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# Executive Summary
# of
# Draft Environmental Impact Assessment Report
# For
# Talcher Thermal Power Project Stage-III (2x660 MW)
# at
# Talcher, Angul District in Odisha

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## Project Proponent:

**NTPC Limited, New Delhi**
**(A Government of India Enterprise)**

Prepared By


**EQMS India Pvt. Ltd.**
304-305, Rishabh Corporate Tower, Community Centre,
Karkardooma, Delhi – 110092,
Ph: - 011-30003200-219, Fax : 011-22374775,
E-mail :eqms@eqmsindia.org,
Website :www.eqmsindia.com

(QCI-NABET Accredited
Environmental Consultant Organization)
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# EXECUTIVE SUMMARY

## 1.1 Introduction

Talcher Thermal Power Station (TTPS) is situated near Talcher town in Angul district of Odisha having existing capacity of 460 MW [Stage-I (4x60 MW) + Stage-II (2x110 MW)]. M/s NTPC Limited is proposing Talcher Thermal Power Project (TTPP) Stage-III (2x660 MW) within the existing plant.

The Proposed Project is envisaged as an inter-regional base load station for meeting the power demand of Eastern Region Beneficiaries and the home state- Odisha.

The proposed project is covered under Category 'A' of schedule 1(d) of the Environmental Impact Assessment (EIA) Notification-2006 and requires an Environmental Clearance from the Ministry of Environment, Forests and Climate Change (MoEF&CC).

Terms of Reference (TOR) for Talcher TPP Stage-III (2X660 MW) was accorded by MOEF&CC vide letter No.J-3012/31/2009-IA.II (T) dated 22.10.2014. MOEF&CC has issued a corrigendum vide letter dated 13.01.2017 clarifying the validity of said TOR for 3 years i.e. till 21.10.2017. In accordance with TOR conditions, the draft EIA report is prepared by M/s EQMS India Pvt. Ltd., Delhi.

## 1.2 Location

The proposed site is located at a Latitude of 20° 54' 02" North to 20° 55' 05" North and Longitude of 85° 12' 10" East to 85° 13' 00" East near Talcher Town, Angul district of Odisha. The site is about 4 km from Talcher Town and about 25 km from district headquarters Angul. Nearest railway station named 'Talcher' is on Talcher-Cuttack section of North Eastern Railway (renamed East Coast Railway) at about 2 Kms. However, a small railway station named 'Talcher Thermal' is located near project boundary. The area is accessible from by NH-23 (renamed NH-149) at about 1 km. The nearest commercial airport is at Bhubaneshwar at an aerial distance of 90 km approx. and about 150 km by road. Environmental settings within the study area (10 km radius from proposed project) is presented in **Table 1.1** below.

**Table 1.1 Environmental settings within the study area**

| Sr. No. | Particulars | Details | |
|---|---|---|---|
| 1 | Project Location | Near Talcher town, Angul district, Odisha | |
| 2 | Main Plant Site & Township Latitude/Longitude | Latitude | Longitude |
| | **Corner name** | | |
| | Top corner left (NW) | 20° 54' 41'' N | 85° 12' 10'' E |
| | Top corner right (NE) | 20° 55' 05'' N | 85° 12' 32'' E |
| | Bottom corner left (SW) | 20° 54' 02'' N | 85° 12' 11'' E |
| | Bottom corner right (SE) | 20° 54' 07'' N | 85° 13' 00'' E |
| 3 | Present land use at the site | Industrial, within the existing project | |
| 4 | Villages within 1 km (approx) radius area | Nuagaon (S), Gurujangli (SE), Dighi (W), Kendupali (W), Bhoghabereni (S), Nuapada (N) and | |

| Sr. No. | Particulars | Details |
|---|---|---|
| | | Pudiabangha (W), Jagannathpur (W), Bantol (NE), Bangu (E) etc. |
| 5 | Nearest town/City / District Headquarters | Talcher Town (4 km, North),<br>Angul District HQ (about 25 km) |
| 6 | Hills/valleys | There are some hillocks of upto 170m approx. above mean sea level, which are located beyond 4 km approx. distance from plant site towards NW & W. |
| 7 | Climatic conditions (IMD, Angul) | (IMD Climatological Table 1971-2000)<br>**Annual**<br>Daily Mean Temperature : (Max) 39.8 °C,<br>: (Min) 15.1 °C<br>Total Rainfall (mm) : 1300.1<br>Relative Humidity % : (Max) 83 % , (Min) 35 %<br>Wind Direction : W, NW |
| | | (IMD Climatological Table 1971-2000)<br>**Pre-Monsoon Season**<br>Daily Mean Temperature °C : (Max) 39.8 °C<br>: (Min) 21.0 °C<br>Total Rainfall (mm) : 137.2<br>Relative Humidity % : (Max) 70 %, (Min) : 35 %<br>Wind Direction : W and E |
| 8 | Topography | Mild slopes |
| 9 | Archaeologically important places | Ananta Sayi Vishnu at Saranga (sleeping Vishnu), a centrally protected monument, carved on the rocky bed of Brahmani River at Saranga, is located about 5.5 kms (aerial) from project boundary.<br><br>However, a group of temples at Astasambhu Complex at Kualo, is located at about 10.5 kms (aerial) from project boundary. |
| 10 | Protected areas as per Wildlife Protection act, 1972 (Biospheres, Tiger reserves, Elephant reserves, National Parks / Wildlife Sanctuaries, Conservation reserves and Community reserves) | None within 10 km radius. |
| 11 | Reserved Forest (RF) and Protected Forests (PF). Distance (approx.) | Hirapur RF (6.2 km WNW), Kauchiakhol RF (6.9 km WNW), Rakas RF (7.3 km NW), Makundanali RF (5.6 km NW), Gengutia RF (4.6 km N), Kandhal RF (8.5 km N), Petachira RF (7.2 km N), Khalpal RF (9 Km NE), Balaram Prasad PF (4.9 km SW), Paturia RF (7.7 Km N) |
| 12 | Seismicity | Seismic Zone-III, Low damage risk zone |
| 13 | Surface water bodies | River Brahmani, about 2.0 Km (E)<br>Nandir Jhor (a small rivulet), leading to Brahmani river, passes adjacent to the southern boundary wall (existing) of the project. |
| 14 | Defence Installations | None within 10 km radius |
| 15 | Ash Disposal Site | Jagannath OCP Mine Voids of MCL<br>Latitude 20° 56' 00" & 20° 57' 31" N and Longitudes 85°08'39" & 85°10'02" E. |

A vicinity map of 10 km radius study area is shown below as **Figure 1.1**.

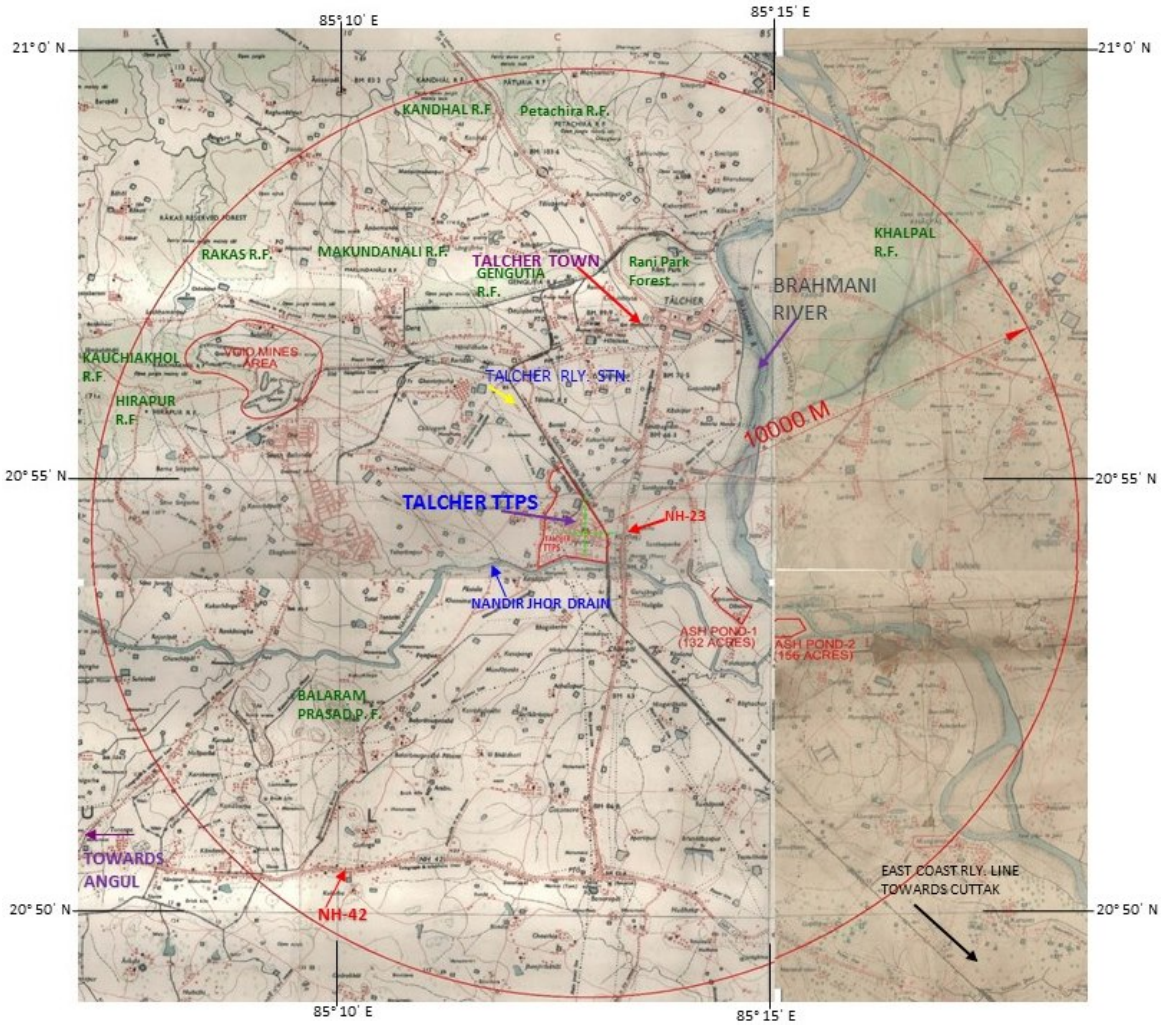


**Figure 1.1 Vicinity Map showing Site & Surrounding Features within 10 km area**

## 1.3 Land requirement

There is no additional land envisaged to be acquired for proposed expansion Stage-III (2 x 660 MW) of plant. The plant facilities for this Stage-III (2 x 660MW) expansion would be accommodated within the land available in the existing power station and township of Talcher Thermal Power Station Stage-I & II.

Total land required for proposed expansion project is about **150 acres** (within the 997 acres land of existing project). However, a small amount of land about 2.337 acres of Govt. forest land near upstream of Samal Barrage on Brahmani River, is proposed to be acquired from State Govt. for make-up water pump house. Make-up water pipelines (about 30 km) are proposed to be laid along the Right Bank Canal of Samal Barrage up to TTPP. About 223 acres of land would be required for Right of Use (ROU) for about 30 meter wide corridor and

about 30 Km long pipeline. The proposed project involves demolition of some old quarters and common facilities. Aerial view of proposed site is shown as below in **Figure 1.2.**


**Figure 1.2: Aerial View of Proposed Site of Talcher Thermal Power Project Stage-III (2x660 MW)**

## 1.4 Water Requirement

The make-up water requirement for Stage-III of this project would be about 3300 $m^3$/hr. Ash disposal is envisaged into Jagannath OCP Mine voids of MCL, located about 14 Km from the plant, through lean slurry system. Consequently, for ash disposal additional quantity of 500 $m^3$/hr will be required to be drawn. Water requirement for the project will be met from upstream of the Samal Barrage discharge on the River Brahmani and shall be pumped to the plant site located about 30 kms from intake well. Industrial Promotion and Investment Corporation of Odisha Limited (IPICOL), Bhubaneswar, has recommended the requirement of 39 cusecs to Odisha Govt. for allocation to NTPC.

## 1.5 Fuel Requirement

Coal requirement for Talcher TPS Stage–III (2 x660 MW) is estimated to be about 6.87 MTPA considering 90% PLF and weighted average GCV of 3405 Kcal/kg. NTPC is in the process of transfer of coal linkage (about 3 MTPA) of existing TTPS (460 MW) on its closure to proposed Talcher Stage-III project at the same location, under the existing MoC, Govt. of India policy. Efforts would also be made to source the balance coal from Talcher area of Mahanadi Coal fields.

The coal quality considered for Talcher TPS, Stage-III, based on coal supplied by MCL to existing TTPS and design considerations, is given in **Table- 1.2.**

**Table- 1.2 : Coal Characteristics**

| Parameters | Range |
|---|---|
| Total moisture (%) | 11 - 17 |
| Ash (%) | 34 - 46 |
| GCV (kcal/kg) | 2900 - 4100 |
| Sulphur (%) | 0.35 - 0.65 |

The envisaged mode of coal transportation from the coal mines to the power plant is by belt conveyor/Railways rakes. The rakes shall be unloaded at the track hopper terminal. No congestion of rail traffic is anticipated.

Light Diesel Oil (LDO) is proposed to be used as auxiliary fuel during initial start-up, coal flame stabilization and part load (upto 30%) operation of the steam generator while firing coal.

## 1.6 Project Description

The proposed TPP will comprise 2 x 660 MW boiler and turbines, with matching coal handling facilities, cooling towers, air conditioning & ventilation system, Fire protection system, electrical systems, Electrostatic Precipitators, $NO_x$ Emission Reduction System, Flue Gas De-sulphurization System (FGD), Limestone and Gypsum Handling System, Chimney, water intake and effluent treated plant, ash management system, and ancillary infrastructure and utilities.

The units are expected to be start Commercial Operation in 52 months and 6 months thereafter from the investment approval. Approximate capital cost of Talcher TPP Stage-III (2X660MW) project (as of II quarter, 2010 price level) excluding IDC & WCM is Rs. 6412.35 Crores. However, the estimated project cost will increase by Rs. 1.0 Crore per MW considering New Environmental Guidelines.

Supercritical technology has been selected for the boilers. This technology will facilitate higher efficiency than sub-critical technology. Air pollution load will be lower than the conventional technology. The firing system would employ latest $NO_X$ emission reduction system.

The air emissions shall be beated in high efficiency Electro Static Precipitator and Flue Gas Desulphurization (FGD) system. The flue gases from the FGD are discharged through a tall chimney for wider dispersal of remaining ash particles and gases to minimize ground level concentrations of pollutants. The ash collected in the ESP hoppers is extracted in dry form and conveyed to dry ash storage silos from where it would be supplied to user industries. The balance ash will be conveyed to ash disposal area.

Beside thermal power generation, a roof top solar system is also proposed to harness the solar power.

## 1.7 Baseline Environment

The baseline environmental quality has been collected during the period of 1st March 2015 to 31th May 2015 (Pre-monsoon Season) within a study area of 10 km radial distance around the proposed Project. The study period and methodology for primary data collection is done as per the TOR accorded by MOEF&CC. The valued environmental components viz., topography, meteorology, air, water, land use, noise, soil, ecology, hydrology, geology, demography and socio-economic have been established through field monitoring supported by data from secondary sources.

### 1.7.1 Hydrology

The major part of the district is underlain by hard crystalline rocks and is devoid of any primary porosity and hence weathered and fractured, secondary porosity is developed. The recent alluvium occurs in a limited extent and sustains good yield. Groundwater occurs under watertable conditions in the weathered mantle of the crystalline rocks and in semi-consolidated formations whereas in the deeper fractured rocks, the groundwater occurs under semi-confined to confined conditions. The depth to water level in the area varies widely from less than 4-m bgl to as high as 11-m bgl in different areas.

### 1.7.2 Geology

The district of Angul represents diverse geological sequence, from rocks of Eastern Ghats of Pre-Cambrian age, Iron-ore super group, Gondwana Super group, Laterites to alluvial deposits of Quaternary age. The Gondwana rocks are exposed in the central part of the district covering parts of Talchir, Kaniha, Chendipada and Kishorenagar blocks.

### 1.7.3 Meteorology

The annual predominant wind direction observed at IMD Angul (1971-2000) is from west and northwest direction**.** The predominant wind direction during study period (Pre-Monsson, 2015) monitored at site is from WNW and West direction. The wind speed ranges between 0.5 to 5.7 m/s during study period. During the study period daily mean minimum temperature was 18.4$^0$C and daily mean maximum temperature was 46.1 $^o$C.

### 1.7.4 Ambient Air Quality

Significant parameters for thermal power plant $PM_{2.5}$, $PM_{10}$, $SO_2$, $NO_x$, Hg and $O_3$ were monitored at seven locations in the study area.

**Table 1.3: Summary of Ambient Air Quality Analysis Results in Study Area during Pre-Monsoon Season, 2015**

| Pollutant | Range of Concentrations (µg/m$^3$) | NAAQ Standards |
|---|---|---|
| $PM_{10}$ | 53-96 * | 100 |
| $PM_{2.5}$ | 19-48 | 60 |
| $SO_2$ | 10.8-28.4 | 80 |
| $NO_X$ | 13.5–31.4 | 80 |
| $O_3$ (8 hours) | 26.7–39.7 | 100 |
| Hg | BDL | - |

* Note: One sampling location at Bhaghmara village has some high concentrations of $PM_{10}$ upto 112 µg/m³.
BDL –Below Detection Limits

$PM_{10,}$ level of study area is within the prescribed National Ambient Air Quality Standards except some observations at Bhaghmara village. That may be due to, domestic coal burning, poor infrastructure and other industrial activities in that area.

### 1.7.5 Ambient noise

The noise levels observed at 14 locations in the study area are in the range of during day time 46.5 – 63.7 dB(A) and for night time in the range of 36.6 – 53.2 dB(A) for the various zones. The ambient noise levels of the study area are well within the prescribed National Ambient Air Standards for noise w.r.t residential area, Commercial area, Silence zone and industrial area category.

### 1.7.6 Water Quality

Five samples each of surface and groundwater were collected for analysis. The pH value of ground water samples at all the location (ranging from 7.25-7.92) did not show any significant variations and all the values were within permissible limit. The total hardness value in ground water sample found in the range of 120-385 mg/l and found within permissible range. All the parameters (except Fe at one location) in ground water sample of study area are well within the permissible limit of Indian Standard IS: 10500.

Surface water quality of Samal Barrage, Brahmini River at different location is found to meet the BDU Criteria class “C” of CPCB except BOD concentration in few of the samples. Water quality observed in Nandira Jhor was moderate. No metallic contamination was found in surface water samples.

### 1.7.7 Soil

It is revealed by analysing 14 soil samples collected from study area that soils of the study area are moderately fertile in the study area with medium level of available nutrients. Soils are observed generally slightly to moderately alkaline in nature. Most of the study area soils are with medium to high level of organic carbon contents as well as organic matter. Soils are low to medium in available nitrogen content. Medium phosphorous levels were also observed in the soils of study area. Low to medium potassium levels are observed in the soil of the area.

### 1.7.8 Ecology

Study area of the project area (10 radius of project area) comprises of various terrestrial ecosystems i.e. forests, agricultural lands, wastelands and barren lands and a river aquatic ecosystem. 5 nos. of sampling locations of terrestrial and aquatic ecology each collected from study area. The general vegetation is deciduous type. Although Sal forest is in dominance position in many areas but general character of vegetation is tropophilous with distinct tendency to xerophytic structure of many of its species. There are 10 reserve/protected forests present within the 10 km radius of project site bearing good vegetation cover. No endangered species of plants and animals are found in the study area.

There are no National Parks/wildlife sanctuaries located in the study area. The primary study reveals that, potential fishing activities during the summer season have not observed in the study area as water gets dry in stagnant water bodies and ponds.

### 1.7.9 Land Use

As per the land use based on satellite image about 43.10% of the land is under cultivation. About 17.97% of the land is under settlement, about 3.76% land is under water bodies, 9.34% land is under vegetation cover and rest of the land is under other uses.

### 1.7.10 Demography and Socio-economics

No additional land is proposed to be acquired for the proposed expansion project. Hence, there are no project affected persons (PAPs) due to land acquisition under the proposed project. The sex ratio in the study area is 897 females per 1000 males, below state and national figures. In the study area about 10.31% population belong to Scheduled Tribes (ST) and 20.17% Scheduled Castes (SC) indicating that about 30.48% of the population in the study area belongs to socially weaker sections. The analysis of the literacy levels in the study area reveals an average literacy rate of 74.15% as per 2011 census data. As per 2011 census records altogether the main workers works out to be 26.33% of the total population. The marginal workers and non-workers constitute to 6.77 % and 66.90 % of the total population respectively. The distribution of workers by occupation indicates that the non-workers are the predominant population. Agricultural activities dominates in the villages where as in urban areas most people are employed in the private establishments and engaged in the service or household sector. Reasonably satisfactory levels of infrastructure facilities are available in the study area, which consists of education, health care, communications, transportation, etc.

## 1.8 Anticipated Environmental Impacts and Mitigation Measures

### 1.8.1 Air Quality

Demolition and construction will generate fugitive dust emissions which will be controlled by water sprinkling.

During operation phase, fugitive dust emissions during coal unloading and coal stock yard will be suppressed using water sprinkling. Dust extraction/ suppression system at all coal transfer points, *viz.* crusher house, junction towers etc. will be provided. Belt conveyors will be covered to minimise the fugitive dust emissions. The impact of fugitive emissions from the proposed power plant on air quality of the region would be insignificant after mitigation measures.

The ambient air quality in respect of air pollutants will change during the operation phase of the proposed project. However, adequate stack height will be provided for better dispersion of flue gas as per the guidelines of CPCB/OSPCB. In addition to that green area/plantation will be developed at available spaces wherever feasible, by the project proponent for further control of air pollution due to fugitive emissions at site.

The emission control measures mainly include installation of FGD, NOx emission reduction system, Electrostatic Precipitator etc. This shall be coupled with the continuous monitoring of air pollutants within and around the project site as well as in adjoining areas.

***Summary of Predicted GLC's***

The summary of predicted ground level concentrations (98 percentile) for 2 x 660 MW and its impact on the study area under the worst meteorological scenario is given in **Table 1.4.**

**Table 1.4: Resultant Ground level Concentration (98 percentile 24-hourly) in Pre-monsoon season due to proposed Talcher Thermal Power Project Stage-III (2x660 MW)**

| Pollutant | 98 Percentile of Baseline Con. (µg/m³) | 98 Percentile of 24 Hourly Incremental GLC (µg/m³) | Distance (M) | Direction | Resultant GLC, 98 Percentile (µg/m³) | NAAQ Standards (µg/m³) |
|---|---|---|---|---|---|---|
| $PM_{10}$ | 89 | 1.75 | 1600 | E, ESE | 90.75 | 100 |
| $SO_2$ | 27.4 | 5.87 | 1800 | E, ESE | 33.27 | 80 |
| $NO_X$ | 31.1 | 5.87 | 1800 | E, ESE | 36.97 | 80 |

The above table shows that in the worst case scenario, the 98 percentile of 24 hourly resultant ground level concentration of pollutants due to the proposed project will be towards East, East-South-East wind direction. In the post-project scenario, the 98 percentile of 24-hourly average concentration for the particulate matter $PM_{10}$, and $PM_{2.5}$ and gaseous pollutants $SO_2$ and $NO_X$ are within the National Ambient Air Quality Standards in the worst case.

The cumulative Impact assessment was done considering proposed major industrial projects (2x660 MW NSL Nagapttnam Thermal Power Project and GMR Kamlanga Thermal Power Project 1x350 MW) which have already been accorded Environmental Clearance but are not operationalized yet. The fugitive emissions from proposed Coal mines/coal washries shall have localised impact on ambient air, hence not considered in assessment. The cumulative Impact assessment is presented in **Table 1.5**.

**Table 1.5 : Cumulative Incremental Concentrations Due To Proposed Major Industries in Area (Based on New Emission Norms will be followed by all proposed Industries)**

| Pollutant | 98 Percentile of Baseline Con. (µg/m³) | 98 Percentile impact (µg/m³) | Distance (M) | Direction | Resultant GLC 98 Percentile (µg/m³) | NAAQ Standards (µg/m³) |
|---|---|---|---|---|---|---|
| $PM_{10}$ | 89 | 2.57 | 1600 | E, ESE | 91.57 | 100 |
| SOx | 27.4 | 8.58 | 1300 | E, ESE | 35.98 | 80 |
| NOX | 31.1 | 8.58 | 1300 | E, ESE | 39.68 | 80 |

The above table shows that in the worst case scenario, the 98 percentile of 24 hourly resultant ground level concentrations of particulate matter $PM_{10}$ and gaseous pollutants $SO_2$ and $NO_X$ due to the proposed project will be within NAAQ Standards.

### 1.8.2 Noise Environment

There will be noise generation from construction equipment, material handling equipment and other vehicles. The noise impacts during construction phase are temporary. The noise impact would be localized to construction workers during their duty hours. These will be mitigated through use of personal protective equipment (PPEs) like ear muffs/plugs etc.

During operation phase, the stationary noise sources are Boilers, Steam Turbine generators, Compressors, Pumps, Coal crushers etc. and mobile sources like vehicular traffic. The noise generation at source from major equipment will be restricted to ≤90 dB(A) through technical specifications.

The noise impact has been predicted and the impact of noise outside the proposed project premises would be insignificant. Due to the masking effect, the ambient noise level in the nearby areas will not increase during the operation of the plant. The occupational noise exposure to the workers will be maintained well within the prescribed OSHA standard limits / Factories Act and PPEs will be provided in high noise areas.

### 1.8.3 Water Environment

During the construction, demolition, site preparation may have temporary effect on the water quality of receiving water body in monsoon. Adequate arrangement would be made to ensure proper drainage and disposal of the wastewater and the wash off will be directed to a sedimentation basin before discharge. Hence, no significant increase in the suspended solid content of the water regime is expected.

The CWC has No Objection to the withdrawal of water from u/s of Samal Barrage, for the proposed project and IPCOL also recommended optimum water requirement for the project. It may therefore, be concluded that the withdrawal of water for the proposed TPP is not likely to cause any adverse impact on the availability of water to downstream users of Brahmani River. No ground water source will be tapped for meeting the water requirements during operation phase of power plant. However, during construction phase groundwater may be used, if necessary.

While developing the water system for the project, utmost care has been taken to maximize the recycle/ reuse of effluents and minimize effluent quantity to achieve near to zero discharge from plant. All major water systems of the plant (cooling water system, service water system, coal handling water system and ash water system) shall have the re-circulatory systems. Therefore, no thermal impact on the receiving water body is anticipated. Water balance diagram of about 5 cycle of concentration (COC) is envisaged for the proposed project. The sewage from plant and township shall be treated in a sewage treatment plant. The treated effluent conforming to prescribed standards shall be utilized for plantation & horticulture to the extent possible. In view of the above, no significant change in water quality of receiving water body is anticipated.

### 1.8.4 Solid Wastes

Due to demolition activities, a lot of debris and solid waste will be generated. The recyclable waste generated after demolition like wood, iron, steel, bricks etc. will be segregated and disposed to authorized recyclers.

During operation of plant, about 2.82 MTPA ash generated from the proposed power project will be utilized as per MOEF&CC notifications (03.11.2009 & amendment dated 25.01.2016).

Bottom ash shall be used for making embankments, road and flyover construction, making aggregates, etc. The balance unutilized ash (mostly bottom ash and some fly ash) will be disposed in ash disposal site (abandoned mine voids of Jagannath mines). Beside this, efforts will be made to increase ash utilization in Cement sector, flyash bricks, RMC, road and embankment etc.

Spent oils, lubricants and oily sludge will be sold to the potential users after obtaining authorization from Pollution Control Board. Sludge generated from effluent and sewage treatment plant will be finally disposed in ash disposal site.

Gypsum produced by the FGD system is envisaged to be removed by conveyers to a storage shed for further disposal in an environmentally friendly manner and in-compliance to regulatory guidelines. Domestic waste generated from township and plant will be disposed as per regulatory norms.

### 1.8.5 Biological Environment

The proposed land is already in acquisition of Talcher TPS. As no additional land is proposed to be acquired (except about 2.337 acres govt. forest land for MUPH), the direct impact on terrestrial ecology (loss of flora and fauna) is likely to be insignificant. As the site is devoid of natural as well as manmade forest, the overall impact on terrestrial ecosystem will be negligible. Further, as the site infrastructure facilities are already developed, construction activities will be confined to proposed project site and impact will be marginal for a short time period.

The impact on the surrounding ecology during the operation of the project will mainly occur from the deposition of air pollutants. Most of the vegetation in the study area are deciduous and have high Air Pollution Tolerance Index (APTI) and therefore impact of $SO_2$ and NOx emission on the surrounding vegetation will be insignificant. The incremental emission of air pollutants is not likely to induce any significant changes in the ecology, during operation of proposed project, because the ambient air quality is likely to remain within the national ambient air quality standards.

Since the layout of plant is very compact, hence plantation will be developed in 20 acres area. Beside this plantation will be done at all available spaces in plant and township. Efforts will be made to develop additional plantation in 30 acres area in nearby villages and degraded forests, if any, subject to land availability from local administration and forest department.

The wastewater from the project during normal operations will not be discharged outside into any water body, hence no significant impact on aquatic life of natural water bodies. Suitable

system like trash racks and screens at make-up water intake system at Samal Barrage shall be provided to reduce entrapment and impingement for fishes.

### 1.8.6 Soil and agriculture

During the operation stage the project will generate fugitive dust and gas emissions. The fugitive emissions and stack emissions will be kept minimum to prevent any damage to soils and agriculture. The impacts of the project operation on the soil and agriculture of study area will be in-significant, due to wide dispersion of pollutants and state of art pollution control technologies.

### 1.8.7 Land Use

The project site is already in industrial use. No additional land is proposed to be acquired for this expansion project. Expansion project will be accommodated within the land available with the existing project. A small patch of govt. forest land 2.337 acres will be acquired for make-up water pump house. Hence there is no significant impact on land use.

### 1.8.8 Socioeconomic

No additional land is proposed to be acquired for the proposed expansion project. Hence no PAPs will be there due to this project. However, the CSR-CD activities will be continued and increased after installation of this project. The project will generate direct and indirect employment opportunities as well as opportunities for self-employment. However, direct employment opportunities will be limited. The proposed project will be helpful to improve the living standards of nearby population.

### 1.8.9 Impact on Archaeological Sites

There are two Archaeological Sites, at a distance of about 5.5 Km and 10.5 Km, notified as Centrally Protected Monuments by Archaeological Survey of India (ASI). The '*Ananta Sayi Vishnu'*, located on bank of Brahmani River in Sarang village, Dist. Dhenkenal is approx. 5.5 KM in NE direction (Crosswind Direction) and another ASI site, '*Astha Shambhu Temple'* in Kualo village, which is approx. 10.5 Km in North East direction and crosswind direction of proposed project. To assess the baseline conditions and impacts on these ASI sites, sampling has been carried out for Air Quality, Soil, Noise etc. at both the ASI Sites. Due to large distance of ASI Sites from the proposed TPP, no significant impact is anticipated in air modelling due to proposed project.

## 1.9 Environmental Monitoring Program

The environmental monitoring program encompasses location, duration, frequency of the parameters that has to be monitored. Environment Management Group (EMG) already existing in TTPS for supervise monitoring of environmental quality parameters. The same would be augmented/ strengthened encompassing proposed Stage-III (2x660 MW) also. A well maintained scientific laboratory having all necessary equipment /instrument will be maintained at the TTPP site.

### 1.10 Risk Assessment

Fire and Explosion are the likely hazards, which may occur due to the fuel storage. Results of FE&TI analysis shows that the storage of LDO falls into Light category of fire and explosion index with a Nil toxicity index. Coal dust when dispersed in air and ignited may explode. Crusher house and conveyor systems are most susceptible to this hazard. Stockpile areas shall be provided with automatic garden type sprinklers for dust suppression as well as to reduce spontaneous ignition of the coal stockpiles. Necessary water distribution network for service water with pumps, piping, tanks, valves etc will be provided for distributing water at all transfer points, crusher house, control rooms etc. A centralized control room with microprocessor based control system (PLC) has been envisaged for operation of the coal handling plant and auxiliary fuel handling. All necessary interlocks, control panels, MCC's, mimic diagrams etc. will be provided for safe and reliable operation of the fuel handling plant. Other potential hazards are spillage of chemicals while handling (HCl, NaOH) and chlorine leakage. These hazards can be mitigate with automation of system and proper precautions as per MSDS.

### 1.11 Disaster Management Plan (DMP)

The plant and surrounding area falls in a low damage risk zone of earth quake and far away from sea shore, hence vulnerability of cyclones in Talcher area is less. TTPS Stage-III will be located at higher elevation than HFL of Brahmani River.

TTPS has already implemented an On-Site Disaster Management Plan for existing units. It has various actions like preventive and predictive system, protective systems, personnel protective equipment, mock drill and simulation exercises, mutual aid scheme, communication system, medical facilities and reporting to external agencies etc.

The Off-Site Disaster Management Plan is prepared in consultation with district authorities and pollution control board. It includes major activities like educating the people around, mock drills, communication, emergency transport, emergency medical facilities, coordination with various departments & authorities and evacuation etc. New units shall also be included in the same DMP.

### 1.12 Occupational Health

Exposure to dust, noise, heat, mechanical injury, fire in coal yard, etc. are some of the hazards identified. Workers will be given personal protective equipment like mask, ear plugs, goggles, gloves, boots, etc. Occupational Health Centre will be established. Workers health will be checked at routine intervals as per Rules. Workers will be provided clean drinking water and toilets. Regular training and awareness programs will be conducted.

### 1.13 CSR/CD Plan

The proposed budget estimation for 2016-17 & 2017-18 for CSR-CD activities at TTPS is about Rs. 3.79 crores approx. The proposed activities in Talcher area pertains to education, health, sanitation, socio-economic development, infrastructural development, vocational training etc.

### 1.14 Hydrogeological Study and Impact of Ash filling in Mine Voids

The ash disposal of proposed project is envisaged in abandoned mine void nos. 4 & 7 of Jagannath mines of Mahanadi Coalfields. A number of studies have already been undertaken for Jagannath Mine Voids and the reports submitted to MOEF&CC, covering the hydro-geological Investigation of mine void and surrounding area, ash characterization and leachate Studies, radioactivity measurement and tracer studies, studies on flora and fauna and impacts of ash disposal on the same, core drilling in filled-in ash deposits to assess the characteristics of deposited ash and EIA/EMP Studies etc.

### 1.15 Environmental Management Plan (EMP)

EMP specifies various technological measures for pollution prevention, waste minimization, end-of-pipe treatment, attenuation etc. proposed to be undertaken to mitigate the adverse environmental impacts on each sector of environment during each phase of the project i.e. construction phase and operation phase. Most of the mitigation measures are integral part of the main plant package and will be implemented simultaneously with the commissioning of the main plant packages. EMP also includes institutional set-up for implementation of various measures, Afforestation and plantation Plan, Ash Utilisation Plan, Rainwater Harvesting Plan, Occupational Health and Safety Plan and EMP budget.

The responsibility of environmental management of an operating station lies mainly with Environmental Management Group at site, which acts as coordinator for environmental matters.

#### 1.15.1 Plantation / Afforestation Plan

Plants in general and trees in particular, function as sinks for gaseous pollutants and this is achieved through various physiological processes occurring within the plant system. NTPC TTPS has planted total of about 3,57,854 nos. seedlings in and around TTPS up to Dec. 2016.

Plantation is proposed in 20 acres within the available space of existing land of TTPS. No additional land is being acquired for main plant and its facilities. The general layout plan of TTPS Stage-III has been made very compact for optimizing the land. Since the proposed expansion will be accommodated within the existing project boundary, hence there is limitation of space available for new plantation / green belt.

In addition to above proposed plantation within plant boundary, efforts will be made to undertake some plantation activities in about 30 acres area at nearby existing ash ponds (near Santhapada village), and nearby villages, wherever space available and feasible, and area provided by District Administration, if any. Divisional Forest Officer, will also be consulted for additional plantation in degraded forest area, if any. Cost provision for Rs. 5 crores towards afforestation, greenbelt/plantation & landscaping has been made in project cost.

#### 1.15.2 Rain Water harvesting

NTPC will implement water conservation and artificial recharge structures by rain water harvesting wherever feasible. The actual design of the system will depend on various factors

including high content of clay particles, design of final layout, storm water drainage system and therefore need to be worked out during detailed engineering. The same shall be finalized at later stage during the finalization of technical specifications and detailed engineering.

### 1.15.3 Ash utilization Plan

It is estimated that ash production will be about 2.82 MTPA in proposed project. The potential areas of ash utilization are mine filling, cement & concrete, manufacturing of building products and road embankment construction etc.

### 1.15.4 Cost Provision for Environmental Measures

Environmental protection will be monitored and executed by Environmental Management Group (EMG). A cost provision ₹ 2016.5 crores towards environmental measures which includes pollution control, treatment and monitoring system etc.

## 1.16 Benefits of the Project

Commissioning of proposed 2x660 MW Thermal Power Project will improve the power supply position in the state of Odisha as well as in India, which is vital for economic growth as well as improving the quality of life. The project will generate direct and indirect employment opportunities as well as opportunities for self-employment. However, the direct opportunities for employment during operation phase are limited.

During construction phase, there will be opportunities for local skilled and unskilled workers to be employed through contractors/sub-contractors in the various construction related activities. Providing jobs to local persons on a preferential basis wherever feasible would be facilitated through these agencies.

The economic activity of the entire area will improve due to market multiplier effect. The project will create opportunities for indirect employment in nearby area due to increase in trade opportunities like stockist / retailers of building materials, groceries, provision shops, medical stores, garment shops, furniture shops, etc.

NTPC's Community Development activities, in focus areas of basic infrastructure development, education, community health & sanitation, capacity building and women empowerment etc. are based on specific local requirements, government directions and guided by Need Assessment Survey and consultation through various participative forums like Village Development Advisory Committee, Rehabilitation and Periphery Development Advisory Committee etc.

CSR activities proposed by NTPC will help improving basic infrastructure facilities and amenities such as village Roads, Street lighting, Potable Drinking Water Supply, Soak Pit Latrines and common Public Conveniences, Health, Primary and Secondary Schools/Colleges in the area. NTPC Ashalok hospital is contributing significantly to provide medical facilities to nearby populations as per NTPC policy. NTPC TTPS under ***"Swach Vidhalaya Abhiyaan"*** has made available about 900 toilets in schools as identified by GOI.

During last 5 years, various activities have undertaken under CSR-CD to improve socio-economic status and infrastructure of surrounding area. NTPC-TTPS continuing imparting skill training like Apprentice Training every year, further, development of skills of villagers through training has been planned. NTPC-TTPS continually imparting Training on Stitching & Tailoring, Soft Toy making, Beautician, Agriculture training like Flower cultivation, vegetable cultivation Training etc. to provide certain skill set for their livelihood.

**Glimpses of CSR & CD Activities by TTPS**

Water Pump House-Jagannathpur


Water supply through tankers in summers


Furniture to Schools

Medical camps in villages


Fogging and Anti Larva Spray


Infrastructure for Piped Water Supply

Construction of Toilets in School/College


Construction of School Buildings

Distribution of Sewing Machines to Ladies

Training to Self help Group Ladies

Scheme of Electrification around TTPS

Distribution of Tricycles

**Glimpses of Activities under Corporate Social responsibility and Community Development Programmes**

### 1.17 Disclosure of Consultants

EQMS is accredited EIA Consultant under a voluntary accreditation scheme of National Accreditation Board for Education & Training (NABET- a constituent board of the Quality Council of India (QCI)) for 14 Sectors including thermal power sector.