

ANNEXURE

DRAFT TERMS OF REFERENCE FOR CONDUCTING RAPID EIA STUDY FOR THE REDEVELOPMENT OF BERTHS 8, 9 & BARGE BERTHS AT THE PORT OF MORMUGAO. GOA.

1. GENERAL

The terms of reference for conducting rapid EIA study is outlined in the following sections.

2. 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 project site as shown below:

The data/information on Environmental Baseline Status is to be collected as per the following paragraphs.

Land use

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

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

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

Meteorology

The meteorological data for the last 5 years of the nearest IMD station will be collected for use in preparation of wind rose diagrams and air quality modeling.

In addition to wind data, information on temperature, humidity, rainfall, etc. will be collected.

Ambient air quality

An ambient air quality monitoring network shall be designed and parameters such as PM₂₅, PM₁₀, SO₂ and NO₂ shall be monitored in the study area for one season. The frequency of sampling will be twice a week for twelve consecutive weeks.

Noise

Equivalent continuous noise level (Leq) in and around the project area shall be monitored. Noise readings shall be taken every 24 hours, once at each location. The monitoring shall be done for one season as a part of EIA study.

Aquatic ecology

The marine ecology of the site and its surroundings shall be studied through field studies and literature survey. A marine ecological study shall be conducted for one season as a part of the Rapid EIA study. Marine water and sediments samples shall be collected and the quality will be assessed for physic-chemical and biological parameters.

Detailed flora and fauna studies will be conducted to study the phytoplankton population, zooplankton biomass, population and group density, macro-benthic biomass, population and group diversity. Marine water and sediment samples will also be analyzed for the following physic-chemical and biological parameters.

a) Physico-chemical parameters

Marine Water

- Temperature
- pH
- Electrical conductivity
- Turbidity
- Salinity
- Chlorides
- Sulphates
- Calcium
- Magnesium
- Sodium
- Potassium
- TDS
- Total Kjeldahl Nitrogen
- 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

Detailed flora and fauna studies will be conducted to study the phytoplankton population, zooplankton biomass, population and group density, macro-benthic biomass, population and group diversity.

Marine water and sediment samples will also be analysed for the following biological parameters.

b) Biological parameters to be analysed

Marine Water

- Primary productivity, mg C/m³ day
- Chlorophylla mg/m³
- Phaeophytin mg/m³
- Oxidisable particular organic carbon, mg/m³

Phytoplanktons

- Abundance
- Number and name of groups, present
- Total number and name of species of each group present
- Density (Total numbers of individual of each species/l)
- Total Biomass

Zooplanktons

- Abundance
- Number and name of groups, present
- Total number and name of species of each group present
- Density (Total numbers of individual of each species/l)

Sediments

Benthic Organism

Meio-benthos and Macros-benthos

- Abundance (Nos./10cm²)
- Number and name of groups, present
- Total number and name of species of each group present
- Density (Total numbers of individual of each species/m²)

Fisheries

The following data have been collected through secondary data sources:

- Major aquatic floral and faunal species;
- Pisciculture as being practiced in the area;
- Type of fishes, endemic/exotic, annual yield etc.
- Marketing and processing facilities, if any.

Terrestrial ecology

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

- Preparation of an inventory of major species of trees, herbs, shrubs and timber trees in the area;
- List of economically important plants, if any;
- Presence of rare and endangered species, if any;
- Preparation of an inventory of major wildlife species including mammals, reptiles, birds etc.

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 as follows:

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

3. IMPACT ASSESSMENT

With a knowledge of the 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 berth. The impacts on following aspects of Environment are proposed to be assessed:

Construction Phase

- Impacts due to disposal of solid waste and effluent generation
- Impacts due to dredging and disposal of dredged material
- Impacts due to generation and disposal of construction wastes.
- Impacts on noise level due to various construction activities
- Incidence of water-borne diseases in construction staff colony.

Operation Phase

- Impacts on marine ecology including fisheries due to dredging
- Impacts due to maintenance dredging
- Impacts on water quality due to disposal of liquid and solid wastes generated from ship
- Impacts on ambient noise level due to ship movement
- Impacts on ambient air quality due to various activities on berth

4. 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. The implementation schedule for adopting mitigatory measures will also be indicated as a part of the study. The EMP will be based on the following considerations:

- Management of effluents from various sources during construction phase.
- Solid waste management and disposal during construction phase
- Control of air pollution during construction phase
- Green belt development
- Mitigation of impacts on marine ecology
- Area development activities.
- Noise control measures during operation phase
- Treatment and disposal of effluents from the berth area and related project activities
- Management of impacts during dredging

5. Other Studies to be carried out as part of EIA studies.

Physical model studies for Tranquility, Flow conditions and Morphological aspects.

6. ENVIRONMENTAL MANAGEMENT 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. The equipment and manpower requirement for implementation of this programme and the costs involved shall also be identified.

7. CRZ Classification of the area

CRZ – II

8. Expected Cost of the Project

Rs. 1265 Crores

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