

**DRAFT TERMS OF REFERENCE  
FOR  
  
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY  
FOR  
ANDAMAN & NICOBAR GAS POWER PROJECT  
(50 MW)  
  
IN  
  
HOPE TOWN AT FERRARGUNJ TEHSIL  
DIST. SOUTH ANDAMAN  
(ANDAMAN & NICOBAR ISLANDS)**

**NTPC VIDYUT VYAPAR NIGAM LIMITED  
(NVVN)  
(A wholly owned subsidiary of NTPC Ltd.)**

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## 1.0 INTRODUCTION

NTPC Vidyut Vyapar Nigam Limited (NVVN) intends to set up a 50 MW Dual Fuel Power Project (RLNG & Diesel), as base load power station in Andaman & Nicobar Island. The proposed project is envisaged to be commissioned during 2021-22.

The Dual Fuel Technology enables reciprocating engine to operate on either Liquid Natural Gas (LNG) or High Speed Diesel (HSD). Switching between fuels can take place seamlessly during operation, without loss of power or speed. The engines are designed to have the same output regardless of the fuel used.

## 2.0 PROJECT DESCRIPTION

The project site is located in Hope Town at Ferrargunj Tehsil in South Andaman District of Andaman & Nicobar Islands. Nearest National Highway NH-223 is at a distance of 8 km in North direction. Nearest major city is Port Blair located at a distance of 7.9 km South to the project site. The Site is located at latitudes of 11° 41' 43" N and longitudes of 92° 43' 40" E respectively. The site can be approached from coastal road linking Bamboo Flat & Hope Town and through water ways. The nearest commercial airport is Veer Savarkar International Airport, Port Blair at a distance of about 4.5 Km from project site. The Vicinity Plan of the site is enclosed as **Exhibit - 1**.

The power project is proposed to be accommodated within the available land at Hope Town Site, about 2 Acres of undulated barren and rocky land having irregular topography with elevation of 2 M above MSL exists along the Sea Shore. The land is Government land & is under physical possession of A&N Administration. No forest land is involved.

Sea Water will be the Source of Water. About 8 KL/day of fresh water is required to meet the requirement of Cooling Water System & Service Water System of the plant. In order to meet the water requirement of the project through desalination plant, it is proposed to draw 25 KL/day of water from Sea.

LNG required for 50 MW Dual Fuel Power Project is proposed to be met from proposed LNG Terminal & Floating Storage Regasification Unit (FSRU) at Hope Town. Diesel requirement for the power project is to be met from M/s Indian Oil Corporation Ltd (IOCL)'s existing Oil Depot, which is at about 50 Km from the Site.

Accordingly an application in Form-I along with draft TOR and Pre-Feasibility report for Andaman & Nicobar Gas Power Project (5X10 MW) has been prepared for accord of TOR for carrying out EIA Study.

### 3.0 OBJECTIVE:

In order to identify the environmental impacts due to the construction and operation of Andaman & Nicobar Gas Power Project (50 MW) and associated facilities, an Environmental Impact Assessment (EIA) study is proposed to be undertaken. The aim of the study is to establish the existing environmental conditions, predict impacts of the power plant, and associated facilities and formulate the Environmental Management Plan. The EIA report is required for conducting Public Consultation by Andaman & Nicobar Islands Pollution Control Committee (ANPCC) and Environmental Clearance (EC) from Ministry of Environment, Forests and Climate Change (MoEF&CC) & Consent to Establish (CTE) by ANPCC.

### 4.0 SCOPE OF SERVICES:

The EIA study is to be conducted covering all the disciplines of environment (i.e. Land Use, Water Use, Demography & Socio-economics, Geology, Soils, Sediments, Hydrology, Water Quality, Meteorology, Air Quality, Terrestrial Ecology, Aquatic Ecology and Noise) with twelve month field monitoring baseline data in relevant discipline. The consultant will also be required to present the findings of the EIA report before the Expert Appraisal Committee (EAC)/ANCZMA or NCZMA of the Ministry of Environment, Forests and Climate Change (MoEF&CC), and submit all clarifications/replies to the queries. The EIA report is to be prepared as per MOEF&CC notification dated 14.09.2006 and 01.12.2009.

The Scope of Services for the study will comprise of the following stages:-

Stage 'A'	<ul style="list-style-type: none"> <li>• Description of Site and Surrounding</li> <li>• Description of the Proposed Project</li> <li>• Establish Baseline Environmental Conditions</li> </ul>
Stage 'B'	<ul style="list-style-type: none"> <li>• Impact Assessment</li> <li>• Preparation of Risk Assessment</li> <li>• Disaster Management Plan &amp; Occupational Health and Safety Plan</li> <li>• Environmental Management Plan</li> </ul>
Stage 'C'	Preparation of following Document <ul style="list-style-type: none"> <li>• Draft EIA Report based upon one season (non-monsoon) data for submission to Andaman &amp; Nicobar Islands Pollution Control Committee (ANPCC) for Public Consultation</li> <li>• Executive Summary of Draft EIA Report in English and local language.</li> <li>• Final Comprehensive EIA Report based on twelve (12) months environmental baseline data and incorporating minutes of Public Consultation for submission to MOEF&amp;CC for EC.</li> </ul>

#### 4.1 STAGE 'A':

##### Description of Site and Surrounding

The salient features in the core area which covers a radius of 10 km around the project site should be spelt out and highlighted on a color map of appropriate scale. Ecological sensitive areas as notified by MOEF&CC such as *National Park, Tiger Reserve/Elephant Reserve/Turtle Nesting Ground, Core Zone of Biosphere Reserve, Habitat for migratory bird, Lakes/Reservoir/Dam, Streams/Lakes, estuary/sea, mangroves, Mountains/ Hills, Notified/ other Archeological Sites, Industries/Thermal Power Plants, Defense Installation, Airport, and Coastal areas rich in corals, mangroves, breeding grounds of specific species etc.* need to be identified within 10 km radius of core area around the project site through primary and secondary data collection.

In addition demarcation of HTL/LTL for plant area and CRZ clearance and identification of other Eco- sensitive areas around 10 Km radius of the project site is to be done.

##### Description of the Proposed Project

Highlight the salient features of the project likely to affect the environment based on Feasibility Report of the project.

##### Establishment of Baseline Conditions

Baseline conditions in respect of Land Use, Water Use, Demography & Socio-economics, Geology, Soils, Sediments, Hydrology, Water Quality, Meteorology, Air Quality, Terrestrial Ecology, Aquatic Ecology and Noise are to be established in the study area. Please refer Annexures- I & II for details on establishment of Baseline Conditions.

Annexure-I: Summary of Scope of work

Annexure-II: Primary Data Collection/ Monitoring Schedule

However, the details presented in Annexure-I and II are only indicative and not exclusive. The consultant shall explore all possible sources for data collection and generate relevant data as required in Gazette Notification on EIA by MOEF&CC, dated 14.09.2006 and 01.12.2009.

Further, the consultant shall review and analyze all recent information available in publications (like District Census Handbook etc.) and data available with various Government, educational and other institutions for each discipline, to characterise the environment of the area. The consultant shall explore all possible sources of secondary data, generate relevant primary data and satisfy himself for submission of EIA Report to the satisfaction of NVVN, Andaman & Nicobar Islands Pollution Control Committee (ANPCC) / Ministry of Environment, Forests and Climate Change (MoEF&CC).

## **4.2 STAGE 'B':**

### **4.2.1 Environmental Impact**

The features of the power plant which are likely to have impact on the environment have to be discussed in detail covering particulates and gaseous emissions, liquid effluents, noise, etc.

The impacts will be assessed for both construction and operation phases. Both short term and long term impacts on sensitive areas if any such as habitat of endangered species of wildlife or plants, sites/monuments of historical and cultural importance, centers with concentrated population in the core/study area etc., will be established wherever applicable.

The detailed methodologies of impact assessment for the different disciplines of study will be broadly defined by the consultant. Special reference should be made with respect to following impacts.

### **4.2.2 Air Quality Impact:**

A computer based internationally recognized mathematical air quality model (e.g., ISC3 or equivalent) suitable for the region will be identified and run to predict the concentration of SO<sub>2</sub> and NO<sub>x</sub> due to the operation of the power plant. The results will be presented for seasonal and short term (24 hourly) concentrations over a radius of 10 km. around the plant. 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. The predicted air quality has to be compared with existing regulations and mitigative measures, if any, to be identified. The impact at all the monitoring locations shall also be estimated.

### **4.2.3 Water Quality Impact:**

The impact of liquid effluents on natural water bodies i.e. Sea, Ocean receiving the effluents shall be established and significant parameters, which are likely to change critically, shall be clearly spelt out.

### **4.2.4 Land Use Impact**

Total land envisaged for the project is about 2 acres of undulated barren & rocky land located in Hope Town with elevation of 2 M above MSL exists along the Sea Shore. The Site is flanked between Sea on front side & stiff rock Hill on backside.

The land is Government land and is under physical possession of A&N Administration. No forest land is involved. The land is away from the navigational channel & other marine traffic.

However, the classification of land use in study area with respect to agricultural/forest/waste/Govt./Private and Revenue should also be indicated in detail. The direct and indirect impacts of construction of power projects on the land use of the study area shall be assessed based. The change in land use before and after expansion will be provided.

#### 4.2.5 Impact on Ecology:

Impacts on terrestrial and aquatic ecosystems shall be established qualitatively based on predicted changes in the ambient air and water quality and experiences in similar power projects.

In addition, impacts on marine ecology is to be established mainly due to construction of breakwater and the channels for intake and outfall of sea water and due to withdrawal of sea water during operation phase of the project.

#### 4.2.6 Social Impacts

Impacts on demographic and socio-economic characteristics of the population shall be established qualitatively based on experiences in similar power projects. In addition, the positive impacts like employment opportunities, life standard improvement etc. may be provided.

#### 4.2.7 Impact on Noise Levels

The noise level at varying distances for multi-sources will be predicted using suitable noise model. A comparison of measured noise level (Leq) at monitoring locations to that of predicted noise levels (Leq) should be made and mitigatory measures required, if any, be recommended to conform to regulatory ambient air noise standards.

#### 4.2.8 Risk Assessment and Disaster Management Plan and Occupational Health and Safety Plan

Risk assessment will be carried out for fuel oil storage, transport and handling of hazardous material/oil etc. The risk analysis based on an appropriate computer based model will be carried out for possible accidental scenarios (such as pipeline rupture or leakage leading to pool fire, storage tank on fire, bund/dyke fire, vapour cloud explosion etc.) arising out of handling and storage of gas/ liquid fuel. Thermal radiation contours and exclusion zones based on the results of the analysis shall be drawn on the lay out plan and mitigating measures required to prevent occurrence of any disaster suggested.

A Disaster Management Plan (DMP) for dealing with on-site and off-site emergency situations arising due to fire, explosion, leakages of hazardous substances, etc. in the plant is to be prepared.

Occupational risk involved during construction and operation of the plant should be assessed and necessary safety and protective measures should be spelt out.

#### 4.2.9 Environmental Management Plan (EMP)

An EMP identifying various mitigation measures for environmental pollution control and environmental management as per Feasibility Report shall be described and their adequacy shall be established with respect to prevailing environmental norms both for construction and operational phases. Additional mitigatory measure, if any shall be suggested.

Considering the requirements of Regulatory Agencies and identified critical parameters, the consultant will design a post study environmental monitoring

program and identify all equipment and man power necessary for the implementation of this program and cost involved.

Environmental Management Plan will be drawn for mitigation of potential adverse impacts due to the project during construction and operation phases.

#### **4.3 STAGE: 'C':**

##### **Preparation of EIA Report**

Stage-C includes preparation of following reports –

- Draft EIA Report based upon one season data (non-monsoon) for submission to Andaman & Nicobar Islands Pollution Control Committee (ANPCC) for Public Consultation.
- Executive Summary of Draft EIA Report in English and local language.
- Final Comprehensive EIA Report based on twelve (12) months environmental baseline data and incorporating details of Public Consultation for submission to MOEF&CC for EC.

The report will include all references, and fulfill the requirements of MOEF&CC. The basic format of the EIA will be as per MOEF&CC Gazette Notification dated 14.09.2006 and 01.12.2009 on EIA. The report will be finalized in consultation with Engineer-In-Charge (E-I-C).



**Annexure-I**
**STAGE–A: ESTABLISHMENT OF BASELINE CONDITIONS: SUMMARY OF SCOPE**

<b>Discipline</b>	<b>Scope</b>
<b>General</b>	<ul style="list-style-type: none"> <li>• General description of the core study area within 10 km radius around project site.</li> <li>• Highlight land, fuel and water requirements for the project and associated facilities as will be assessed by NVVN in Feasibility Report.</li> <li>• Infrastructure facilities and amenities available within the study area.</li> <li>• Study on Demarcation of CRZ Map Incorporating High Tide Line &amp; Low Tide Line</li> </ul>
<b>Land Use</b>	<ul style="list-style-type: none"> <li>• Analysis of current Satellite Imagery for core study area <i>i.e., 10 Km radius</i> along with ground truth verification.</li> <li>• Classification of land use for the Main Plant and its associated facilities with latest satellite imagery along with ground truth verification.</li> <li>• Analysis of Census Data for various land uses within core area.</li> </ul>
<b>Water Use</b>	<ul style="list-style-type: none"> <li>• Assessment of water sources, current water use and identify conflicts, if any for core study area based on secondary data.</li> </ul>
<b>Demography &amp; Socio-economics</b>	<ul style="list-style-type: none"> <li>• Establishment of demographic characteristics and occupational structure of population within and core study area based on Census Data.</li> </ul>
<b>Geology</b>	<ul style="list-style-type: none"> <li>• Presentation of geological map, geological profile and brief geological description of the study area based on secondary data.</li> </ul>
<b>Soil</b>	<ul style="list-style-type: none"> <li>• Establishment of physico-chemical characteristics and nutrient levels of soil in core study area based on primary data generation (Annexure-II).</li> </ul>
<b>Sediments</b>	<ul style="list-style-type: none"> <li>• Sediment Characteristics (composition, Benthic Organisms; Pesticides &amp; Heavy Metals) near intake point, discharge point and proposed location for dredging.</li> </ul>
<b>Hydrology</b>	<ul style="list-style-type: none"> <li>• Establishment of surface and ground water hydrology of core study area based on secondary data.</li> </ul>
<b>Water Quality</b>	<ul style="list-style-type: none"> <li>• Establishment of physico-chemical characteristics, pollution levels and bacteriological contamination of surface and ground water bodies in the core study area through primary data generation (Annexure-II).</li> <li>• Analysis of rain water of the first rain.</li> <li>• Sampling &amp; monitoring to be done at the water intake source and outfall/discharge point, if any.</li> </ul>

<b>Discipline</b>	<b>Scope</b>
<b>Meteorology</b>	<ul style="list-style-type: none"> <li>Monitoring of On-site Meteorological Parameters by setting up an Automatic meteorological station at site. (Annexure-II)</li> <li>Collection of climatological data from nearest IMD station (i.e.at Port Blair) for long term analysis of climatological parameters for a period not less than 10 years.</li> </ul>
<b>Air quality</b>	<ul style="list-style-type: none"> <li>Establishment of Ambient Air Quality in core study area through primary data generation (Annexure-II).</li> <li>At least one monitoring station each in the upwind and in the pre dominant downwind direction to be selected for analyzing the likely maximum ground level concentration of pollutants.</li> </ul>
<b>Terrestrial Ecology</b>	<ul style="list-style-type: none"> <li>General description of terrestrial ecosystems based on secondary data and seasonal field sampling</li> <li>Listing of flora &amp; fauna along with rare and endangered species present in the study area as per Wild life Act,1972</li> <li>List of flora and fauna duly authenticated by DFO.</li> </ul>
<b>Aquatic Ecology</b>	<ul style="list-style-type: none"> <li>General description of aquatic ecosystems in core study area based on secondary data and primary data generation seasonal field sampling. (Annexure-II)</li> <li>Identification of flora and fauna and endangered species in the surface water body falling in the study area</li> <li>Listing of fish in the receiving water body with special reference to spawning and breeding zone</li> <li>Listing of other species in the water body</li> </ul>
<b>Noise</b>	<ul style="list-style-type: none"> <li>Monitoring of noise at critical locations in and around the power plant in core study area through primary data generation (Annexure-II).</li> </ul>

**Notes:**

- Any additional work deemed feel necessary for the project should be quoted separately along with the cost by the consultant. The consultant is required to undertake any additional work for upgrading the final EIA report on mutually agreed terms.
- Action Plan along with locations of sampling sites will be finalized in consultation with the Engineer-in-Charge (EIC).

**ANNEXURE-II**

**STAGE-A: ESTABLISHMENT OF BASELINE CONDITIONS: PRIMARY DATA**

**COLLECTION/ MONITORING SCHEDULE**

FIELD/ PARAMETERS	NO. OF SAMPLING LOCATION	FREQUENCY	REMARK
Ambient Air Quality			
SO <sub>2</sub> NO <sub>x</sub> PM <sub>(10)</sub> PM <sub>(2.5)</sub>      Hg O <sub>3</sub>	4 (Four)        4 (Four)	Twice a week        Once in a month on 8 hourly basis.	⇒ 24 hour sampling at each location using appropriate ambient air quality monitoring instrument. Consultant has to deploy 4 (four) numbers of monitoring instruments at site. Analysis of samples should be as per Gazette notification dated 16.11.2009 on AAQ. ⇒ At least one monitoring stations each to be identified in upwind and predominant downwind directions.
Meteorology			
Wind speed & direction	1 (One)	Continuous (averaging time of 1 hour)	A permanent Automatic meteorological station is to be established at site for monitoring the meteorological parameters like wind speed & direction, temperature (at 2 m and 10 m height), solar radiation, humidity, atmospheric pressure, rainfall.
Max. & Minimum Temp. (Wet & Dry bulb Temp.)		Daily (at 8.30 & 17.30 IST)	
Solar radiation		Continuous (averaging time of 1 hour)	
Humidity		Daily at 8.30 & 17.30 IST	
Atmospheric pressure		Daily at 8.30 & 17.30 IST	
Rainfall		Daily	
Storm		Daily	
Temperature at 2 m and 10 m height		Continuous (averaging time of 1 hour)	
Water Quality (Surface & Ground Water)			
Physical parameters: pH, Temp., DO, conductivity & TSS	Six	Monthly	Consultant has to set up site laboratory for these parameters during the period of study.
Chemical Parameters: Total Dissolved Solids, Alkalinity, Hardness, BOD, COD, NO <sub>3</sub> , PO <sub>4</sub> , F,	Six	Monthly	Consultant has to specify the laboratory facilities for analysis of these parameters.

Cl, SO <sub>4</sub> , Na, K, Ca, Mg, Silica, oil & grease, phenolic compounds			
<b>Bacteriological</b> MPN and Total coliform	Six	Monthly	As above
<b>Heavy metals</b> (As, Hg, Pb, Cd, Cr-6, total Cr, Cu, Zn, Se, Fe).	Six	Quarterly	As above
<b>Soil</b>			
pH, conductivity, cation exchange capacity; Total N, P, K, Mercury, sand, silt and clay etc.	Ten	Twice a year	
<b>Sediments</b>	Ten	Twice a year (Discharge & proposed dredging location)	Sediment Characteristics (composition, Benthic Organisms; Pesticides & Heavy Metals)
<b>Noise</b>			
Leq	Ten	Twice a year	24 hourly sampling at each location using an integrating sound level meter
<b>Aquatic Ecology</b>			
Phytoplankton, Zooplankton, Fish	Three	Twice a year	Surface water bodies in the study area to be covered.
<b>Terrestrial Ecology</b>			
Density, diversity, abundance of species, IVI	Three	Twice a year	Different terrestrial ecosystems in the study are need to cover

**General:**

- The Consultant's offer shall indicate detailed methodology (including sampling and analysis procedures wherever applicable and sampling frequency)
- The parameters to be analyzed and the number of sampling locations indicated under various disciplines are only indicative. Consultant will determine the actual plan of action in consultation with E-I-C

Exhibit-I: Vicinity Plan of Andaman & Nicobar Gas Power Project (5X10 MW)

