Revised Master Plan Development of Kattupalli Port
Kattupalli (V), Ponneri (T), Thiruvallur District, Tamil Nadu

Proposed Terms of Reference
November 2018

Prepared By
L&T INFRASTRUCTURE ENGINEERING LIMITED
L&T Infra Engineering
NABET ACCREDITED
**Client:** Marine Infrastructure Developer Private Limited

**Project:** Revised Master Plan Development of Kattupalli Port

**Title:** Proposed Terms of Reference

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**Revision Details:**

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1  Proposed Terms of Reference (ToR)

1.1  Introduction

Marine Infrastructure Developer Private Limited (MIDPL) is a company incorporated under the provisions of Companies Act, 2013, having its registered office at No. 22, L&T Construction Complex, Mount Poonamallee Road, Manapakkam, Chennai - 600 089. Expert Appraisal Committee (Infra-2) during its 23rd meeting dated October 13, 2017 recommended the bifurcation proposal on the mutually acceptable division of responsibilities between L&T Shipbuilding Limited (LTSB) and MIDPL and granted the bifurcated EC vide letter no. F. No.10-130/2007-IA.III dated February 9, 2018. For Port development total five berths are approved, out of which two berths are constructed and operational since January 30, 2013.

Development of 5 Berths with total quay length of ~1900 m and 2 Port Craft Berths are approved as a part of existing Clearance, out of which 2 berths are already developed and operational and 3rd berth is in construction phase. All the existing and approved berths are forming a part of revised master Plan development. As part of Revised Master Plan Development, additional Quay length of ~9567 m berth length, quay length of 1250 m Barge berths & ~12 Port Craft are proposed (including existing approved 2 port craft) and 2 no SPM are being proposed. Total quay length of berth proposed as a part of revised master plan development will be ~11467 m in addition to 1250 m long barge berths. Port Craft facilities will be executed progressively with the berth execution and location of port craft to be finalized adjacent to the berth for smoother operation. Type of berth and type of cargo is commercial and business requirement. Hence revised master plan development is proposed with flexibilities to accommodate all berths (existing as well as proposed) as Multipurpose

Along with berths, trans loading facilities, backup facilities and independent port craft facilities, waste reception facilities, conveyor systems, drainage, water supply, electrical works, internal roads, railway works and other utilities, amenities and bunkering will be developed to accommodate all multipurpose cargo such as Liquid, Bulk, Break Bulk, Project Cargo, dry cargo, General Cargo, Container, Ro – Ro & Automobile & Liquid /Gas/ cryogenic cargo (Cryogenic Gases (Upto -162 degree Celsius, Pressurized Gases). Depending on the business requirements, LNG will also be handled through FSRU and LPG will be handed through FSO, in addition to land based terminal as part of Revised Master Plan development. In addition to these, as per the business requirement, it is proposed to develop Port backup, Industries and Industrial development area and its associated infrastructure.

Apart from existing Breakwater, two new Breakwater of about total 12.10 km length is proposed, out of which new Northern Breakwaters will be about 9.02 & 1.22 km and new Southern Breakwater will be about 1.86 km.

Total proposed quantity for Reclamation including landfilling is estimated 138 Mm³ which will be used for reclaiming 1145 Ha area. Entire dredged material will be used for reclamation. Additional material for reclamation will be borrowed from identified borrows area. Additional material if required for level raising and area development will be sourced from nearby quarry sites

Total cargo handling capacity will be approximately 320 MMTPA. Average dredge depth at berths will be (-) 20.5 m CD to (-) 25 m CD. The dredged depth of the basin area and approach channel will be (-) 25.0 m CD and (-) 27.0 m CD respectively. Maintenance
The estimated quantity of MSW generated will be about 0.75 TPD of which 60% will be biodegradable and 40% non-biodegradable during Revised Master Plan Development. Material Recover Facilities (MRF) facilities to handle solid waste will be developed within the port premises. Municipal wastes generated will be handled as per prevailing norms. The hazardous waste such as used oil, spent oil, Wastes/Residue containing oil, Pig wastes, Oil soaked rags, Cotton waste, discarded containers, barrels & Used Battery and Sludge from ETP will be handled as per Hazardous Waste Management Rules (as amended). Hazardous wastes will be disposed through approved TNPCB/CPCB vendors.

1.2 Location
The Kattupalli Port is located towards North of Ennore (Kamarajar) Major Port near Kattupalli village of Ponneri Taluk, Thiruvallur District, Tamil Nadu. The geographic location of the
Kattupalli port is at Latitude 13° 18’ 50.35” N and Longitude 80° 20’ 45.68” E. The location map showing the project site is given as Figure FD0101.

### 1.3 Details of Revised Master Plan Development of Kattupalli Port

The salient features of the Existing and Proposed Revised Master Plan Development are presented in Table 1.

**Table 1: Salient Features**

<table>
<thead>
<tr>
<th>Features/Description</th>
<th>Unit</th>
<th>Existing Facilities at Kattupalli Port</th>
<th>Proposed Revised Mater Plan Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handling Capacity</td>
<td>MMTPA</td>
<td>24.65</td>
<td>320</td>
</tr>
<tr>
<td>Cargo Mix</td>
<td>-</td>
<td>Container (MTEUs), Break Bulk / General (MTPA), Project Cargo, Ro-Ro (No’s), Non-Hazardous Liquid Cargo (MTPA)</td>
<td>Revised Master Plan Development of Kattupalli Port involves handling and storage of Multipurpose Cargoes including liquid, Coal, Iron Ore, Bulk, Break Bulk, Project Cargo, General Cargo, Dry Cargo Container, Fertilizer and FRM, Ro – Ro &amp; Automobiles and any other non-hazardous cargo and Liquid/ Gas / Cryogenics (Upto -162 degree Celsius) cargoes including All Class A, B, C petroleum products, excluded petroleum products, Non-Classified Chemicals &amp; Petroleum products Hazardous, Toxic and Non-Hazardous chemicals/Liquids and other Liquid cargos Including LNG/CNG/LPG etc., etc. Apart from port backup area, external road, rail (double line), utility corridors and 30 MLD capacity of desalination plant etc. Port backup Industries &amp; Industrial development area and its infrastructure</td>
</tr>
<tr>
<td>Length of North Western Breakwater</td>
<td>m</td>
<td>1775</td>
<td>12.1 km in total length. New Northern Breakwaters will be about 9.02 &amp; 1.22 km and new Southern Breakwater will be about 1.86 km</td>
</tr>
<tr>
<td>Length of South Breakwater</td>
<td>m</td>
<td>1665</td>
<td></td>
</tr>
<tr>
<td>Total Area</td>
<td>Ha</td>
<td>~136.28</td>
<td>Revised Master Plan Development of Kattupalli Port will be carried out in total area of 2472.85 ha which includes 133.50 ha of existing area, 761.8 Ha of govt. land, 781.4 ha of Private and proposed sea reclamation of 796.15 ha.</td>
</tr>
<tr>
<td>Dredging Quantity</td>
<td>MCM</td>
<td>8.0 out of 24 approved</td>
<td>Dredging will be carried out at proposed berthing areas and for widening and deepening of existing approach channel, as per the revised master plan development requirements. It is estimated that ~ 85 Mm$^3$ of dredged material will be generated. Entire dredged material will be used for reclamation. Additional material for reclamation will be borrowed from identified borrow area (onshore/offshore).</td>
</tr>
<tr>
<td>Reclamation</td>
<td>MCM</td>
<td>6.0</td>
<td></td>
</tr>
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### Proposed Terms of Reference

<table>
<thead>
<tr>
<th>Features/Description</th>
<th>Unit</th>
<th>Existing Facilities at Kattupalli Port</th>
<th>Proposed Revised Master Plan Development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total proposed quantity for Reclamation including landfilling is estimated about 138 Mm$^3$ which will be used for reclaiming 1145 Ha area.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Offshore Disposal</td>
<td>MCM</td>
<td>2.0</td>
<td>1.25-2.0</td>
</tr>
<tr>
<td>Maintenance Dredging</td>
<td>MCM/Annum</td>
<td>~0.3</td>
<td>1.25-2.0</td>
</tr>
<tr>
<td>Diameter of Turning Circle</td>
<td>m</td>
<td>580</td>
<td>One 650 m &amp; two new 700 m</td>
</tr>
<tr>
<td>Depth at Turning Circle (Manoeuvring Areas) below CD m</td>
<td></td>
<td>-14.0</td>
<td>(-) 20.5 &amp; (-) 25.0</td>
</tr>
<tr>
<td>Quay Length</td>
<td>m</td>
<td>1900 and 2 Port Craft Berths. Only 2 out of 5 berths are existing</td>
<td>11467 (Cumulative) in addition to 1250 m long barge berths and 12 Port Craft Berths + Trans loading Facility &amp; 2 SPMs</td>
</tr>
<tr>
<td>Approach Channel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer Channel Width</td>
<td>m</td>
<td>180</td>
<td>500</td>
</tr>
<tr>
<td>Depth (-) 14.0 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length 2325 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inner Channel Width</td>
<td>m</td>
<td>215</td>
<td>500</td>
</tr>
<tr>
<td>Depth (-) 14.0 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water (Potable) Source m$^3$/day</td>
<td></td>
<td>60/CWSSB Desalination Plant</td>
<td>30000 (Proposed Captive Desalination Plant Cumulative)</td>
</tr>
<tr>
<td>Seawater Intake for Desalination Plant MLD</td>
<td></td>
<td>-</td>
<td>~75</td>
</tr>
<tr>
<td>Reject from Desalination Plant MLD</td>
<td></td>
<td>-</td>
<td>~45</td>
</tr>
<tr>
<td>Seawater intake for Regasification/Process if any MLD</td>
<td></td>
<td>-</td>
<td>2880</td>
</tr>
<tr>
<td>Power MVA</td>
<td></td>
<td>6.5</td>
<td>100</td>
</tr>
<tr>
<td>Greenbelt and other areas Ha</td>
<td></td>
<td>~7.0</td>
<td>242</td>
</tr>
<tr>
<td>New Road/Rail</td>
<td></td>
<td>Road access developed</td>
<td>The rail connectivity to existing Kattupalli port is also proposed from the existing nearby railway line and is termed as southern link. However in parallel to Revised Master Plan Development to cater immediate cargo evacuation requirement, connecting to southern rail link is being taken up and separate CRZ clearances are in progress. In future the existing facility of southern connectivity of the Kattupalli Port, will not be sufficient to cater the projected increase in traffic of the port as well as operationally there will be need of another railway link to the Kattupalli port which is proposed from Minjur station, situated on the north side of existing railway link and is termed as northern link. However, feasibility of alignment of proposed corridor will be checked during detailed study. Apart from port backup area, external road, rail and utility corridor is proposed in an area of around 30 ha to provide connectivity</td>
</tr>
<tr>
<td>Employment Nos.</td>
<td></td>
<td>250</td>
<td>1500 Direct &amp; 4500 Indirect</td>
</tr>
</tbody>
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### Features/Description

<table>
<thead>
<tr>
<th></th>
<th>Unit</th>
<th>Existing Facilities at Kattupalli Port</th>
<th>Proposed Revised Master Plan Development</th>
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<tbody>
<tr>
<td>Project Cost</td>
<td>Crores</td>
<td>4675 As per EIA</td>
<td>53031</td>
</tr>
<tr>
<td>Navigational Aids</td>
<td>-</td>
<td>Channel marker buoys, Fairway buoy and Turning circle buoys, Front and rear leading light, Berth corner lights, Maritime Buoyage Systems (Lateral marks, Cardinal marks, Isolated danger marks, Safe water marks, Special marks) and Other Marks (Lighthouse, Beacons, Sector lights, Leading lines, Port or Harbour marks), VTMS, Tugs, etc.,</td>
<td>Covered Coal Storages; Wind Barrier; Covered Conveyors; Dust Suppression System; Use of Specialised Unloaders; Proper housekeeping; Trucks &amp; railway wagons covered with tarpaulin; Washing of Trucks Tyres and areas susceptible for coal; Green Belt, Stacks for DG, ETP (1500 KLD), STP (240 KLD), Settling Pond at Coal Stock Yard; Storm Water Drainage System, Organic Waster Convertor, Hazardous waste to Authorized Vendor/TSDF, PPEs, Updated Oil Spill Contingency Plan and Green Belt</td>
</tr>
<tr>
<td>Environmental Aspects</td>
<td>-</td>
<td>Stacks for DG, Oil Water Separator (5KLD), STP (45 KLD), Organic Waster Convertor, Hazardous waste to Authorized Vendor/TSDF, PPEs, Approved Oil Spill Contingency Plan and Green Belt</td>
<td></td>
</tr>
</tbody>
</table>

### 1.3.1 Land

Revised Master Plan Development of Kattupalli Port will be carried out in total area of 2472.85 ha which includes 133.50 ha of existing area, 761.8 Ha of govt. land, 781.4 ha of Private and proposed sea reclamation of 796.15 ha. Apart from port backup area, external road, rail and utility corridor is proposed in an area of around 30 ha to provide connectivity.

### 1.4 EIA Methodology

Methodology of the EIA study involved following stages:

- Reconnaissance survey and site visit
- Review of available literature
- Compliance to statutory requirements
- Baseline environmental monitoring (terrestrial and marine environments)
- Identification and Prediction of Impacts
- Risk Analysis and Disaster Management Plan
- Environmental Management Plan

#### 1.4.1 Baseline Environmental Monitoring

The baseline environmental studies were carried out for terrestrial and marine environments. The study is a combination of primary (field surveys) and secondary data collection.

**Study Period:** Baseline environmental monitoring were carried out covering *Three (03) Seasons* and same data will be utilised for the establishment of baseline conditions for both terrestrial and marine environment. The seasons under consideration for terrestrial and marine environmental surveys are as follows

- Winter (January 2018 – February 2018)
- Summer (March 2018 – May 2018)
- Post Monsoon (June 2018 – September 2018)

Baseline data generation was completed and secondary data collection initiated as per MoEF&CC Office memorandum dated August 29, 2017.

**Study Area:** As per the Ports and Harbours EIA guidance manual released by MoEF&CC on February 2010, an area within 5 km radius from project boundary for primary data generation and 15 km radius as a buffer study area for secondary data generation is considered. A map showing the study area is given as Figure FD0102.

1.4.1.1 Marine Environment

Marine environment/ Marine Biodiversity in the region were studied through field studies and compilation of secondary data and literature surveys.

Marine environmental studies were carried out covering water quality, sediment quality, biological aspects (planktons and benthos), mangroves, fishing and breeding grounds and fishery resources. A reputed marine environmental monitoring institute are appointed to carry out marine monitoring/bio diversity studies. Marine environment monitoring were carried out at Ten (10) locations in the study area with Once in a season frequency during the study period. A map showing marine sampling locations is enclosed as Figure FD0103.

**Marine Water Quality**

Representative surface and bottom samples were collected using a NISKIN sampler. Some of the physical parameters such as Temperature, pH, Salinity and Transparency are observed on-site. Samples were preserved for assessing other physico-chemical and bacteriological parameters. Methodologies used for collecting, preserving and analysing water samples are as per standard protocols and procedures defined in standard manuals and reference materials. Parameters that assessed are listed below:

- Physico-chemical parameters – pH, temperature, salinity, turbidity, conductivity, suspended solids, total dissolved solids, DO, BOD, COD, chloride, sulphate, sodium, potassium, silicate, hydrocarbons, oil and grease.
- Nutrients – nitrite, nitrate, ammonia, total nitrogen, total phosphates, sulphide
- Heavy Metals and Trace metals
- Bacteriological parameters – Total Coliforms, Faecal Coliforms

**Sediment Quality**

Representative sediment samples were collected using a suitable grab sampler (Naturalist’s Grab/Van Veen Grab). After collection, samples were sieved and subjected to physico-chemical analysis. Parameters that assessed include composition, texture, organic matter and heavy metals.

**Biological Aspects**

Biological parameters viz., phytoplankton, zooplankton, chlorophyll-a, and primary productivity etc. were assessed. Plankton content in coastal waters were assessed by collection of water samples using Plankton net of suitable mesh size. All net hauls are fixed in buffered 5% Formaldehyde and stored for analysis in Laboratory. A research microscope
is used for taxonomic identification. Primary Productivity is measured following light and dark bottle method (Gaarder and Gran, 1927, re-described Subba Rao, 2002).

**Benthic Communities**

Sediment samples were collected for assessing physico-chemical characteristics and used for enumerating benthic communities. Sediment samples intended for benthic communities assessment were preserved with Rose Bengal and Formalin Solutions. Analysis of benthic communities will include meio and macro benthos in the region.

1.4.1.2 Terrestrial Environment

**Meteorology**

Meteorological parameters such as wind speed, direction, relative humidity, rainfall, temperature etc., were recorded by using automatic weather monitoring station in the study area at One (1) location during the study period. In addition, the general meteorological data from Climatological Tables of Indian Meteorological Department (IMD) are used to establish the baseline meteorological conditions of the site. For the purpose of carrying out the air quality modelling study, site specific meteorological data (pre-processed from MM5) for the recent year were obtained and used.

**Ambient Air Quality**

The ambient air quality monitoring were carried out as per CPCB/MoEF&CC guidelines. The locations were identified with regard to the predominant wind direction, topography, population, sensitive locations and possible impact zones. Representative Ambient Air Quality (AAQ) monitored at Seven (07) locations in the study area with twice a week frequency during the study period.

As per MoEF&CC National Ambient Air Quality Standards (NAAQS) Notification dated 16th November, 2009, all twelve (12) parameters were monitored. The measurement is carried out for establishing 24-hourly background concentrations for all parameters except CO and O₃ which were measured on eight hourly basis on each monitoring day.

A map showing air quality monitoring locations is enclosed as Figure FD0104.

**Ambient Noise Levels**

Noise levels were measured at Seven (07) locations within the study area. Intensity of the noise levels (Peak noise and Equivalent noise levels) were measured at hourly intervals for 24 hours once during the study period. Representative noise level measurements carried out as per the IS: 4954-1968 as adopted by CPCB, CPCB/IS: 4954-1968 and the CPCB/ OSHA Standards using a precision noise/sound level meter. A map showing noise level monitoring locations is enclosed as Figure FD0104.

**Inland Water Quality**

Water samples were collected at the identified sources based on the type of the source, its relevance, number of upstream and downstream users and the type of the industrial activity in the vicinity. Water qualities were monitored at Seven (07) locations within the study area. Representative water samples collected and analysed, once during each season, for
physico-chemical and biological characteristics. Water Quality monitored adopting procedures as per IS 3026 and relevant guidelines of MoEF&CC/ CPCB. A map showing water quality monitoring locations is enclosed as Figure FD0104.

**Soil Quality/Land Environment**

The soil types in the study area were identified based on the review of the available data supported with information gathered from reconnaissance survey. Representative soil samples are collected at **Seven (07) locations** for various types of soils in the study area. The collected samples analysed once during each season for physico-chemical characteristics. A map showing soil sampling locations is enclosed as Figure FD0104.

**Terrestrial Ecology**

Vegetation pattern identified based on literature survey and field investigation. A list of flora and fauna of terrestrial ecosystem are prepared. Endangered and dominant plant species areas were identified. Flora and fauna in project area assessed through field observations and also information collected from secondary sources.

**Flora and Fauna:** Flora and fauna in study area were assessed by primary surveys and collecting secondary information from sources like Forest Department and other agencies involved in similar studies.

**Floral Diversity and Species Inventory**

Sampling of vegetation was carried out using selected samples of 100 m x 10 m belt transects for tree species, 10 m x 10 m quadrants for shrub species and 1 m x 1 m quadrants for herb species.

**Faunal Diversity and Species Inventory (Vertebrates)**

Inventory of animal species were prepared based on following methodology:

- Direct observation during field visits
- Interviewing local villagers and forest officials
- Secondary sources such as published literature on fauna

Bio-diversity index and relative abundance index of different types of flora will be established. Cover of trees in different areas will be established. Canopy cover of trees in different areas will also be established. Terrestrial flora and fauna survey was carried out as per standard practice.

**Land Use/Land Cover**

Land use around 15 km radius of project site will be established based on latest satellite imagery. Necessary features such as National Highways, State Highways, district road/approach road, river, canal, natural drainage, protected areas if any under Wild Life (Protection) Act, archaeological site, natural lake/ponds, human settlements, industries, if any will be presented on the map.
The proposed project layout shall be superimposed on the map to give an idea on the status of the land in and around the proposed Revised Master Plan Development.

**Demography and Socio-economics**

The socio-economic conditions in study area will be established through collection and review of available secondary/published data and socio-economic data. This will include:

- Demographic structure covering total households, total population, population density, sex ratio, schedule caste and schedule tribe, literacy and employment.
- Health Status
- Cultural and aesthetic attributes in study area including places of historical and archaeological importance
- Inventory of places of historical, cultural and religious importance in the study area.
- Details of various economic activities, industries, fishermen details and fishing hamlets if any, will be collected

1.4.2 Establishment of Baseline Environmental Conditions

The information gathered from secondary/published data and primary surveys will be used for presenting the baseline environmental and social conditions. The baseline levels will be compared with the existing standards prescribed by the MoEF&CC/CPCB or TNPCB. Any critical issues in the baseline environmental conditions will be identified and adequately addressed in the CEIA report.

1.4.3 Anticipated Environmental and Social Impacts and their Mitigation Measures

Environmental attributes likely to be affected by project activities of the proposed Revised Master Plan Development of Kattupalli Port will be identified and impacts will be assessed. Project activities of the proposed Revised Master Plan Development of Kattupalli Port can be broadly classified into construction and operation phase activities.

Construction phase activities will include capital dredging, reclamation, construction of Breakwaters, cargo berths, cargo storage areas, Desalination Plant and LNG Regasification Plant, LPG handling system, intake and outfall, rail/road connectivity, water and wastewater treatment facilities and installation of cargo handling equipment, development of internal infrastructure, relocation of existing CWDL intake/Outfall if required etc.

Operation phase activities will include maintenance dredging, cargo handling, movement of ships calling at port, movement of tugs and port crafts, cargo storage and inland cargo movement. Most appropriate and accepted methods will be used wherever possible to quantify impacts likely to arise due to proposed Revised Master Plan Development of Kattupalli Port.

The mitigation measures proposed to minimise/avoid each of the likely impacts that occur during construction and operation phases will be discussed in detail.
1.4.3.1 Marine Environment

Impacts on marine ecology will be studied both for construction and operation phases of proposed Revised Master Plan Development of Kattupalli Port. Based on development plan, impacts will be identified and predicted both for construction and operation phases. Impact on environment will be studied with respect to following project activities:

- Construction Phase activities such as Dredging and disposal of dredged material/Construction of marine structures such as Breakwaters, Berths etc./Sea reclamation and Reclamation of back-up area / Construction of Sea water intake (for Cryogenic Gases (Upto -162 degree Celsius, Pressurized Gases) Regasification/Desalination Plant)/outfall for Desalination Plant and Cryogenic Gases (Upto -162 degree Celsius, Pressurized Gases) Regasification unit
  - Changes in Hydrodynamics
  - Impact on Marine water quality
  - Impact Marine ecology
  - Impact on Pulicat Lake if any
  - Impact on fishing communities.
  - Impact on nearby establishments such as Intake/outfall facilities of Desalination Plants.
- Operation Phase (Maintenance Dredging and Disposal; Ship Movement; Cargo Handling and storage, Seawater intake/marine outfall)
  - Marine water quality
  - Marine ecology
  - Impact on Shoreline/Coastline
  - Sediment Transport
  - Fishing communities.

Appropriate available models will be used to quantify the impacts due to dredge spoil disposal, various discharges, shoreline, hydrodynamics in and around the facility etc.,

1.4.3.2 Air Environment

Construction phase will involve movement of construction material to project area, site clearing, vehicular emissions, emissions from construction machinery, etc. which in turn could influence ambient air quality in the region through build-up of dust levels and gaseous emission levels.

Impacts on air environment during operation phase are envisaged in terms of fugitive emissions during Bulk cargo handling/storage and transportation, Cryogenic Gases (Upto -162 degree Celsius, Pressurized Gases) regasification process and emissions from ships etc., These might result in increased levels of PM, CO, NO\textsubscript{X} and SO\textsubscript{2}. Build-up of pollutant levels due to these emissions will be arrived through modelling studies using Gaussian Dispersion Models (ISCST3/ AERMOD). Mitigation measures will be accordingly suggested.

1.4.3.3 Noise

Generally, the activities which tend to impact the air environment also equally impact the noise levels. The impacts on the noise levels during the construction phase could arise from vehicular traffic, construction machinery, DG sets and transportation of construction material to the site.
Further, during the operation phase, noise might be generated due to cargo handling operations, transport through conveyors, DG sets and vehicular traffic and the same will be felt upon the work personnel operating in the respective areas. Impacts will be evaluated qualitatively taking into consideration the noise generating sources together with environmental conditions and the receptors.

1.4.3.4 Water Environment

The impacts on inland water quality would arise from wastewater, floor washings etc. and the proposed treatment and disposal options. The qualitative impact assessment would cover impacts on the surface water bodies, if any, in the project region. The runoffs containing contaminated water during construction and operational phases of the project can affect the water environment, if not properly controlled. The impacts will be addressed and subsequent mitigation measures will be accordingly included in the study.

Impacts will also be assessed on water resources of the region due to the proposed project by carrying out the competing user’s analysis. Water balance diagram will be prepared with due emphasis on recycling and reuse.

1.4.3.5 Land Environment

The impacts on the land environment during the construction and operation phase will largely result from reclamation, soil erosion, disposal of construction materials and change in land use patterns. The impacts on the land environment will be evaluated qualitatively considering the activities involved in the construction and operation phases.

1.4.3.6 Solid Waste Management

Details of solid and other hazardous/non-hazardous waste generation, handling, transportation, storage, treatment and disposal will be studied. Suitable mitigation measures shall be suggested for eco-friendly and sustainable waste management techniques.

1.4.3.7 Ecology

Impact prediction on ecology within the study area will be carried out by analysing likely changes in sensitive biological indicators. Impact on ecology will also be assessed considering the fact of number of trees/vegetation to be retained/felled or cleared from the Project site and planned as part of landscape development of the Project site.

1.4.4 Analysis of Alternatives

Since Kattupalli port has already been established and operational, for expansion of the port no other site selection criterion has been considered.

1.4.5 Environmental Monitoring Programme

Environmental Monitoring Programme covering the technical aspects (including methodology, parameters, frequency, location, etc., and detailed budget) of monitoring to check the effectiveness of mitigation measures during construction and operation phases will be prepared.
1.4.6 Additional Studies

1.4.6.1 Public Consultation
In line with the requirements of EIA Notification, 2006 (as amended) for Category A projects, Public Hearing for Proposed Revised Master Plan Development of Kattupalli Port will be conducted. For conducting Public Hearing, the Draft EIA Report will be prepared as per MoEF&CC approved ToR and Executive summaries in English and Local (Tamil) languages will be submitted to Tamil Nadu Pollution Control Board (TNPCB).

1.4.6.1 Social Impact Assessment
The social impacts associated during construction phase such as land acquisition, R&R details if applicable, impact on local infrastructure, etc. will be provided and social impacts during operation phase in terms of employment generation and impact on nearby settlements etc. will be addressed.

1.4.6.2 Risk Analysis
Risk analysis will be carried out for liquid/gas terminals and storage tanks proposed in the Revised Master Plan Development of Kattupalli Port. Maximum inventory of storage at site will be taken into account. Potential hazards will be identified through Consequence Analysis and Fire & Explosion hazards.

Hazard Identification

The hazard identification consists of a qualitative review of possible accidents that may occur. Hazard identification describes the boundaries of a study in terms of materials and release conditions to be modelled, impact criteria to be used, and identifying and selecting a list of failure cases that will fully capture the hazard potential of the facilities to be studied.

Consequence Analysis

Consequence analysis evaluates the resulting effects if the accidents occur, and their impact on people, equipment and structures and environment or business etc. Estimation of consequences of probable events identified through hazard identification.

Risk Reduction/Mitigation

Risk reduction and mitigation is necessary to bring the risks to acceptable level. Mitigation measures based on risks evaluated will be suggested.

1.4.6.3 Disaster Management Plan
A broad Disaster Management Plan (DMP) will be prepared in conjunction with and taking into consideration all technical reviews and suggestions as per acceptable norms and also considering the existing Kattupalli Port DMP. The measures to be followed during pre-cyclone, during cyclone and post cyclone will be provided as part of the DMP and a broad Oil Spill Contingency Plan will also be prepared for the accidental spills, if any. A broad structure of on-site and off-site emergency preparedness plans shall be prepared. Occupational health and safety aspects shall be covered. Emergency evacuation during natural and man-made disaster will be covered in DMP.
1.4.6.4 Traffic and Transportation Management Plan
The Kattupalli Port has good network of roads and railways. NH-5/AH-45 (Chennai-Kolkata) is about 15.9 km from project site. Athipattu railway station is about 2.7 km. The proposed Rail connectivity to Kattupalli Port and the proposed 100 mtrs wide ROW for Road Corridor is by TNRDC as Northern Port Access Road to connect both Ennore and Kattupalli Port to NH-5 can be able to cater the proposed Revised Master Plan Development traffic generation. The adequacy of the same will be studied. The details such as traffic projections due to the proposed expansion and adequacy of the proposed rail/road will be presented in EIA report.

Buckingham Canal is passing through the proposed Revised Master Plan Development, which has also been declared as prestigious National Waterway-4 project by GoI. NW-4 has a vast coverage having a length of more than 1000 km connecting the coastal areas from Pondicherry to Kakinada. In NW-4 barges of capacity 300 Tons (40m X 9m) will be navigating, which requires 1.5m draft. To augment the efficacy of NW-4 and treating it as great opportunity, evacuation by waterways is also proposed just like railways and roadways in Revised Master Plan Development.

1.4.6.5 Drainage study
The area proposed Kattupalli Revised Master Plan Development is partly on sea (Reclamation), partly near the tidal influenced river Kosisttalaiyar and Buncikgham Canal. Sufficient buffer at the planning stage itself considered to minimise the impacts. In addition, storm water drainage network will be designed considering the proposed level rising near these areas, the drain in and around project site area will be designed to safely carry the runoff generated due to rainfall. Outlets will be developed for the storm water towards natural sloping which can be used during monsoon and will be connected to existing drainage network if any. The details of the same shall be studied and covered as a part of EIA studies.

1.4.6.6 Status of Previous Phases EC compliances
Existing Kattupalli Port Environmental/CRZ clearance and its amendment compliance status will be provided in the CEIA report.

1.4.7 Project Benefits
The project benefits in terms of improvements in the physical infrastructures and social infrastructure, employment potential and other tangible benefits will be discussed in detail in CEIA report.

1.4.8 Environmental Management Plan
An Environmental Management Plan (EMP) will be formulated for the proposed Kattupalli Port Revised Master Plan Development. EMP will address mitigation measures for each area i.e. air, water, soil, water environment, solid waste, green areas, etc. separately, covering all relevant aspects as per the recommendations and requirement of MoEF&CC. Based on the identified potential impacts associated with the project, an EMP will be framed for the construction and operation phases of the project, which will include:

- Pollution abatement and adequacy of control measures
- Green belt development plan (suggesting suitable species, width of plantation, spacing, etc.)
• Water recycle and reuse for green belt development and irrigation including rainwater harvesting plan.
• Recommendations of measures for noise measurement
• Suitable mitigation measures for various potential impact causing activities
• Solid waste management Plan
• Environmental monitoring programme during construction and operation phases
• Budgetary estimates for implementation
• Institutional mechanism for implementation of EMP

1.4.9 HTL/LTL, CRZ Demarcation
HTL/LTL, CRZ demarcation shall be carried out by MoEF&CC authorised agency, inline to CRZ notification 2011. The proposed Revised Master Plan Development layout will be superimposed on CRZ map and HTL/LTL, CRZ map in 1:4000 scale shall be submitted.

1.4.10 Structure of EIA Report
Based on above studies, the CEIA report will be compiled and submitted to MoEF&CC for seeking Environmental and CRZ Clearance. The structure of CEIA report will be as per Appendix III of EIA Notification, 2006 and also EIA Guidance Manual for Ports and Harbours, 2010 released by MoEF&CC.

Chapter-I: Introduction - describes the introduction to project, background of study, scope and objectives of study and approach adopted to carry out the study.

Chapter-II: Project Description - describes the basic features of project, basis and considerations, project operations and CRZ compatibility.

Chapter-III: Analysis of Alternatives - describes the alternatives considered in the layout selection

Chapter-IV: Description of Environment - describes the baseline environmental status covering both terrestrial and marine environments

Chapter-V: Anticipated Environmental Impacts & Mitigation Measures - describes the potential impacts due to project activities on environment and their mitigation measures

Chapter-VI: Environmental Monitoring Programme - describes the technical aspects of monitoring the effectiveness of mitigation measures (incl. Measurement methodologies, frequency, location,)


Chapter–VIII: Project Benefits - describes the project benefits with CSR and CER budgeting

Chapter – IX: Environmental Management Plan- Describes the administrative aspects of ensuring the mitigative measures that are going to be implemented and detailed budget
Chapter – X: Summary and Conclusion- Overall justification for implementation of the project, impact evaluation and mitigation and project benefits including CSR.

Chapter – XI: Disclosure of Consultants Engaged - describes the Consultants engaged with their brief profile and nature of the Consultancy rendered.