socio-economic factors.

Impact on Demography and Socio-Economics

On the basis of the compiled information and the proposed employment and other benefits to the people of the study area as well as others, the likely socio-economic impacts of proposed port project in post-project scenarios for demography, facilities and services, agricultural sector, civic infrastructure and basic amenities, industrial sector, economic status and health status of people, etc will be assessed.

Impact on Soil

Impacts on soil characteristics include destruction of soil profile, changes in soil productivity, increased erosion and subsequent loss of agricultural soils and land use changes. The impact assessment includes an analysis of susceptibility of the area to loss of agricultural production, change in crop pattern etc. Details on solid wastes from the proposed project establishment activity will be estimated and Impact of disposal /utilization of solid waste will be addressed to the effect on human settlement, vegetation, ground water contamination etc.

Impact on Water Quality

The assessment of potential impacts of the project will be carried out with respect to:

- Ground water quality degradation;
- Surface and river water quality degradation;
- Agricultural productivity;
- Habitat conditions; and Recreation resources and aesthetics.

Impact on Ambient Air Quality

Emission inventory will be carried in the study area. A computer based internationally recognized mathematical air quality model (ISCST3) suitable for the region will be used to predict the concentration of S02, NOx and SPM due to the operation of the proposed project. The results will be presented for short-term (24-hourly) concentrations in and around the project site. The dispersion model results will be included in the report using isopleths or other graphical methods, overlaying a land use map of the surrounding area. The predicted air quality results will be compared with existing regulations.

Impact on Noise

Sources of noise and its impact on the environment will be addressed. The noise level' at varying distances for multi-sources will be predicted using Noise model. A comparison 'of measured noise (Leq) at .monitorinq locations to that of predicted noise levels (Leq) will be made and mitigatory measures will be recommended to conform to regulatory ambient air noise standards.

Baseline noise levels in different zones like industrial, residential and sensitive areas like hospitals etc will be monitored. The potential noise level exposure will be determined and evaluate for acceptable limits of exposure.

Impact on Ecology

Impacts on aquatic species especially during dry season will be assessed particularly those which are endangered. The parameters, which are of concern, are TSS, TDS, heavy metals, oil and grease, pH and temperature. The assessment

will also include impacts of chlorinated organic chemicals. The impact of site preparation activities involving site clearing, excavation, earth moving, dewatering or impounding water, bodies and developing burrow and fill areas will be assessed. Recommendations will be made to mitigate such adverse impacts as soil erosion and habitat loss. In addition, impact of fugitive and stack emissions will be assessed on the surrounding species of economic/genetic/biological importance.

Marine Environmental Impacts

These are considered for construction phase and operational phase.

Construction Phase

Marine environmental impacts during the construction phase may potentially manifest in the form of (i) changes in physical processes (bathymetry, circulation pattern, littoral transport): (ii) degradation in water quality and sediment texture; (iii) destruction of biotic communities of localized sub tidal and intertidal areas. Environmental considerations have become major significance in development of coastal structures. Even though the effect may not be detrimental, but will appear to be objectionable to the public. The main areas of influence include (i) physical disturbance (ii) release of contaminants (iii)' depleted oxygen supplies and (iv) increase in water turbidity.

The EIA guidance manual for ports sector brought out by MOEF, GOI has identified the following potential impact in the development and construction of ports and associated infrastructure facilities. These are applicable as port development is a major component and comprises the outer and inner harbor.

The various impacts of project in regard to the offshore and inner harbor component are assessed under the following categories -

- Potential impact due to port location
- Potential impact during construction
- Potential impact during operations

The specific subject areas considered are the following.

- Land Environment
- Water Environment
- Marine Environment
- Biological Environment
- Air Environment
- Noise Environment
- Waste Management
- Socio cultural impacts

ENVIRONMENT MANAGEMENT PLAN

The Environment Management Plan (EMP) will include all the mitigatory measures proposed under each significant environmental attribute.

DISASTER MANAGEMENT PLAN AND OCCUPATIONAL SAFETY

A Disaster Management Plan (DMP) for dealing emergency situation arising due to fire explosion, leakages of hazardous substances, etc in the project will be prepared. The plans include storage, handling, transportation etc for the hazardous materials to be used in the proposed port project.

Occupational risk involved during construction and operation of the project will be assessed and necessary safety and protective measures will be spell out. The DMP will include both onsite and offsite emergency preparedness plans.

POST STUDY MONITORING PLAN

The Post Project Monitoring (PPM) plan will be prepared considering the following:

- The proposed pollution control measures for air, wastewater and solid waste (hazardous/non-hazardous) disposal;
- Waste minimization, wastewater management, waste reuse and resource recovery, waste segregation to make the treatment and disposal cost-effective;

- The monitoring requirements for ensuring the statutory as well as process data are collected.

The organizational/institutional set-up required for effective environment management plan implementation and post-project monitoring will be suggested along with the budgetary requirements.

Report on alternate sites and preferred site with charts alternative sites

Alternative Sites

In order to arrive at the most suitable layout for coastal and marine facilities as proposed the following factors influencing such development have been considered.

- Port limits and the area demarcated.
- The expected bed rock levels which influence the development costs for providing the required water depths and channel configuration to accommodate the designed vassal movements.
- Coastal Protection
- Adequate maneuverinq area for the designed ships and stopping distance
- Location of intake and outfall systems if required.
- Future expansion possibilities.
- Ability to cater for littoral drift.
- Advantages of all weather ports as compared to the weather port.

Following additional criteria in order of importance have been kept in mind while selecting the site.

- Absence of forest land/Minimum trees on revenue land.
- Avoidance 0 environmental issues, by keeping allowable, distance from National Park, wildlife sanctuaries, HFL of rivers, railway lines etc.
- Un inhabited Area as for as possible considering R&R Issues
- Accessibility by rail and road
- Minimum irrigated land, better terrain & favourable soil consideration.

- Sufficient availability of land as per requirement.

Environmental Considerations

Further, in respect of Environmental Clearance, the short listing of the sites has been done by giving environmental consideration equal importance as technlf-economical considerations.

Following are the major environmental considerations that have gone into selecting the site.

- That no existing or proposed National Parks, Wildlife sanctuaries animal migration routes/corridors, tiger or elephants reserves lie within 15.00km of the selected site.
- Terrain of the selected land should be as far as possible, plan so that involvement of land cutting and filling is minimum possible.
- Barren land, land with minimum trees, land without any irrigation facility is preferable.
- That the selected site is at least 500m (0.5km) away from railway lines, national/highways, highest level of nearby rivers, canals etc.

Note Alternative Sites

A number of sites have been examined which are located on the coastline of Andhra Pradesh for location of the proposed multi terminal port and fishing harbor. As Andhra Pradesh Coastline as a number of port sites which are declared as minor port but not in use for various reasons and for many years, an examination of these minor port site has also been made in respect of the site selection process.

The following are the minor port sites which have been examined.

Bhavanapadu Minor Port

The Bhavanapadu Port (Srikakulam District) is located about 70 km North East of Srikakulam on the Bay of Bengal. The nearest Railway station is at Palasa. The port is encircled with salt industries besides agricultural produce. The port has a

potential of handling about 0.50 lakh tones of fertilizer imports and 0.50 lakh tones of salt exports per annum. The Fishing Harbour has been designed to accommodate 200 · mechanized fishing vessels of 9.8 Mts popularly known as 'Royya' boats. The Port could be further location has been developed due to the E-W geological formation and formation of bay. *Heavy* siltation in the dredged channel and disturbance due to high waves at the entrance were the main problems.

Constraints

The Port is located in Srikakulam Districts which is identified as a cyclone prone district by IMD. The fishing harbour is also not in use because of heavy halides and littorals dust blocking entry.

Kalingapatl1am Minor Port

The Kalingapatnam port (Srikakulam District) is an open port, located at the mouth of the Vamsadhara *River.*

At the river confluence the spring tide is 1.5 m and the neap in about 1.0 m. There is a bar at the entrance of the river, which in the dry season has roughly 60 cm. of water over it. The width varies from 150 mts during the rainy season and to about 200.00 mts in summer. The river is subjected to floods, which cause erosion on the right bank. The port is located on the southern bank of the Vamsadhara River.

Bheemunipatnam Minor Port

Bheemunipatnam port is located at the mouth of the river Gosthani and is 25 km north of the major port of Visakhapatnam. In olden days, the port was of some importance, but with the development of Visakhapatnam Harbour in the thirties, the trade has come to a standstill.

The anchorage for large vessels off Bheemunipatnarn is more sheltered than at adjacent ports. The mean tide range at springs is 1.5 m and that at neap 6 cm.

There is a proposal to shift the existing fishing harbour at VPT to Bheemunipatnam. The new fishing harbour will need cold storage, fishing based industries like fishing nets, package industries, ship making yard etc.

Industries in' the vicinity include salt factories, ground nut oil mills etc, at Bheemunipatnam and Jute Mills at Chittivalasa is 4.8 km. from the port. The main agricultural products in. these areas are jute, raw hemp, groundnuts, tobacco, Palmyra (for fiber).

New Site

The justification for location of the proposed Multi Terminal Port and Fishing Harbour is based on the selective analysis of databases that are available. Among the new sites studied for locating this port facilities are Puidmadaka, Revupolavaram and Pentakota.

Pudimadaka - New Location

The occurrence of pillar rock and possible connectivity with EW tending geological formation of Pudimadaka favours the formation of Bay and consequently landing facility. The water column depths of 5 to 6 m are very near the shore.

The proposed harbour facilities in the Pudimadaka Port area will have breakwaters to provide the desired tranquil conditions and protection from South-west and North-east Monsoons. End on type, shore connect are preferred.

The south breakwater will extend to a length of 750 m. A deflector will be provided to function as a north breakwater to a length of 150 m. And finally would be constructed for a length of 650 m.

The breakwaters and the rock promontory provides a calm basin where barges can be handled throughout the year. An entrance to the basin of 90 m width is provided between the two breakwaters. A turning circle of 350 m diameter is provided so as to enable the barges to turn on their own power. The turning circle and the area in front of the berths are to be dredged to -6 m level.

Dredging is an imperative requirement for the development and operation of a port. The sea bed needs to be deepened to desire depths through dredging operations and the dredged material could be utilised for reclamation of low lying land, shore disposal for beach nourishment. The remaining material could be discharged into the deep sea.

Dredging operations would be required in respect of Pudimadaka harbour.

Revupolavaram - New Location

This location is along the NE -SW trending coastline .The geological configuration and the occurrence of rock a hill near the shore line permit construction for mini harbour facility.

Pentakota - New Location

There is an estuary formed due to the Thandava River joining the sea at Pentakota. This location is on the NE - SW running coastline.

If a Southern breakwater is built perhaps this could be avoided and the 4tuary of the backwaters could be developed in to an inner harbor.

Uppada

The occurrence of Pedda Eru estuary near Uppada has created a location for natural Port and landing facilities. The water column dept of 4 to 6 m at Uppada.

Uppada location is in very close proximity to Kakinada port and the site is more erosion prone compare to other sites. A proximity of Kakinada port would have a major impact on a new minor port operation Pentakota has been selected as the site for establishing the proposed maritime complex.

However, Pudimadaka and Revupolavaram are located in very close proximity to the Navalbase which is being established at Rambilli and as such the Ministry of Defence (Navy) have raised objections for a port location.

The following constraints and as much cannot be considered

- Non availability of adequate land
- The minor ports are non functional for major constraints of port operations essentially dealing with excessive sand drifts and cyclonic activity.

One of the major criteria is in respect of the distance to the headquarters of the Eastern Naval command located at the Visakhapatnam.

Even though Bhavanapadu and Mutyalammapalem are harbor sites which are already declared the close proximity to Visakhapatnam is in respect of Mutyalammapalem which is at a distance of 30.00 km from Visakhapatnam port. However, Mutyalammapalem site was not considered as a NTPC thermal" power plant and the Hinduja Thermal power plant are located along the North and - Eastern boundaries of the site. Further, the immediate surroundings of the project site have high population density.