DRAFT TERMS OF REFERENCE

FOR

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY
FOR

KATWA SUPER THERMAL POWER PROJECT (2X660 MW), WEST BENGAL

NTPC Limited
(A Government of India Enterprise)

ENVIRONMENTAL ENGINEERING DEPARTMENT
Engineering Office Complex
Sector - 24, Noida, U.P.-201 301

October, 2014

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SPECIFICATION NO.:9582/999/GEG/S/001

This is Technical Specification for conducting Environmental Impact Assessment study for Katwa Super Thermal Power Project (2x660 MW) at district Bardhaman, West Bengal.

October, 2014

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1.0 INTRODUCTION

The proposed Katwa Super Thermal Power Project (Katwa STPP) is located approx. 7 Km from Katwa town near villages Srikhanda, Debakundu and Koshigram in Bardhaman district of West Bengal. The Bardhaman – Katwa road directly connects the proposed site to district head quarter at Bardhaman and sub-division town of Katwa. The Saptagram-Tribeni-Kalna-Katwa (STKK) Road (SH-6) connects Katwa to South Bengal.

The nearest broad gauge Railway Station Katwa is at about 7 Km on Katwa-Howrah section of Eastern Railway and nearest narrow gauge Srikhanda is at about 1.5 Km on Katwa-Bardhaman narrow gauge line of Eastern Railway which is being converted to broad gauge. The nearest commercial airport is Kolkata at about 160 Km and the nearest seaport Haldia is about 250 Km. The Vicinity Plan of the site is enclosed as **Exhibit - 1.**

The project was conceived by M/s West Bengal Power Development Corporation Limited (WBPDCL) having a capacity of 1200 MW (2x600 MW) for which Environmental Clearance (EC) was accorded by Ministry of Environment, Forests and Climate Change (MoEFCC then MoEF) to WBPDCL vide letter no. J-13011/78/2007-IA.II(T) dated 01.05.2008. The project was transferred to NTPC on 27.02.2014. NTPC now intends to set-up the project with a revised capacity of 2x660 MW.

1.1 OBJECTIVE:

In order to identify the environmental impacts due to the construction and operation of Katwa Super Thermal Power Project (2x660 MW) and associated facilities (township, ash disposal area etc), 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 (EMP). The EIA report is required for conducting Public Hearing for the project, obtaining Consent to Establish for the project from West Bengal Pollution Control Board and obtaining Environmental Clearance (EC) from Ministry of Environment, Forests and Climate Change.

2.0 SCOPE OF SERVICES:

The EIA study is to be conducted covering all the disciplines of environment (Land Use, Water Use, Demography & Socio-economics, Geology, Soils, Sediments, Hydrology, Water Quality, Meteorology, Air Quality, Terrestrial Ecology, Aquatic Ecology and Noise) required as per Terms of Reference to be accorded by MOEF&CC.

The consultant will also be required to present the findings of the EIA report before the Public Hearing Panel and Expert Appraisal Committee (EAC) of the Ministry of Environment, Forests and Climate Change (MoEFCC), and submit all

clarifications/replies to the queries. The EIA report is to be prepared as per MOEF notification dated 14.09.2006 and it's subsequent amendments.

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

Stage 'A'	• Description of Site and Surrounding • Description of the Proposed Project • Establish Baseline Environmental Conditions
Stage 'B'	• Impact Assessment • Preparation of Risk Assessment • Disaster Management Plan • Occupational Health and Safety Plan • Environmental Management Plan • Green Belt Development Plan
Stage 'C'	Preparation of following Document • Draft EIA Report and Executive Summary of Draft EIA Report in English and Bengali for Public Hearing. • Final EIA Report incorporating details of Public Consultation for submission to MoEFCC for EC.

2.1 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 colour map of appropriate scale. Ecological sensitive areas as notified by MoEFCC 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 etc. need to be identified within 10 Km radius of core area around the project site through primary and secondary data collection.

Description of the Proposed Project

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

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 over a period of one year. Please refer Annexure - 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.

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 concerned discipline, to characterize 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 NTPC, West Bengal Pollution Control Board / Ministry of Environment, Forests and Climate Change.

2.2 STAGE 'B':

2.2.1 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, solid wastes, 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.

2.2.1.1 Air Quality Impact:

A computer based internationally recognized mathematical air quality model (e.g., ISC3) suitable for the region will be identified and run to predict the concentration of SO_2, NO_x, PM_{10} due to the operation of the power plant. Cumulative impact assessment on ambient air quality due to proposed plant and other sources (including existing sources around the project as well as other proposed source of emission) to be carried out. The results will be presented for annual, 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, overlaying 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.

2.2.1.2 Water Quality Impact:

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

2.2.1.3 Land Use Impact

The classification of land in study area with respect to agricultural / forest / waste / Govt. / Private and Revenue should also be indicated. The direct and indirect impacts of construction of power project on the land use of the study area shall be assessed based on experience. The change in land use from existing to operation of the project will be depicted.

2.2.1.4 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.

2.2.1.5 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, life standard improvement etc. may be provided.

2.2.1.6 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.

2.2.1.7 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. Thermal radiation contours will be drawn and any mitigative measures required will be 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.

2.2.1.8 Environmental Management Plan (EMP)

An EMP identifying the measures to mitigate the adverse impacts of emissions and effluents will be prepared covering construction and operational phases. It will also include a green belt / Afforestation plan for the project site. Role and capability of existing environmental units on site will be examined. 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.

2.2.1.9 Cumulative Impact Assessment

A cumulative impact assessment of all major projects within 15 Km of the project which have been accorded but not commissioned shall be undertaken based on the information available with MoEF/SPCB/CPCB or other secondary sources.

2.3 STAGE: 'C':

Preparation of EIA Report

- Submission of Draft EIA Report and Executive Summary of Draft EIA Report in English and Bengali for Public Hearing.
- Submission of Final EIA report incorporating details of Public Consultation for submission to MoEFCC for Environmental clearance.

The report will include all references, and fulfill the requirements of MoEFCC. The basic format of the EIA will be as per MOEF Gazette Notification dated 14.09.2006 and it's subsequent amendments on EIA. The Draft and Final EIA Reports shall be strictly in compliance with the Terms of Reference issued by MOEF&CC.

Annexure-I

STAGE–A: ESTABLISHMENT OF BASELINE CONDITIONS

SUMMARY OF SCOPE

DISCIPLINE	SCOPE
General	• General description of the core study area within 10 Km radius along the periphery of the plant boundary. • Highlight land, fuel and water requirements for the project and associated facilities as assessed by NTPC in Feasibility Report. • Infrastructure facilities and amenities available within the study area.
Land Use	• Procurement and analysis of latest Satellite Imagery for core study area (*i.e., 10 Km radius from the periphery of plant boundary*) along with ground truth verification. • Classification of land use for the Main Plant and Township area with latest satellite imagery along with ground truth verification. • Analysis of Census Data for various land uses within core area.
Water Use	• Assessment of water sources, current water use and identify conflicts, if any for core study area based on secondary data.
Demography & Socio-economics	• Establishment of demographic characteristics and occupational structure of population within and core study area based on Census Data.
Geology	• Presentation of geological map, geological profile and brief geological description of the study area, especially with respect to ash disposal area, based on secondary data.
Soil	• Establishment of physico-chemical characteristics and nutrient levels of soil in core study area based on primary data generation (Annexure-II). • Establishment of infiltration characteristics of soil in and around the ash disposal area based on primary data generation (Annexure-II).
Hydrology	• Establishment of surface and ground water hydrology of core study area based on secondary data.
Water Quality	• 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). • Sampling & monitoring to be done at the water intake source and outfall / discharge point.

DISCIPLINE	SCOPE
Meteorology	• Monitoring of On-site Meteorological Parameters by setting up a meteorological station at site. (Annexure-II) • Collection of climatological data from nearest IMD station for long term analysis of climatological parameters for a period not less than 10 years.
Air quality	• Establishment of Ambient Air Quality in core study area through primary data generation (Annexure-II). • 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. • Cumulative impact assessment on ambient air quality due to proposed plant and others (including existing sources as well as other proposed source of emission) to be carried out. • Analysis of Rain Water
Terrestrial Ecology	• General description of terrestrial ecosystems based on secondary data and seasonal field sampling. • Listing of flora & fauna along with rare and endangered species present in the study area as per Wild life Act, 1972. • List of flora and fauna duly authenticated by DFO.
Aquatic Ecology	• General description of aquatic ecosystems in core study area based on secondary data and primary data generation seasonal field sampling. (Annexure-II) • Identification of flora and fauna and endangered species in the surface water body falling in the study area • Listing of fish in the receiving water body with special reference to spawning and breeding zone • Listing of other species in the water body
Noise	• Monitoring of noise at critical locations in and around the power plant in core study area through primary data generation (Annexure-II).

Notes:

- Any additional work deemed felt 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_2 NO_X PM $_{(10)}$ PM $_{(2.5)}$	4 (Four)	Twice a week 24 Hourly basis	⇒24 hour sampling at each location using High Volume Sampler. Consultant has to deploy 4 (four) numbers of HVS at site. Analysis of samples should be as per Gazette notification on NAAQS dated 16.11.2009.
Hg O_3	4 (Four)	Twice a week 8 hourly basis.	
Meteorology			
Wind speed & direction	1 (One)	Continuous (averaging time of 1 hour)	A permanent 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	
Rainwater Analysis (pH, conductivity, sulphates, chlorides and nitrates)		First three rains in monsoon	
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

FIELD/ PARAMETERS	NO. OF SAMPLING LOCATION	FREQUENCY	REMARK
			parameters during the period of study.
Chemical Parameters: Total Dissolved Solids, Alkalinity, Hardness, BOD, COD, NO_3, PO_4, Cl, SO_4, Na, K, Ca, Mg, Silica, oil & grease, phenolic compounds	Six	Monthly	Consultant has to specify the laboratory facilities for analysis of these parameters.
Bacteriological (MPN and Total coliform)	Six	Monthly	As above
Heavy metals (As, Hg, Pb, Cd, Cr^{-6}, Total Cr, Cu, Zn, Se, Fe).	Six	Quarterly	As above
Soil			
pH, Conductivity, Cation Exchange Capacity, Total N, P, K, Organic Content, Mercury, Sand, Silt and Clay, Infiltration Tests etc.	Ten	Pre-monsoon and Post-monsoon Seasons	Representative composite soil samples from agricultural / barren land.
Noise			
Leq	Ten	Pre-monsoon and Post-monsoon Seasons	24 hourly sampling at each location using an integrating sound level meter.
Aquatic Ecology			
Phytoplankton, Zooplankton, Fish	Three	Pre-monsoon and Post-monsoon Seasons	Surface water bodies in the study area to be covered, with special emphasis on intake water source location.
Terrestrial Ecology			
Density, Diversity, abundance of species, IVI.	Three	Pre-monsoon and Post-monsoon Seasons	Different terrestrial ecosystems in the study area need to be covered.

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 EIC.

EXIBHIT-I: VICINITY PLAN OF KATWA STPP (2X660 MW)