PROPOSEED TERMS OF REFERENCE
EIA STUDY FOR THE DEVELOPMENT OF PORT AT MAHANADI RIVER, ODISHA

1. GENERAL

The Governor of Odisha acting through the Commerce & Transport Department, Government of Odisha, and represented by the Commissioner-cum-Secretary of the Department is engaged in the development of Port and as part of this endeavor, the Authority has decided to undertake the development of a Port on River Mahanadi through Public Private Partnership on Design, Build, Finance, Operate and Transfer basis. The project site is located near to industrial sites adjacent to the National Highway NH-5A and located on the left bank of the River Mahanadi. The project area is very active economically. The proposed port is located at Latitude 20°20’23.02"N and Longitude 86°37’16.00"E and is connected to Cuttack by NH-5A highway which is about 90 km from the project site.

As per the Environment Impact Assessment Notification, September 2006 and CRZ Notification of January, 2011, proposed project attracts the Environmental Clearance from Ministry of Environment, Forest and Climate Change (MoEF&CC). Hence, EIA study needs to be carried out for obtaining the necessary Environmental Clearance for the proposed project.

2 PROJECT DESCRIPTION

The proposed project envisages the development of Port on the left bank of the River Mahanadi, in Musadia village under Kujang Tehsil of Jagatsinghpur district in Orissa. The proposed project site is located approximately 3 km from Paradeep. Total land requirement for the port is 175 ha, of which approximately 100 ha is the private land remaining 75 ha is government land. The total cargo handling capacity in 1st phase will be 18.43 MTPA. Iron Ore, Coal and Fertilizer make up the bulk cargo traffic, which will constitute the major traffic that will be coming to the port. Two jetties with facilities to receive dry bulk, break bulk, liquid bulk and containers are proposed. Being a riverine port in shallow area and in order to have access to the port a 190m wide outer channel and 160m

inner channel is proposed to be dredged to -14m and -12m, having length of approximately 14km and 13Km respectively. Proposed project envisages the following activities/facilities:

- Iron Ore Handling Berth - 250m X 25m
- Multi Cargo Handling Berth - 250m X 25m
- Coal Storage Area - 15.30 Ha (4Nos. -1000m X38m)
- Iron Ore Storage - 11.80 Ha (3Nos. - 1000m X 38m)
- Fertilizer Storage Area - 4.10 Ha (2 Nos. - 275m X 75m)
- Break Bulk Storage Area - 0.90 Ha (150m X 75m)
- Container Storage Area - 1.65 Ha (220m X 55m)
- Admin Building - 30m X 20m
- Workshop - 60m X 15m
- Fuel Station - 30m X 30m
- Electrical Building - 20m X 30m
- Sub Station - 50m X 50m
- Security Building - 5m X 5m
- Road Bridge - 80m X 10m
- Rail Bridge - 80 m X 6m
- Fire Station - 20 X 20m
- Port Users Building - 30x20M
- Rail Yard for Iron Ore - 500X50 m
- Rail Yard for Coal - 500X50 m
- Dredging in navigation Channel - 13 km (In Mahanadi river)
- Dredging in navigation Channel - 14 km (In sea up to river mouth)
- Quantity of dredged material - 30 Mm^3
- Quantity of maintenance dredging - 4.5 Mm^3/year
- Construction of roads - 6 km
- Railway Bridge - 750 m
- Green Belt - 25 ha

Details of the Material handling equipment:

- Continuous Loader (for Iron Ore) - 1 x 5000 tph
- Continuous Unloader (for Coal) - 1 x 2500 tph
- Mobile Cranes (for break bulk) - 2 x 500 tph
- Conveyer belt - 1000 mm
- Fork lifts, Gantry Cranes etc

3. ENVIRONMENTAL BASELINE STATUS

The data for EIA study is proposed to be collected through field studies, literature review, and interaction with concerned departments. The Study Area for the EIA study shall be the area within the 10 km radius of the periphery of the land to be acquired for the project. The data/information on Environmental Baseline Status is to be collected as follows:

3.1 Land use

The information on land use pattern shall be collected from the Revenue Department, Census book and District Gazetteers and top sheets. Digital satellite data for the study area has been procured from National Remote Sensing Agency (NRSA), Hyderabad and the existing land use pattern will be assessed. The land use pattern will be classified as follows:

- Dense vegetation
- Open vegetation
- Barren land
- Agricultural land
- Marshy lands
- Settlement
- Water bodies

Based on the remote sensing data and GIS information, a detailed land use map of the area will be prepared.

3.2 Meteorology

The meteorological data for the nearest IMD station will be collected for use in preparation of wind rose diagrams and air quality modelling. In addition to wind data, information on temperature, humidity, rainfall, etc. will be collected.

3.3 Ambient air quality

The ambient air quality shall be monitored at 4 appropriate locations considering the prevailing meteorological conditions in the area. At each location, 24 hour sampling shall be undertaken twice a week for 12 consecutive weeks for each season. The ambient air quality shall be monitored as per the notification dated 16.11.2009 issued by MoEF&CC and the 12 parameters (PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, Pb, Arsenic (As), Nickel (Ni), Ammonia (NH_3), Ozone (O_3), Benzene and Benzopyrene) as suggested in referred notification shall be monitored. The

ambient air quality monitoring shall be carried out for three seasons for Comprehensive Environmental impact Assessment (CEIA).

3.4 Noise

Equivalent continuous noise level (Leq) in and around the project area shall be monitored. Hourly noise levels shall be monitored at about 4-6 locations for 24 hours, once at each location. The monitoring shall be conducted for one season as a part of EIA study.

3.5 Marine ecology

The aquatic ecology of the site and its surroundings shall be studied thorough field studies and literature survey. The water bodies will be characterized for primary productivity, and density and diversity of phytoplankton, zooplanktons, benthic macro-invertebrates, fish and macrophytes. The spawning and breeding grounds of aquatic species if any shall be identified. River water and sediment samples will be collected from 10-12 locations in the study area considering the proposed project layout. Marine water and sediments quality will be studied in three seasons for Comprehensive Environmental impact Assessment (CEIA).

a) Physico-chemical parameters

River water and sediment samples shall be collected and analysed for following physico-chemical parameters.

River Water

- Temperature
- pH
- Electrical Conductivity
- Turbidity
- Salinity
- Turbidity
- Chlorides
- Sulphates
- Calcium
- Magnesium
- Sodium
- Potassium
- TDS
- Total Kjeldahl Ntrogen
- Dissolved Oxygen
- BOD

- Nitrates
- Ammonical Nitrogen
- Phosphates
- Total Nitrogen
- Zinc
- Cadmium
- Lead
- Mercury
- Copper
- Oil & Grease

Sediments

- pH
- Organic matter
- Total Volatile Solids
- Chlorides
- Phosphates
- Nitrates
- Sulphates
- Sodium
- Potassium
- Total Kjeldahl Nitrogen
- Heavy metals:
- Zinc
- Cadmium
- Copper
- Lead
- Mercury

b) Biological parameters

Detailed aquatic ecological study will be conducted to study the aquatic organisms i.e. planktons, benthos, fishes, aquatic weeds, aquatic grass, mangroves, aquatic weeds/grasses and other aquatic organisms in the study area. River water and sediment samples will be analysed for the following biological parameters.

Water Quality

- Primary productivity
- Chlorophyll a
- Phaeophytin
- Phytoplanktons (Density, diversity, Abundance)
- Zooplanktons (Density, diversity, Abundance)

Sediments

- Abundance and density of Meio-benthos
- Abundance and density of Macros-benthos

Fisheries

The following data have been collected through secondary data sources:

- major fish species observed in the study area
- details of species wise fish catch in the study area
- rare and endangered species, if any
- type of fishes, endemic/exotic, annual yield etc
- infrastructure facilities for fisheries in the study area
- marketing and processing facilities, if any

3.6 Terrestrial Ecology

As a part of the study the information on the following has shall be collected through forest department and revenue offices:

- Preparation of an inventory of major species of trees, herbs, shrubs and timber trees and economically important plants in the study area;
- Presence of rare and endangered species, if any;
- Identification of Wild life Sanctuary/ National Park/Ecologically sensitive habitat in the study area
- Preparation of an inventory of major wildlife species including mammals, reptiles, birds, etc.

3.7 Socio-Economic Environment

The data on demographic profile in the study area shall be collected using secondary data sources. The data to be collected is listed below :

- Demographic characteristics such as population density literacy levels and occupational profile;
- Infrastructure facilities in the study area;
- Inventory of major industrial and commercial activities, archaeological monuments, within 10 km of the project site.

4. IMPACT ASSESSMENT

With the comprehensive knowledge of baseline conditions, project characteristics, the intensity of construction activities and current critical conditions, detailed projections shall be made of the influence of the existing and planned units of the project on all the areas of social, physical and

biological environment in the area. Based on the predictions, the critically affected environmental parameters will be identified for the operation of the proposed port. The impacts, inter alia, on the following aspects of environment shall be assessed.

Construction Phase

- Impacts due to dredging and disposal of capital dredged material
- Impacts due to reclamation in the proposed project area
- Impacts due to generation and disposal of construction waste
- Impacts due to disposal of solid waste and effluent generated from construction staff colony and construction site
- Impacts on noise level due to various construction activities
- Impacts on ambient air quality due to various construction activities
- Incidence of water borne diseases in construction staff colony
- Impact on aquatic ecology during construction
- Impacts on wild life including Avi-fauna

Operation Phase

- Impacts on aquatic ecology including fisheries due to maintenance dredging
- Impacts due to maintenance dredging
- Impacts on water quality due to disposal of liquid & solid waste generated from ships
- Impacts due to liquid & solid wastes generated from berths, warehouses, stock yards, material storage places
- Impacts on ambient noise level due to ship movement, cargo handling at berths
- Impact on aquatic ecology during construction
- Impacts on wild life including Avi-fauna
- Impacts on ambient air quality due to various activities of port including its backup area

1. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Environmental Management Plan will be developed to selectively mitigate the adverse impacts due to the construction and operation of various activities planned for the proposed project. Any modification needed to make the project environmentally compatible will also be suggested.

Based on the identified potential impacts associated with the project, an EMP shall be framed for the construction and operations phases of the project, which shall include the following minimum:

- Analysis of the various mitigation measures and recommendation of feasible and cost effective measures
- Environmental monitoring programme for the construction and the operation phases
- Budgetary estimates for implementation

The EMP will be based on the following considerations;

- Management of effluent construction phase
- Solid waste management and disposal during construction phase
- Control of air pollution during construction phase
- Control of noise during construction phase
- Green belt development and area greenery planning
- Mitigation of impacts on aquatic ecology
- Noise control measures during operation phase
- Treatment and disposal of effluents from port, back up area & other related areas
- Management of impacts due to dredging
- Management of impacts due to reclamation works

2. RESETTLEMENT AND REHABILITATION PLAN

The project envisages acquisition of 300 ha of land for various project appurtenances. Total 175 ha area will be utilized for Phase-I development. Out of the total land, approximately 100 ha is private land. The families losing land and, homestead on account of acquisition of land for various project appurtenances shall be identified. The information on other infrastructure facilities and community properties likely to be affected as a result of the project shall also be collected.

A Resettlement & Rehabilitation (R&R) Master Plan highlighting the guidelines of land acquisition and provisions for rehabilitation measures shall be formulated. The Resettlement and Rehabilitation Plan shall be formulated as per the norms of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013.

3. RISK ANALYSIS AND DISASTER MANAGEMENT PLAN

Risk Analyses

The proposed project does not envisage the handling and storage of hazardous material. However, Risk Analysis and DMP shall be prepared as part of the Environmental management Plan. The terms, ‘hazard’ refers to sources of

potential harms, and denotes a property or a situation which in particular circumstances could lead to harm. Risk on other hand, is a function of the probability of a hazard occurring, and the magnitude of the consequences. Risk therefore, represents the likelihood of a potential hazard being realized. Risk Estimation involves identifying the probability of harm occurring from an intended action or accidental event. Risk Analysis broadly comprises of the following steps:

- Identification of Hazards and Selection of Scenarios
- Effects and Consequence Calculations
- Likelihood Estimation
- Risk Summation
- Risk Mitigation Measures

Key aspects to be covered under risk analyses are :

- Identification of hazards
- Consequence analysis
- Preventive Measures
- Risk assessment
- Fire and Explosion Hazards
- Risk Assessment for accidents at site and its impact on adjoining area,

Disaster Management Plan

Disaster Management Plan including emergency evacuation during natural and man-made disaster like floods, cyclone, tsunami and earth quakes etc. Required infrastructure shall be suggested as a part of DMP.

4. HTL/LTL DEMARCATION

Proposed port is a riverine port in shallow area and will be located 13 km from river mouth. In order to have access to the port a 190 m wide outer channel and 160 m inner channel is proposed to be dredged to -14 m and -12 m having length of approximately 14 km and 13 km respectively. Hence, as per CRZ notification issued by MoEF&CC on 6th January 2011, CRZ clearance will also be required for the proposed project, which would require project specific CRZ demarcation indicating High Tide Line (HTL)/Low Tide Line (LTL) on a map of 1:4000 scales covering an area of 7 km radius from project layout. HTL/LTL demarcation shall be done as per the regulation of CRZ Notification 2011, through one of the agencies authorized by MoEF&CC for HTL/LTL demarcation

9. ENVIRONMENTAL MONITORING PROGRAMME

An Environmental Monitoring Programme to monitor critical parameters during construction and operation phases will be suggested. The costs and manpower requirement necessary for the implementation of this programme will also be estimated.