

TERMS OF REFERENCE

1.0 PROPOSED SCOPE OF WORK FOR EIA STUDY

The components of the EIA study include:

- Determination of baseline data using primary data generation and secondary data available from various government published reports on air, meteorology, water, soil, flora & fauna, socio-economics, infrastructure, sensitive areas (forests, archaeological, historical etc);
- Detailed description of all elements of the project activities during the pre-construction, construction and operational phases. The elements analyzed include the infrastructures of the project including drainage features, roads, waste collection, disposal and management and utility requirements;
- Identification of the sources of pollution and assessing the impacts on the environment due to proposed project if any;
- 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.

2.0 BASELINE ENVIRONMENTAL DATA GENERATION

Sr. No.	Attributes	Scope of Work
1	Ambient Air Quality	8 Locations - 2 days/week for 13 weeks. PM ,PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , .will be collected. Design of ambient air quality sampling network with regard to topography, population, sensitive locations, emission sources, background concentrations and possible impact zones, through application of screening air quality models for assessing the maximum GLC zones prior to start of baseline study.
2	Meteorological data	1 Location – 90 days A fully instrumented continuous recording micro-meteorological observatory with battery back-up facilities will be installed to facilities to measure

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		<p>barometric pressures, Wind speed, direction, temperature, humidity, cloud cover and rainfall will be monitored with one hr avg. recording. Occurrence of Inversions will be calculated based on the daily temperature profile.</p> <p>This is to be further supported by the meteorological data for last 5-years for the area of interest from the nearest meteorological observatory and Trend analysis of micrometeorological data generated at the site.</p>
3	Water Quality	<p>8 Locations – Once during study period</p> <p>Parameters as per IS-10500, IS:2296 and EPA Act as applicable etc will be carried out for surface water and ground water in the study area.</p> <p>The survey also include estimation of water balance, recommendations on water conservation and rain water harvesting measures based on past experience on similar projects; water samples will be collected around the ash pond area to know the baseline water quality around ash pond.</p>
4	Soil Quality	<p>Soil profile of minimum 1-m depth at 8 locations once during the study period will be undertaken for parameters related to afforestation, organic matter, water percolation, infiltration rate, water holding capacity, nutrients, pollutants etc. will be carried out.</p>
5	Noise Levels	<p>8 Locations once during the study period for 24 hrs at each location during EIA study for Leq, Ld and Ln.</p>
6	Land use	<p>Land use as per the district census handbooks as well as with the help of satellite imagery will be presented in 10-km radius study area. Once in the study period. Areas under various crops, crop nutrient requirements and nutrient status of soils.</p>
7	Geology and Hydro-geological aspects	<p>These aspects will be covered for study area for the proposed project. The data will be compiled for geology and hydrogeology from the primary survey as well as secondary sources. Once in the study period.</p>
8	Socio-Economic and Health aspects	<p>Socio-economic and health aspects will be covered for 0.5-km, 0.5-3.0 km, 3.0-10.0 km from the periphery of the site based on the Census documents and NIC database for the past two decades. Once in the study period.</p>

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9	Ecological studies (Terrestrial and Aquatic)	Flora and fauna will be studied in 10-km radius study area, once during the study period. These studies will be based on primary as well as secondary sources. The survey also includes assessment of the species diversity, density, abundance etc. in the study area and formulation of ecological indexes, assessment of likely changes on flora and fauna due to the project related activities, suggestions for conservation and protection of flora and fauna in the study area and suggestions for development of new conservation areas locally.
10	Aesthetic/Cultural / Sensitive Aspects	Identification of all historical/ archeological sites/cultural/ religious / tourist interests/ deference installations in the study area. Other sensitive locations such as tropical forests, important lakes, important lakes, biosphere reserves, coastal areas rich in coral reef within 25-km radius will be identified. Once in the study period.
11	Traffic Survey	Traffic volumes will be measured once during the study period at three important traffic intersections leading to the project matter to assess the traffic volumes.

3.0 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 EIA Report.

4.0 Environmental Impact Assessment

The guidelines suggested and international practices prescribed by World Bank and Asian Development Bank will be reviewed to determine the adverse impacts and critical areas.

There are various qualitative as well as quantitative methods of conducting EIA studies, each having its own merits and demerits. We intend to use the best logical tool to assess the impact of the project.

A qualitative and quantitative assessment of pollution aspects of proposed project (air and dust, wastewater, noise pollution, wastewater discharges etc.) will also be done to identify the adequacy of the proposed control measures as well as the likely impact on

existing critical areas. The short term and long-term impacts, particularly on sensitive targets such as endangered species, plants and historically important monuments, will be identified and mitigation measures to reduce adverse impacts will be suggested.

Air Impacts:

Emission Inventory will be carried in an area of 10-km around the project site. A computer based internationally recognized mathematical air quality models – **AERMOD 8.2** and other model suitable for the region will be identified and run to predict the concentration of SO₂, NO_x & PM due to the operation of the proposed project. The dispersion model results will be included in the report using isopleths or other graphical methods, over laying a land use map of the surrounding area.

- Prediction of short term and long term ground level concentrations of SO₂, NO_x, HC, PM and graphical representation in the form of isopleths through application of air quality models taking effects of terrain and requirements specified in the publication by Central Pollution Control Board, New Delhi – ‘Assessment of Impact on Air Environment: Guidelines for conducting Air Quality Modelling’;
- Justification of air dispersion modelling used with a detailed listing of all assumptions; and
- Combined impacts due to the existing plant and the proposed new plant will be estimated.

Water Environment

- Estimation of water balance for the proposed plant.
- Characterization/collection of data on waste water streams;
- Assessment of the nature of effluents likely to be discharged and its impact;
- Assessment of feasibility of water recycles, and reuse for green belt development and irrigation;
- Recommendations on water conservation measures based on past experience on similar projects.

Land Environment

- Collection of data on soil characteristics and soil types;
- Quantification of solid wastes likely to be generated during operation and suggestions on proper collection, treatment and disposal methods;
- Delineation of environmentally compatible options for value added utilization of solid wastes;
- Strengthening of green belt keeping in view the selected plant species and attenuation factors for noise and air pollutants.

Biological Environment

- Collection of the existing and available information on flora and fauna in the study

- area including rare and endangered species;
- Assessment of the species diversity, density, abundance etc. in the study area;
- Assessment of likely changes on flora and fauna due to the projects and related activities;
- Delineation of conservation measures for the protection of flora and fauna in the study area.

Noise Impacts:

Sources of noise and its impact on the environment would be clearly brought out. The noise level at varying distances for multi-sources will be predicted using suitable model. A comparison of measured noise (Leq) at monitoring locations to that of predicted noise levels (Leq) would be made and mitigatory measures required, if any, will be recommended to conform to regulatory ambient air noise standards.

We propose to estimate increase in noise levels over the baseline conditions in different zones like industrial, residential and sensitive areas like hospitals, wild life habitation etc. The potential noise level exposure will be determined and evaluated for acceptable limits of exposure.

Socio-economic and Health Environment

- Study of parameters to assess/characterize the quality of life in the study area;
- Assessment of changes from the baseline in the socio-economic parameters due to proposed plant operations;
- Assessment of economic benefits to community.

Aesthetic/Cultural

- Identification of all historical/archaeological sites/monuments in the study area.

Traffic Study

- Field study at important points on the approach roads to assess the existing total daily traffic, peak hour traffic and traffic composition;
- Assessment of the change in traffic composition and volumes.

5.0 Environment Management Plan

For each potential negative impact identified, recommendations will be presented for avoidance, minimization or mitigation of impacts along with costs associated with potential mitigation.

An EIA/EMP, based on three months baseline study, will be prepared for the project. The EMP will address the following:

- Identify and summarize all anticipated significant adverse environmental impacts;
- Identify and summarize all mitigation measures, including the type of impact to which it relates and the conditions under which it is required;
- Define a set of policies and objectives for environmental performance and continual

- enhancement of performance;
- Green belt development plan;
- Recommend monitoring and reporting procedures including the parameters to monitored, methods to be used, sampling locations, frequency of measurements, detection limits and definition of thresholds that will signal the need for corrective actions;
- Recommend capacity development and training requirements for implementation of EMP;
- Recommend an organizational structure for effective implementation of the EMP; and
- Draw up an implementation and cost schedule for EMP.

An environmental monitoring and management plan will be developed for the sensitive elements of the environment that may require monitoring during construction and implementation of the proposed project. Recommendations will be made on the institutional arrangements that will be necessary to ensure effective monitoring and management.

A detailed management and monitoring program will be developed to reduce the effects of potential negative environmental impacts.

6.0 Risk Assessment and Disaster Management Plan

Risk Assessment studies comprising sub-activities such as hazard identification, assessment and quantification of risk for suggesting risk mitigation measures based on Maximum Credible Accident (MCA) Analysis to be carried out for the proposed project. Preparation of the Risk Assessment Report will be followed by Disaster Management Plan (DMP) and Emergency Preparedness Plan (EPP) based on the quantitative Risk Assessment of the proposed activity and associated infrastructure for the project.

The study includes identification of process hazards, preliminary of hazardous sections of the plant and that of storage with recourse to fire and explosion index for these units, analysis of major inventories in process and storage and identification of major hazardous locations of the plant with recourse to Go I rules, 1989.

7.0 Occupational Health and Safety

We will review the safety management and occupational health surveillance system in the proposed facility plant and recommend for further appropriate measures.

8.0 Impact of treatment technologies on agriculture

We will review the Identification of impact of the treatment technologies on agricultural land in the study area.