DRAFT TERMS OF REFERENCE

FOR

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) STUDY
FOR

MANDAKINI-B COAL MINING PROJECT
(CAPACITY -20 MTPA)

A Maharatna Company

NTPC LTD.

(A Government of India Enterprise)

Environmental Engineering Department
Engineering Office Complex,
Plot no. A-8A
Sector - 24, NOIDA,
U.P.-201 301

Feburary,2019

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1.0 Introduction

Mandakini-B Coal Mine Block is part of Talcher Coal Field and is located in villages Changuria, Santrabandh, Sunaripal, Takua, Bainda, Balipata, Changudia, Debipatanapur, Kakudia, Kalyanpur, Sanbirabarpur and Santrabondh, District Angul in Odisha State. Area of the block is 2072.97 Ha with a total production capacity of 20 MTPA.

The Block is well connected to the district headquarter Angul via Kosala at a distance of 40 km by all-weather road. The block is located at a distance of 14 km (by road) from Kaniha Super Thermal Power Station of NTPC. The block comes under Chhendipada Tehsil, which is located at a distance of about 8 km. The nearest railway station is Talcher on Talcher – Cuttack line of East- Coast railway and is about 32 km from the block. The nearest Airport is at Bhubaneswar, State Capital of Odisha which is about 170 km by road. The nearest port is at Paradip at Bay of Bengal situated at a distance of 220 km from the block. A vicinity map is enclosed as Exhibit-1. The block forms a part of Survey of India Toposheet No. F45 M16 (Old. T.S. No. 73C/16) on R.F. 1:50,000 and bound by following co-ordinates

	Latitudes	Longitudes
Mine Block	21°04'16" to 21°07'33.5" N	84°56'06" to 84°59'51" E

The Mandakini – B Coal Block, located in Talcher Coalfields in Angul district of Odisha State. The block for a total area of 20.73 sq. km. has been allocated by Ministry of Coal, Government of India vide F.No.103/33/2015NA dated 8th Aug 2016 to NTPC Ltd., for captive mining for supply of coal to Telangana Super Thermal Power Project of NTPC. Mining Plan for the block was prepared by M/s CMPDIL based on the Geological Report on Coal Exploration (2017) prepared by M/s CMPDI. The Mining Plan envisages a production capacity of 20 MTPA.

1.1 Objective:

In order to identify the environmental impacts due to the mining activities and associated facilities (like colony/township) an Environmental Impact Assessment (EIA) study is proposed to be undertaken. The main aim of the study is to establish the existing environmental conditions, predict impacts of mining and associated activities and formulate the Environmental Management Plan, Risk Assessment & Disaster Management Plan, Occupational Health & Safety Plan, and Green Development & Afforestation Plan. The EIA report is required for seeking Environmental Clearance (EC) from the Ministry of Environment, Forest and Climate Change (MOEF&CC) & Consent to Establish (CTE) from Odisha State Pollution Control Board (OSPCB).

2.0 Scope of Services

The EIA study will be conducted through a NABET accredited consultant 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) and 3 (three) months field monitoring in relevant disciplines. The consultant will enable in presenting the findings of the EIA report before the Public Hearing Committee, OSPCB and Expert Appraisal Committee (EAC) of the MOEF&CC, and submit all clarifications/replies to queries for obtaining Consent To Establish (CTE) from the OSPCB and Environment Clearance (EC) from MOEF&CC. The EIA Report shall be framed in accordance with the EIA Notification of MOEF&CC dated 14.09.2006 and its subsequent amendments as applicable.

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

Stage 'A'	Description of Site and Surrounding Establishment of Baseline Conditions & Collection of Secondary Data
Stage 'B'	Prediction of Impact Assessment Preparation of • Environmental Management Plan, • Construction & Demolition Waste Management Plan • Risk Assessment and Disaster Management Plan, • Occupational Health and Safety Plan, • Green Belt Development & Afforestation Plan, and • Wildlife Conservation Plan
Stage 'C'	Preparation of following Documents • Draft EIA Report based on one season data for existing environmental baseline and Executive Summary of Draft EIA Report in English and Odia language, • Final EIA Report incorporating details of Public Consultation for submission to MOEF&CC for EC.

The above mentioned documents shall be prepared based on TOR approved/accorded by MOEF&CC and/or Standard TOR. The bids from NABET/QCI accredited EIA consultants has been invited. EIA study will be awarded to only NABET/QCI accredited EIA consultants. The EIA Study shall cover all the conditions stipulated in TOR accorded by MOEF&CC and/or Standard TOR, as well as the scope of work described in the subsequent sections.

2.1 STAGE 'A':

Description of Site and Surrounding

The study area will comprise of core zone (mine lease area) and buffer zone (covers a radius of 10 km around the periphery of mine lease area). The consultant should

identify all major topographical features and other important objects of interest within the core zone & buffer zone and present on maps, such as

- Land use, location of habitats, monuments, major constructions including roads, railways, pipelines, major industries/mines, other sources of pollution etc.
- Forests (as per records), national parks and wildlife sanctuaries, biosphere reserves, elephant reserves, other ecologically sensitive areas, areas where endangered fauna and plants of medicinal and economic importance are found, migratory corridors of fauna etc.
- Water bodies and drainage patterns
- Location of various monitoring stations (air/water/soil/noise – each shown separately).
- Contour Map along with site plan of the mine showing the various proposed break up of land uses for mining operations such as quarry area, OB dumps, green belt safety zone, buildings, infrastructure, stockyard, township/colony, undisturbed area, existing roads and drainage, propose diversion/ rechanneling of water course, proposed approach roads/ haul roads, etc.

Establishment of Baseline Conditions

Establish 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. Please refer Annexure-1 and 2 for details on establishment of Baseline Conditions.

Annexure-1: Summary of Scope of Work

Annexure-2: Primary Data Collection/Monitoring Schedule

However, the details presented in Annexure-1 & 2 are only indicative and not exclusive. All possible sources for data collection shall be explored and relevant data will be generated as required as per the EIA Notification dated 14.09.2006 and subsequent amendments as applicable.

Further, the information available in publications (like District Census Handbook etc.) and unpublished data available with various Government, Educational and Other Institutions for each discipline, to characterize the environment of the area shall be reviewed and analyzed. All possible sources of secondary data, generate relevant primary data shall be explored for preparation of EIA Report to the satisfaction of NTPC, State Pollution Control Board/ Ministry of Environment, Forest and Climate Change.

2.2 STAGE 'B':

Prediction of Impact Assessment

The impacts of mining operations on study area (core and buffer zone) will be established as described in following table. Special emphasis shall be laid on 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 etc.

Discipline	Scope
General	• Predict the both short term and long-term impacts on sensitive areas due to mining operations.
Physiography and Land Use	• Impacts on physiography and on land use pattern due to mining operations and disposal of overburden, in particular agricultural land required for mining operations. • Impacts of agricultural uses on agriculture land at post mining.
Water Quality	• Impacts on surface water quality due to mining activities and disposal of mine seepage water. • Impacts on ground water quality due to mine water extraction. • Impacts of coal handling plant and coal transportation on water quality – generation of effluents from workshop, management plan for maintenance of HEMM, machinery, equipment.
Sediments	• Enumerate impact on sediments quality on nearby water bodies due to mining.
Geology	• Impact on Geology due to mining.
Water Use	• Impact on competing users (Up-stream and downstream) • Impact on sustainability of Water Source.
Hydrology and Drainage	• Impacts of mining on hydrology, modification of natural drainage, diversion and channelling of the existing rivers/water courses flowing though the ML area and impacts on the existing users. • Impacts of construction of embankment on the surface hydrology of the area. • Impacts of withdrawal of mine seepage water on surface and ground water hydrology. • Impacts of mine dewatering on availability of water for different users of ground water.
Soils	• Impacts on physio-chemical characteristics of soil.
Air Quality	• Air Quality impact prediction modelling using the ISCT-3 or latest model for the operation of the Mandakini-B Coal Mine at its peak capacity. • Use appropriate mathematical model to predict air quality due

	to all project activities including mining, coal handling, coal transportation, vehicular movement and other related activities.
Noise	• Predict the noise level at varying distances using suitable model and compare it with monitored noise level. • Impacts of blasting and vibrations.
Solid Waste Disposal	• Impacts of construction and demolition waste on environment. • Impacts of overburden dumps on environment.
Terrestrial Ecology	• Impact of site preparation (clearing, excavation, dewatering, impounding of water etc.) and mining activities on terrestrial ecosystem. • Impacts of mining and overburden dumps on terrestrial flora and fauna, especially endangered species if any.
Aquatic Ecology	• Impacts of discharge of mine water on important water bodies. • Predict the impact on the spawning and breeding activities.
Demography & Socio-economics	• Socio-economic impacts of workers employed during the construction phase on local communities. • Socio-economic impacts of mining on local communities and project affected persons.

Preparation of Environmental Management Plan (EMP)

The EMP should address the following:

- Measures for minimizing the use of natural resources – water, land, energy.
- Measures for minimizing the impacts due to construction and demolition of existing houses and structures.
- Air pollution control measures for mining and associated activities.
- Water pollution control measures including recycle and re-use of treated effluents; flow chart of water balance; treatment of effluents from workshop, township, domestic wastewater, mine water discharge, etc. and ETP in mine.
- Management of drainage regime, especially with reference to diversion of streams/nallas.
- Drilling and blasting plan. DGMS permission should be sought in case of blasting within 100 m from the village.
- Noise pollution control measures and abatement of vibrations due to blasting.
- Solid waste management plan including disposal of overburden and mine waste.
- Slope stabilization measures of over burden dumps.
- Cost of implementation of EMP including equipment and manpower (capital and recurring).
- Conceptual Mine Closure Plan along with the fund requirement for the detailed activities proposed there under.
- Post study environmental monitoring program, in built mechanism of self-monitoring of compliance of environmental regulations.

Preparation of Risk Assessment, Disaster Management Plan (DMP) and Occupational Health & Safety Plan

- Risk assessment will be carried out for fuel oil & explosive storage, transport and handling. Thermal radiation contours will be drawn and any mitigation measures required will be suggested.
- A Disaster Management Plan for dealing with On-site and Off-site emergency situations arising due to fire, explosion, leakages of hazardous substances etc. is to be prepared.
- Occupational risk involved during mining operation will be assessed and necessary safety and protective measures shall be spelt out.

Preparation of Green Belt Development & Afforestation Plan

Progressively spelt out the green belt development and afforestation plan, inclusive of species (local) selection for the afforestation/plantation based on original survey/land use, including 30 m thick avenue plantation along the roads outside the lease.

Wildlife Conservation Plan

The site specific wildlife conservation plan shall be prepared as per applicable rule for the protected schedule-1 species (if any) in the proposed coal mine block and its immediate surroundings.

2.3 STAGE: 'C':

Preparation of EIA Report

Stage-C includes preparation of reports –

- Draft EIA Report based on one season (non-monsoon) data and Executive Summary of Draft EIA Report in English and Local Language (Odia) for Public Consultation process.
- Final EIA Report incorporating the issues raised during Public Consultation. Response to the issues raised during Public Hearing and the written representations (if any), along with a time bound Action Plan and budgetary allocations to address the same, shall be provided in a tabular form, against each action proposed.
- Comprehensive EIA Report based on 3 months data.

The report will include all references and fulfill the requirements of MoEF&CC. The basic format of the EIA-EMP report will be as per MoEF&CC Gazette Notification dated 14.09.2006 and subsequent amendments.

Annexure-1

STAGE–A: ESTABLISHMENT OF BASELINE CONDITIONS: SUMMARY OF SCOPE

Discipline	Scope
General	• General description of the core and buffer zone. • Land requirement for the project and associated facilities. • Breakup of mine lease area as per different land usages and its stage of acquisition, break up as per mining operations. • Details of supporting facilities and infrastructures.
Physiography, Land Use and Drainage Pattern	• Procurement and analysis of current Satellite Imagery along with ground truth verification for land use patterns and drainage patterns. • Development of land use maps (1:50,000 or 1:1,00,000) based on satellite imageries, delineating the agricultural land (irrigated, unirrigated and uncultivable) and forest areas (as per records) for core zone and buffer zone.
Water Use	• Identification of various surface & ground water resources. • Assessment of current water uses. • Identification of conflicts on water use, if any.
Water Quality	• Establishing the water quality of major surface & ground water resources based on primary data generated and secondary data collected.
Sediments	• Physico-chemical parameters and Heavy metals on sediments of nearby water bodies.
Hydrology	• Establishment of surface and ground water hydrology based on secondary data collected and or through field investigation. • Characterization of surface water bodies and drainage flow especially in pre and post monsoon period. • Characterization of aquifer to determine ground water resources based on total annual replenishable recharge (TARR) methodology. • Establishment of the direction of flow of ground water by observing average water table fluctuations with the help of at least 30 test wells in pre and post monsoon seasons (if 30 test wells are not available consultant is to construct piezometer at no extra cost) and at least one pumping test to analyse the aquifer characteristics within the core and buffer zone each including long term modelling. • Preparation of water budget for the mine sub-basin based on runoff, evaporation, evapo-transpiration parameters.

Geology	• Presentation of Geological map and brief description of geology based on secondary data.
Soil	• Establishment of physico-chemical characteristics and nutrient levels of soil in core and buffer zone based on primary data generation (Annexure-2).
Meteorology	• Monitoring of On-site Meteorological Parameters by setting up an Automatic Meteorological Station at site (Annexure-2).
Air quality	• Establishment of Ambient Air Quality in core and buffer zone through primary data generation (Annexure-2).
Noise	• Monitoring of noise at locations in and around the mining area through primary data generation (Annexure-2).
Terrestrial Ecology	• Development of vegetation map with demarcation of different kinds of habitats and ecosystems, degrees of disturbances and habitat fragmentation based on interpretation of satellite imagery, ground truth verification and ecological survey. • Inventorisation of flora and fauna (including avian fauna) and listing of endangered species present in the core and buffer zone duly authenticated by DFO. • Study on the existing flora and fauna carried out by an institution of relevant discipline.
Aquatic Ecology	• General description of aquatic ecosystems in core and buffer zone based on secondary data and primary data generation through seasonal field sampling. • Identification of flora and fauna and endangered species in the surface water body falling in the study area. • Listing of fish and other species in the receiving water body with special reference to spawning and breeding zone.
Demography & Socio-economic	• Establishment of demographic characteristics and occupational structure of population within core and buffer zone based on Census Data, 2011.

Notes:

- Any additional work deemed feel necessary for the project should be done within the cost of the award by the consultant.

- Action Plan along with locations of sampling sites will be finalized in consultation with the Engineer-in-Charge (EIC).

Annexure-2

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 (NO_2) PM_{10} $PM_{2.5}$	Ten	Twice a week	24 hour sampling at each location using appropriate ambient air quality instruments. Consultant has to deploy 10 (ten) sets of instrument at site. Analysis of samples should be as per Gazette notification dated 18.11.2009 on AAQ.
CO	Ten	Once a month	8 Hourly samples at each location using appropriate instruments.
O_3 & Hg	Ten	Once a month	8 Hourly samples at each location using appropriate instruments.
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, 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		Continuous (averaging time of 1 hour)	
Water Quality (Surface – 06 & Ground Water - 06)			
Physical parameters: Temp., TSS, etc.	Twelve	Monthly	Consultant has to set up site laboratory for these parameters during the period of study.
Chemical Parameters:	Twelve	Monthly	Consultant has to specify the

pH, DO, TDS (Conductivity), Alkalinity, Hardness, BOD, COD, NO_3, PO_4, Cl, F, SO_4, Na, K, Ca, Mg, Silica, Oil & Grease, Phenolic compounds.			laboratory facilities for analysis of these parameters.
Bacteriological: MPN and Total coliform	Twelve	Monthly	As above.
Heavy Metals (As, Hg, Pb, Cd, Cr^{-6}, Total Cr, Cu, Zn, Se, Fe).	Twelve	Quarterly	As above.
Sediment Quality			
Physico-chemical Parameter : pH, Texture,N,P, Organic Matter **Heavy Metals :** (Cu, Zn, Cr, Fe).	Three	Once in season	Consultant has to specify the laboratory facilities for analysis of these parameters.
Soil			
Classification, Texture, pH, Conductivity, Cation Exchange Capacity (CEC), N, P, K, Mercury etc.	Fifteen	Once in Season	As above.
Noise			
$L_{eq.}$	Fifteen (within and outside the core zone)	Once in Season	24 hourly sampling at each location using an integrating sound level meter.
Aquatic Ecology			
Phytoplankton, Zooplankton, Fishes	Four	Once in Season	
Terrestrial Ecology			
Density, Diversity, Frequency, Abundance, Importance Value Index of species etc.	Four	Once in Season	
Rain Water Analysis			
Quantity, pH, Conductivity, SO_4^{2-}, Cl^-, NO_3^{2-}	Two	Once in Season	

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

VICNINITY MAP OF MANDAKINI-B COAL BLOCK