Proposed Terms of Reference for EIA of expansion of units at Haldia Petrochemical Plant, West Bengal

Prepared for:
Haldia Petrochemicals Limited

Prepared by:
ERM India Pvt. Ltd.

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Haldia Petrochemicals Limited proposes to expand its existing units by increasing its suit of intermediates and products. The plant is designed to produce 700KTA ethylene from naphtha cracking. The units associated with Naphtha Cracker Plant are the following:

- High Density Polyethylene (HDPE)
- Linear Low Density Polyethylene (LLDPE)
- Polypropylene
- Benzene
- Butadiene
- Cyclopentane
- C4 Hydrogenated (LPG)
- Pyrolysis Gasoline
- Carbon Black Feedstock (CBFS)
- Motor Spirit

Within the existing design capacity of 700 KTA the petrochemical complex proposes to undergo expansion to increase its range of following products:

- Butene-1
- MS upgradation
- Phenol and acetone
- Polybutylene Terephthalate
- Vinyl Acetate Ethylene
- Along with infrastructure augmentation

The proposal to expand the units of petrochemical complex attracts the provisions of prior environmental clearance as enlisted in Sl No. 5(c) referring to petro-chemical complexes (industries based on processing of Petroleum fractions and natural gas and/or reforming to aromatics) and Sl no.5 (e) referring to petrochemical based processing (processes other than cracking and reformation and not covered under the complexes) in EIA Notifications, 2006 and amended hereafter qualifying it to be Category A project. An application will be made through Form 1 to the Environmental Assessment Committee (EAC), MOEFCC. The Terms of Reference is proposed along with Form 1 for facilitating the receipt of approved ToR from EAC for conducting Environmental Impact Assessment Study. Haldia Petrochemicals lie in Haldia Industrial Area that has been designated as Critically Polluted Industrial Area by Central Pollution Control Board (CPCB). Hence, the General conditions of EIA Notification 2006 and amended hereafter will be applicable. Also specific conditions will be applicable as the proposed project attracts the Sl No. 5 (e) of EIA Notification, 2006 amended hereafter.

ERM India Pvt. Ltd. will undertake an environmental assessment of the proposed expansion and document the same as an Environment Impact Assessment report. This draft Term of Reference (ToR) intends to set the scope of the EIA study for the proposed expansion activities.

The intention of the proposed EIA is to support the project for obtaining the necessary environmental clearance from the EAC, MOEFCC. In this
perspective, ERM would strive to fulfill the project objectives delineated in the section below.

1.1 **OBJECTIVES OF THE STUDY**

The overall objectives of the EIA study will be as follows:

- Establish the prevailing baseline environmental and socioeconomic condition of the project site and its surroundings
- Assess environmental, socioeconomic and occupational health impacts arising out of the construction and operation of proposed marine industrial clusters
- Identify residual impacts that may arise from the project and suggest suitable measures to minimize them.
- Recommend appropriate preventive and mitigation measures to minimize pollution, environmental and social disturbances during the life-cycle of the project;
- Formulate EMP that integrate mitigation measures with existing program of project proponent so that they can be implemented, monitored and suitable corrective action can be taken in case of deviations;
- Assess the risk and suitably prepare a Disaster Management Plan

1.2 **STRUCTURE OF DRAFT TOR**

This draft ToR has been prepared in purview of the EIA study to be undertaken for the proposed facility. It has been based on Standard ToR for EIA/EMP report for projects/Activities requiring Environmental Clearance under EIA Notification, 2006, published on April, 2015. The draft ToR submitted to EAC will assist in finalization of the ToR by EAC. The other key purpose of the draft ToR is to identify and convey the issues pertaining to Environmental Baseline Monitoring, Impact Assessment Methodologies and draw Environmental Management Plan at a later stage.

The draft ToR for the EIA study is framed within the following structure:

1.2.1 **Introduction**

This section will include the purpose of the project, profile of the project proponent, the provisions of the General Conditions of EIA Notification, 2006 that the project attracts, etc. Further the need for conducting the study and its scope will be given here.

1.2.2 **Project Description**

This section of the EIA report will provide an overview of the project in terms of:

- Location, layout and implementation schedule of the Project
- Type of the Project
- Relevance of the Project
- Project coverage, masterplan, phasing and scope
- Project accessibility and Transport Linkage
- Project Area - Land description - plot/ survey Nos. / village, tehsil, district, state & extent of the land.

Any litigation pending against the proposed project and or any direction/ order passed by any court of law against the projects and the details thereof.
- Use of existing infrastructure
- Utilities and Resource requirements
- Water requirement & sourcing.
- Source of Power Supply
- Manpower
- Pollution Sources and Characterization
- Estimated Project Cost

As per the Specific Terms of Reference provided for industry lying in 5(e) in the Standard ToR, the following details will be provided:
- Details on requirement of raw material (naphtha/LPG), its source of supply and storage at the plant
- Complete process flow diagram for all products with material balance
- Brief description of equipment for various process (cracker, separation, polymerization, etc)
- Details of proposed source-specific pollution control schemes and equipment to meet the national standards
- Details on VOC emission control system from vents, stacks fugitive emissions and flare management, etc
- Details on LDAR protocol
- Ambient air quality should include hydrocarbon (methane and non-methane), VOC and VCM (if applicable)
- Action plan to meet the standard prescribed under EPA for petrochemical complex

1.2.3 Baseline Studies

Understanding of Project area

To provide an understanding of the project area the EIA study will involve reconnaissance visits and compilation of secondary information present as following.
- Location of the proposed project
- Location of industries/settlements in the vicinity
- Location of sensitive environmental receptors in the project area
- A list of major industries with name and type within study area (10km radius) Landuse break-up of total land of the project site (identified and acquired), government/ private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for industrial area)
- Location of National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, within 10 kms.
- Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak discharge shall be indicated.
rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects) Existing transport infrastructure (e.g., roads/ railways)

Study Area

Intensive data collection will be conducted within the study area i.e. area falling within the boundary of about 10 km around the site which may be impacted by the proposed construction and operation of the developmental activity (Figure 3.1). The project area would be regarded as core area and rest of the area of about 10 km boundary around the project site would be considered as buffer area. This delineation has been done based on the nature of the project, the topology and demography of surrounding areas and on the footprint of pollution from these types of Project. During the course of the study and after reconnaissance visit, if the need is felt, a flexible approach will be taken to expand the study area further. The following features will be considered within the study area:

- Present Land use of Site and in the study area (activities related to estuarine waters, aquaculture land, agricultural land, grazing land, wildlife sanctuary, national park, human settlement, etc)
- Topography in the study area
- Sensitive Environmental Resources: Sensitive Natural Habitats
- Surface water resources and drainage network in the project site and study area
- Ground water resources in the project site and study area
- Details of the physical and socio-economic features along with manmade structures
- Road Network
- Proneness to Natural Disasters
- Sensitive Social Resources: Human habitats, Public Utilities, Valuable Common Property Resources.

The sites and the surrounding study area would be depicted on GIS maps through satellite imagery and topographical map to understand the status of environment and their impacts. The following section details out the Sampling Plan for the study.

Primary Monitoring

The sampling plan for primary monitoring will be drawn up based on the findings of the reconnaissance survey and after obtaining an understanding of the proposed project activities. The sampling plan will also take into consideration the receptor locations that could potentially be affected by the proposed activities. The tentative monitoring stations and sampling locations for each environmental component along with the parameters to be monitored, frequency and number of samples to be taken are presented in the environmental matrix given in Table 1.1.
Table 1.1 Details of monitoring program for environmental components

<table>
<thead>
<tr>
<th>Component</th>
<th>Meteorology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Stations</strong></td>
<td>1 Station</td>
</tr>
<tr>
<td><strong>Frequency &amp; Duration</strong></td>
<td>Wind speed, Wind Direction, Rainfall, Temperature, Relative Humidity &amp; Cloud Cover</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td>Any central location of the study area</td>
</tr>
<tr>
<td><strong>Locations</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Air Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Stations</strong></td>
<td>8 Stations</td>
</tr>
<tr>
<td><strong>Frequency &amp; Duration</strong></td>
<td>24hrs / 8 hrs, 2 times a week for one season (excluding monsoon)</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td>PM$<em>{10}$, PM$</em>{2.5}$, SO$_2$, NOx, HC, NMHC,CO, C$_6$H$_6$, BAP, NH$_3$, O$_3$, VOCs and a suit of individual VOCs</td>
</tr>
<tr>
<td><strong>Locations</strong></td>
<td>Sensitive receptors around the proposed site, residential, commercial and industrial zones considering micro-meteorological condition</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Surface Water Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Stations</strong></td>
<td>4 Stations</td>
</tr>
<tr>
<td><strong>Frequency &amp; Duration</strong></td>
<td>Grab sample – once in the season</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td>Color, pH, Total Dissolve Solids, Total Suspended Solids, Oil and Grease, DO, BOD, COD, Chlorides, Sulphates, Total Hardness, Salinity (Na), Free Ammonia, Electrical Conductivity, Sodium Absorption Ratio (SAR), Lead, Iron, Arsenic, Boron, Cadmium, Chromium, Total Coliforms, Faecal Coliforms</td>
</tr>
<tr>
<td><strong>Locations</strong></td>
<td>Upstream of HPL in Hugli river and downstream of discharge point, Haldi river, and a pond in Durgachowk</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Ground Water Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Stations</strong></td>
<td>6 stations (From Open Wells, Dug Wells &amp; Tube Wells in Villages)</td>
</tr>
<tr>
<td><strong>Frequency &amp; Duration</strong></td>
<td>Grab sample – once in the season</td>
</tr>
<tr>
<td><strong>Parameters</strong></td>
<td>Colour, Odour, pH, Taste, Turbidity, TDS, Aluminum, Ammonia, Anionic detergents, Barium, Boron, Calcium, Chloramines, Chlorides, Copper, Fluoride, Free Residual Chlorine, Iron, Magnesium, Manganese, Mineral Oil, Nitrate, Phenolic Compounds, Sulphate, Sulphide, Total Alkalinity, Total Hardness, Zinc, Cadmium, Cyanide, Lead, Mercury, Polychlorinated biphenyls, Polynuclear Aromatic Hydrocarbons, Total chromium, Total Coliform, Faecal Coliform</td>
</tr>
<tr>
<td><strong>Locations</strong></td>
<td>From neighboring villages</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Soil Quality</th>
</tr>
</thead>
</table>
No. of Stations | 6 stations
--- | ---
Frequency & Duration | Grab sample – once in the season


Locations | One from site and five from neighboring paddy fields

Component: Ambient Noise

No. of Stations | 8 Stations
--- | ---
Frequency & Duration | Once in the season over 24 Hours (daytime / night time)

Parameters | Equivalent sound level in dB (A) – Leq

Locations | Sensitive receptors around the proposed site, residential, commercial and industrial zones

Proposed Monitoring Location Map of air, noise and met is enclosed in Figure. 1.2 and soil, water and estuarine monitoring locations are shown in Figure 1.3

Secondary Studies

Desktop study will be conducted for understanding the topography, geological settings like rock type, seismicity and associated hazards mainly in the area will be studied as part of baseline study. Soil data including type, classification, characteristics, soil properties, etc., will be important for engineering design considerations like loading cargo capacity, etc.

Ecological Survey

The ecological profile of the area would be drawn up based on the review of secondary data and primary field surveys. Secondary data will be obtained from Forest Department, Fishing, Ports and local people. Preliminary investigation and studies show that there is no ecologically sensitive area within 10km of the project site boundary. Sundarban National Park is more than 50km away from the site. As the project is located close to the Deltaic Region the following rare and endangered fauna is likely to be inhabiting the project study area viz. Gangetic Dolphin, etc. However this will be further studied during the primary ecological surveys to be undertaken at the project area and surroundings as part of the EIA study.

The primary and secondary data relating to flora, fauna and agricultural diversity of the area will be generated by visiting the site area and its surroundings. The study area will be delineated as the Core Zone (proposed project site) and Buffer Zone (area falling within 10 Km. radius around the proposed site). The baseline surveys will be carried out to determine the existing environmental conditions in order to facilitate an adequate assessment of the Project’s impacts upon ecology and aids in further identification and development of appropriate mitigation measures. Efforts...
will also be made to find protected species in the area which can be of conservation importance.

Socioeconomic Analysis

Assessment of the socioeconomic profile forms an integral part of any EIA Study. The baseline socioeconomic scenario will focus on demographic structure, economic activity, education, literacy profile, infrastructure facilities of the villages located within the study area. Secondary data for this purpose will be utilized from Census of India, 2011. Socioeconomic profiling will involve diagnosis of baseline status of the villages of the study area in relation to human environment with respect to:

- Socio-Cultural resources - which refers to demographic structure, total population, density, housing, sex ratio, literacy, employment level and cultural facilities
- Infrastructure resources - refers to educational facilities, health services, transportation, water supply, communication, other service etc.

As the proposed project is located in an existing industrial land hence, issues pertaining to R&R are not envisaged.

1.2.4 Impact Assessment

The EIA study will aim to identify, characterize and evaluate potential impacts arising out of the project and prioritize them so that they can be effectively addressed through Environment Management Plans and by adopting appropriate Project designing and planning.

Impact Identification

The preliminary identification of the potential impacts will be carried out based on the understanding of the project gained during the scoping exercise and also from the field visit, consultation with representatives of the project proponent and professional judgment of the ERM team. A preliminary understanding of the construction and operation of units undergoing expansion in Haldia Petrochemical Complex is provided below:

1. Air environment: Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. During operation phase, emissions from point sources such as stacks, fugitive emissions from storage, loading/unloading and transportation, etc. Air Quality modelling will be undertaken to understand the additional emissions due to the proposed expansion. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.

2. Water and riverine Environment: Untreated discharge/contaminated run-off during testing of equipment, civil work, etc in construction
phase and from operation of proposed expanded units may impact upon the surface water bodies and rivers in and around the Project Site. A brief summary on treatment of wastewater from different plant operations, extent recycled and reused for different purposes will be provided.

3. Solid Waste: Waste raw material and demolition waste generated at construction stage will increase the existing solid waste load of the area. Hazardous wastes from paints, lubricants, fuel will be generated during construction phase and spent catalyst, incineration ash will be generated during operation phase that will impact upon the environment adversely if not handled as per best practices and applicable rules and regulations.

4. Occupational Health: The imminent health hazards associated with this type of industry are working with hazardous chemicals. This will be dealt in the risk section.

5. Socio-cultural impact: Since, the proposed project is in the existing industry hence socio-cultural impacts are not envisaged.

The environmental and health aspects will be studied in detail in EIA study and relevant mitigation measures will be suggested.

**Impact Evaluation**

An environmental matrix will be developed to formally present an overview of the predicted impacts. The matrix structure will take into account the environmental issues as well as the concerns of the community.

The first step in the elaboration of the matrix will consist of defining the main activities or aspects of the project that possibly can generate negative or positive impacts through extensive consultations with representatives of the project proponent. The second step will aim at establishing a list of environmental elements (biophysical and human) found in the project area. Potential interrelations between the impact sources and these elements will be established to evaluate the impacts.

**Environment Safeguards**

The EIA study would prepare guidelines for mitigating any adverse impacts identified due to the proposed project. The site specific mitigation plan will specifically address impacts that would be generated as a result of the proposed project.

**1.2.5 Analysis of Alternative**

An analysis of the proposed expansion will be conducted with respect to feasibility and mode of advantage.

**1.2.6 Project Benefits**

The benefits arising out of proposed expansion on local population and the country will be studied and provided in this section.
1.2.7 Additional Studies - Risk Assessment and Disaster Management Plan

In normal scenarios, the level of risk is low however fire from fuels, inflammable chemicals can occur in abnormal conditions. Risk analysis will be carried out for the facilities proposed in the development plan in EIA studies. Potential hazards will be identified and consequence analysis will be conducted as part of EIA study. The Disaster Management Plan will be integrated with the existing Disaster Management Plan in the existing plant.

1.2.8 Environmental Management Plan (EMP)

The Environmental Management Plan (EMP) will recommend specific, structured and targeted management plans to mitigate the significant impacts and bring them to a level that would be acceptable to both the regulatory authorities and the community. The EMP would be laid down in a manner that these plans can be integrated with the proponent’s existing environmental management measures. The EMP would also include recommendations those necessary for pollution prevention, control as well as conservation and compensatory measures. In addition, a systematic environmental monitoring plan for assessing the adequacy of the mitigation measures and for understanding changes in environmental quality due to the proposed project would also be part of the EMP.

1.2.9 Environmental Monitoring Strategy

To measure the effectiveness of the implementation of the EMP a monitoring strategy (Plan) for activities during construction phase and also during the post construction phase will be prepared. The Plan will include the monitoring activities and corresponding schedules.

1.2.10 EIA Reporting

Reporting on all activities conducted during the project will be prepared, collated and submitted in the form of an EIA Report. The report will include supporting documents as necessary, a list of findings, impacts and proposed mitigation measures. Following would be the structure of the report as per the guideline set by the EIA 2006 Notification:

- Executive Summary
- Introduction
- Description of Project
- Alternative Analysis
- Description of Environment
- Impact Assessment
- Additional Studies - Risk Assessment and Disaster Management Plan
- Project Benefits
- Environmental Management Plan & Framework
- Environmental Monitoring Program
- Disclosure of Consultants
The draft EIA report would be further finalized by incorporating comments and views obtained from different stakeholders during the public hearing and through letters/representations before submitting it to the appraisal committee. Apart from annexures to the report, there would also be notes and proceedings of the public hearing, list of references and other relevant documents, photographs etc.
Figure 1.1  Study Area of the proposed project at Haldia
Figure 1.2  Proposed monitoring locations of Meteorology, Air and Noise

[Map of proposed monitoring locations]

Legend:
- ▲ Air Quality
- ⬤ Noise
- ⚩ Met
- ☘ Traffic
- Red: Project Site

Scale:
0 0.45 0.9 1.8 Kilometers

Image Reference:
- Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, Increment P Corp., GEBCO, USGS, FAO, NPS, NRCan, GeoBase, IGN, Kadaster NL,
- Projection: WGS_1984

Project:
- EIA of Units undergoing Expansion at Haldia Petrochemical Complex

Map Title:
- Monitoring Location Map (Air, Noise, Met and Traffic)

Prepared For:
- Haldia Petrochemicals Ltd.

Prepared By:
Figure 1.3  Proposed monitoring locations of groundwater, surface water and soil