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1.0 PROJECT DESCRIPTION

NTPC Limited is the largest thermal power generating company of India. It was incorporated in the year 1975 as a public sector company to accelerate power development in the country as a wholly owned company of the Government of India.

In pursuit to achieve its target to eliminate energy and peaking shortages in the country, NTPC Ltd proposes to set up Mouda Super Thermal Power project (MSTPP) stage-II (2x660 MW).

1.1 Site and Surroundings

The plant site is located in Mouda tehsil, Nagpur district of Maharashtra, having latitude and longitude of 21°10' 50" N and 79° 23' 52"E respectively. It is bounded by villages Khumbari on North, Lapka & Mouda on South, Koradi on East & Rahli on West and is at a distance of approx. 4 kms. from Mouda town. Further, project site is located at a distance of about 8 kms. from Chacher railway station on Nagpur Kolkata Broad Gauge section of South Eastern Railway.

The Terms of Reference (TOR) for EIA report was accorded by MOEF Vide Letter dated 09/10/2009 for carrying out the EIA study.

The Environmental Impact Assessment (EIA) study is awarded to M/S Vimta Lab Ltd, Hyderabad. The baseline data will be generated for a period of one year. The draft EIA is prepared based on 3 months data that is from Feb 2010 to April 2010 Pre-Monsoon data.


1.2 Land Requirement

The Mouda STPP stage-II (2x660) MW of the project will be accommodated in the land acquired for stage-I. However an additional land 775 acres will be required for ash pond and pipe line corridor. There is no forest land present in the plant site. The proposed project would provide employment to a large number of personnel. The project also generates direct and indirect employment to a considerable number of personnel who will render their services to the project.

1.3 Water Availability and Requirement

The make up water for the plant is proposed to be drawn from the pondage to be created by Gosikhurd dam on river Wainganga, which is presently under construction by Govt. of Maharashtra. The approximately distance between the water drawal location and site is about 24 km.

The estimated requirement of make up water for the Mouda STPP Stage-II (2x660 MW) capacity would be 4800 m³/hr. Maharashtra Government has approved the reservation. of 100 mm³ water for the project from Goshikhurd Project.

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1.4 Fuel Availability & Requirement

Coal requirement for Mouda-II, STPP project is estimated as 7.85 million tonne/annum, considering average GCV of 3250 kcal/kg and 90 % PLF. Ministry of Coal, Government of India vide letter dated 09.03.2010 recommended to Coal India limited for issue of letter of assurance for coal commitment for Mouda STPP Stage-II. Coal is proposed to be transported from Coalfields through Indian Railways network. The coal quality considered in EIA is.as follows:

Ash	39-47 %
GCV (kcal/kg)	2600 - 3600
Sulphur(Max)	0.5 %

1.5 Transmission System

The power generated will be evacuated through a transmission system to be evolved and implemented by Power Grid Corporation of India Ltd.


1.6 Project Description

NTPC Ltd proposes a Super Thermal Power Project, Stage-II 2X660 MW, which is intended for faster implementation of power and other infrastructure projects in the Country. At present, land of about 775 acres is in the possession of NTPC Ltd. The estimated cost of the project is Rs. 81895 Millions, which includes Rs. 10787 Millions for environmental protection measures.

TABLE-1.1
SALIENT FEATURES OF PROPOSED POWER PLANT

Sr. No.	Features	Details of Power Plant
1	Capacity	1320 MW
2	Configuration	2 x 660 MW
3	Type of boilers and technology	Pulverized Coal and Super Critical
4	Power evacuation	Power generated at NTPC Ltd will be evacuated at switchyard of 400 kV
5	Fuel	Coal
6	Source of Coal	From the Mines of Coal India Limited
7	Coal Requirement	7.85 Million Tonnes Per Annum (MTPA)
8	Sulphur content	0.5%
9	Ash Content in Coal	39% - 47%
10	Ash generation	3.689 Million Tonnes Per Annum (MTPA)
11	Bottom Ash	0.737 Million Tonnes Per Annum (MTPA)
12	Fly Ash	2.951 Million Tonnes Per Annum (MTPA)
13	ESP efficiency	99.9%
14	Stack	One bi-Flue stack of 275 m height
15	Water Requirement for makeup	55 Cusecs

Source: Project Report

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2.0 DESCRIPTION OF THE ENVIRONMENT

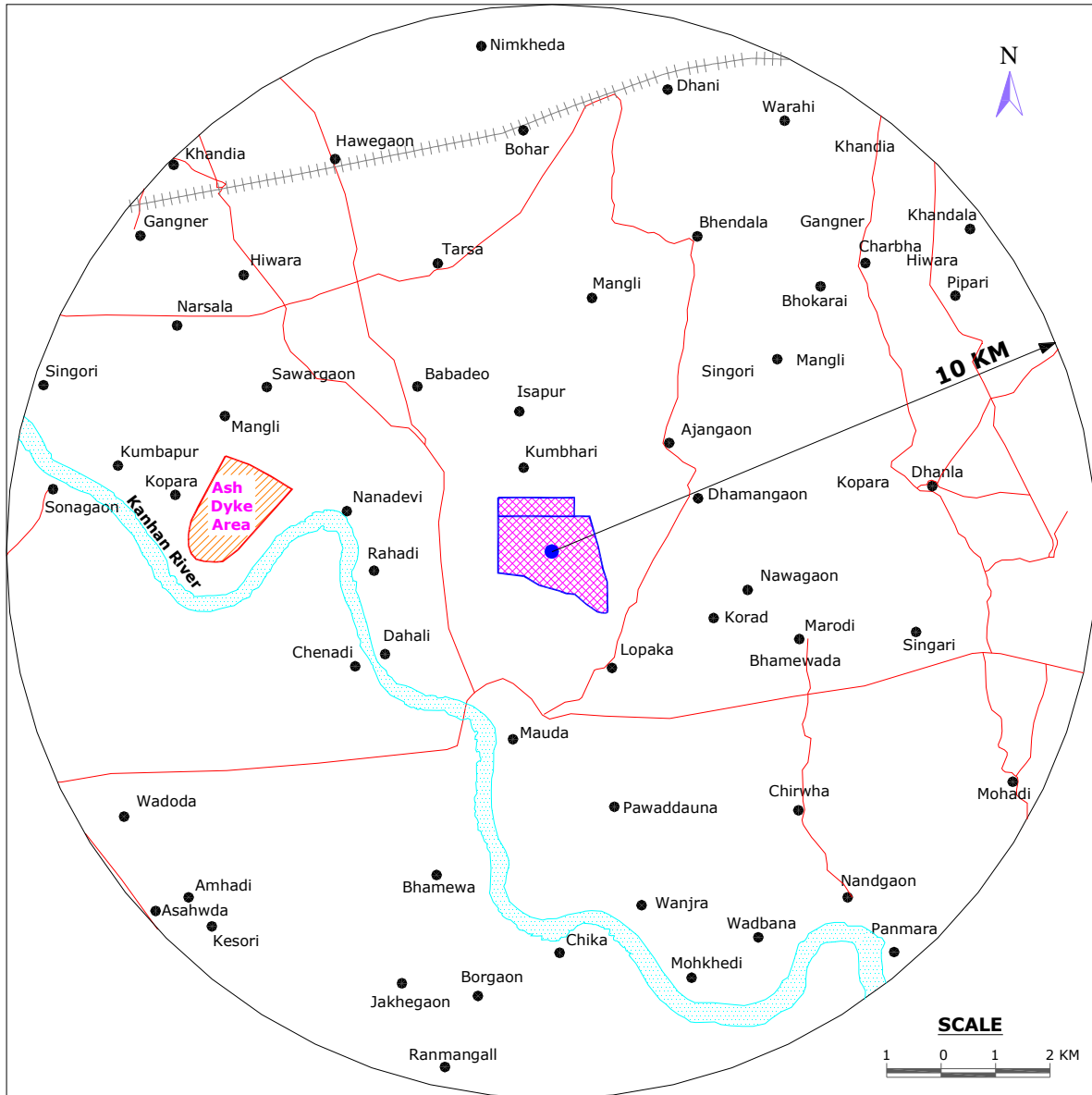
Location and Description of the Site

The terrain of the land in the plant site is plain with gentle slopes and no water streams present in the site area. The environmental setting of the proposed plant site is given in **Table-1.2**.






The study area map of 10 km radius is also given in **Figure-1.0**.

TABLE-1.2
ENVIRONMENTAL SETTING OF THE SITE


Sr. No.	Particulars	Details
1	Project Location	Mouda village and Taluka, Nagpur District, Maharashtra State
2	Plant Site Latitude	Latitude: 21° 11' 00" N
3	Plant site Longitude	Longitude: 79° 20' 42" E
4	Present land use at the site	Industrial within the existing plant
5	Villages in 1 km radius area	Nil
6	Nearest highway	NH-6 (5 km)
7	Nearest railway station	Chacher (8 km)
8	Nearest airport	Nagpur (42 km)
9	Nearest town/City	Mouda Town (4.0 km)
10	Hills/valleys	None in 10 km radius
11	Climatic conditions : Annual (IMD, Nagpur)	Annual Maximum Temperature: 42.8°C Annual Minimum Temperature: 12.7°C Annual total rainfall: 1127.3 mm Wind direction: NW, N and E
12	Climatic conditions : season (IMD, Nagpur)	Maximum Temperature: 39.7°C Minimum Temperature: 19.1 °C Summer total rainfall: 54.6 mm Wind direction: NW,N and WNW
13	Climatic conditions at site (monitored during study period)	Temperature : Maximum: 39.5 °C , Minimum: 26.2 °C Relative Humidity: Maximum : 58%, Minimum: 24% Rainfall: 57 mm Wind direction: NW and NNW
14	Topography	Plain
15	Archaeologically important places	None within 10 km radius
16	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
17	Reserved / Protected Forest	None within 10 km radius
18	Seismicity	Seismic Zone-II according to IS:1893-2002
19	Surface water bodies	Goshikhurd dam and Kanhan river
20	Defence Installations	None within 10 km radius
21	Industrial areas	Only small industries



LEGEND

-  Project Site
-  Highway / Road
-  Railway Line
-  Settlements
-  Nadi Nala

**FIGURE-1
STUDY AREA MAP (10 KM RADIUS)**

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2.1 Baseline Environmental Scenario

The baseline environmental status for various environmental attributes within the study area has been established through field monitoring supported by data from secondary sources. The environmental disciplines studied include land use, demography and socio-economics, geology, soils, hydrology, water use, water quality, meteorology air quality, terrestrial and aquatic ecology and noise.

2.1.1 Land Use

As per the Revenue Records of 2001 the area within the radius of 10 km from the proposed project site exhibited mixture of various land utilization activities. About 77.40% of the total area was under cultivation and about 0.17% was classified as forest. About 9.69% land was recorded as cultivable waste lands. Over the decade the forest cover has increased by 13.73%, whereas the total cultivated area has decreased by 2.84 %.

2.1.2 Demography and Socio Economics

In the study area total population in 1991 was 33518 with a density of about 195 per square kilometer against the district average of 332. The population density in the study area increased to 261.7 persons per square kilometer in 2001. The annual growth rate was about 4%. The literacy rate of the study area shows an increase of about 34% during the last decade (1991-2001). The study area is predominantly rural in character.

2.1.3 Soils


Soil samples were collected from 10 locations. Out of ten samples, four samples were collected from the ash pond area. The analysis of samples indicates that soils in the plant area are loamy, whereas in the ash pond area it is hard clay. The soils in general are neutral to alkaline and fertile.

2.1.4 Hydrology

The project site is more or less on flat land with mild mount and gradient towards West South and East. The Kanhan River drains the area in the West and South and a small rivulet, Sand Nadi, flows in the East.

2.1.5 Water Quality

Surface and ground water quality within the study area was established through monthly monitoring of physico-chemical and bacteriological characteristics at four locations were collected, three from the river Kanhan and remaining five from other ground water sources like tube wells and dug wells. The analysis indicate that the surface water quality of the river Kanhan and ground water at all sampling locations, is fairly good

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2.1.6 Meteorology

The climate of the area is hot, humid and tropical. Maximum and minimum temperatures recorded are 39.5⁰C and 26.2⁰C, respectively. Winds are gentle with moderate strengths. The data collected during the study indicate that the site meteorology is similar to that of climatic data.

2.1.7 Ambient Air Quality

Ambient air quality was conducted at four appropriate locations within the study area to know the status of various air pollutants like Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x). The results indicate that the concentration of SPM, RPM, SO₂, NO_x, O₃, and Hg in the area are well within the National Ambient Air Quality Standards for industrial area. The maximum value of each parameter are given below:

**TABLE-2.1
AMBIENT AIR QUALITY OF THE STUDY AREA**

Parameters	Min. of all Observations (ug/m ³)	Max. of all Observations (ug/m ³)	98% of all Observations (ug/m ³)	Standard
SPM	57.7	131.0	129.9	200
RPM	10.3	28.6	28.4	100
SO ₂	5.5	11.2	11.0	80
NO _x	5.7	11.7	11.6	80
O ₃	2.3	5.5	4.2	100
Hg	BDL	BDL	BDL	-


2.1.8 Ecology

The study area is devoid of forest vegetation and grass cover . Only scattered trees along with bunds and road side are recorded during survey . Shrubs and herbs have found in the barren land and along the kanhan river. As the dense vegetation is not there, the environment is not moderate for higher animals. Though aquatic ecosystem has some plant life along the bank of kanhan river there is no any important aquatic life except some fishes reported i.e *Catla catla* and *Cirrhinus mrigala* .etc.

No rare and endangered species of fauna and flora have been reported in the study area. There is no National park and wild life sanctuary within 25 km radius area.

2.1.9 Noise

Ambient noise levels were measured at ten locations around the project site. The equivalent noise levels vary between 40.9 to 56.1 dB(A) at all monitoring location. The L.day varies from 50.2 to 56.1 dB(A). The L.night varies from 40.9 to 47.6 dB(A).

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3.0 ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

3.1 Land Use

Land to the tune of about 750 acres which will be acquired would be converted from its existing land use to industrial use. The construction activities attract a sizeable population and influx of population is likely to be associated with construction of temporary hutment for construction work force. However, this will be only a temporary change and shall be restricted to construction period.

Development activity also induces changes in land use pattern of the adjoining areas because of the increased availability of infrastructural facilities, increase in commercial value/ potential of land etc.

3.2 Water Use

The Project will abstract its entire water requirement from the pondage to be created by Gosikhurd dam on river Wainganga. Therefore, no impact on water use is envisaged.

3.3 Demography and Socio Economics

Migration of workforce to project site and increase in floating population may create strain on civic. amenities like road, transport, communication, drinking water, sanitation and other facilities to meet the work force requirement. However, such impacts will be temporary and restricted to the period of construction only.

Commissioning of power plant will result in considerable growth of service sector and will also generate new industrial and business opportunities in the area.

Land acquisition will involve rehabilitation issue since most of the land is privately owned. A detailed study of Project affected Persons will be undertaken to prepare a suitable R & R plan based on National R&R Policy and NTPC Ltd R&R policy. The R&R Plan will be made and implemented in consultation with state govt.

3.4 Air Quality

Prediction of short term impacts on air quality due to stack emissions has been carried out using Industrial Source Complex [ISC3] 1993 simulation model, developed by United States Environmental Protection Agency [USEPA]. The model simulations deal with three major pollutants viz., Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x) and Suspended Particulate Matter (SPM) emitted from the stack.

The maximum predicted incremental ground level concentrations (GLCs) for SPM, SO₂ and NO_x, due to operation of proposed project are 1.2, 27.2 and 23.4 µg/m³ respectively (Table 3.4). The maximum GLCs for SO₂ and NO_x. after implementation of project are estimated to be within the ambient air quality standards for industrial and mixed use areas.


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TABLE-3.4
RESULTANT MAXIMUM GROUND LEVEL CONCENTRATION AFTER
IMPLEMENTATION OF PROJECT

Pollutant	AAQ concentration recorded during the study ($\mu\text{g}/\text{m}^3$)	Incremental concentration due to Project ($\mu\text{g}/\text{m}^3$)	Resultant concentration ($\mu\text{g}/\text{m}^3$)
SO ₂	11.2	27.2	38.4
NOx	11.7	23.4	35.1
SPM	131.0	1.2	132.2

1. High efficiency ESPs to limit SPM emission to below 100 mg/Nm³.
2. Two tall stacks of 275 m height for wider dispersal of pollutants, resulting in lower ground level concentrations.
3. Space provision for retrofitting Flue Gas Desulphurisation (FGD) system, if required in future.
4. Installation of dust suppression and extraction system at coal handling area to control fugitive dust.
5. Greenbelt of 100 metres width all around the power plant.
6. Water spraying at all dust generation areas viz. The coal and ash handling areas.


3.5 Soils

The impacts on soil during construction phase shall be mainly due to loss of topsoil in the construction areas and contamination of the soils of surrounding area due to construction materials such as cement, sand, oils, etc. However, it shall be temporary and shall be confined to the areas of construction only. Conservation measures would minimize such local impacts.

3.6 Water Quality

Flow of loose materials (soil and construction material) into the drain, especially during monsoons will result in higher turbidity and suspended solids. However, as the site development activities and construction activities will be limited to construction areas only, such impacts will be minimal. Adequate arrangement would be made to ensure proper drainage and disposal of the wastewater; so that water does not stagnate in the form of pools. The run off water will be directed to a sedimentation basin before discharge. Hence no increase in the suspended solid content of the water regime is expected.

High Concentration Slurry Disposal (HCSD) system for fly ash system and ash water recirculation system for the bottom ash shall reduce the quantity of effluent. Effluents from various sources after appropriate treatments will be led to Central Monitoring Basin (CMB) where regular check of its quality will be carried out. Treated effluents, meeting the limits specified for thermal power plants under Water Act and Environmental (Protection) Rules 1986, are proposed to be discharged from CMB.

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The ash pond leachates are generally alkaline and, therefore, heavy metals are not likely to leach from the ash and, therefore contamination of ground water is unlikely.

3.7 Noise

The major sources of noise during the construction phase are vehicular traffic and construction equipment, which generate noise ranging between 75-90 dB(A). The predicted noise level due to operation of such equipment at a distance of 1600 m (far field) from the source is 35 dB(A). As the ambient noise levels are higher than the predicted noise levels, due to the masking effects, no increase in the ambient noise level during the construction phase is envisaged.

The likely noise levels from the proposed project would be of the order of 90 dB(A). The noise levels predicted at the plant boundary which is at a distance of Approx. 1500 m from the main source is of the order of 38.0 dB(A) during the operation of the plant. Due to the masking effect, the ambient noise level in the nearby villages will not increase during the operation of the plant. Hence, there would not be any adverse impact due to the operation of the plant on the residents in the nearby villages.

3.8 Terrestrial Ecology

During construction phase, deposition of fugitive dust on pubescent leaves of nearby vegetation may lead to temporary reduction of photosynthesis. Such impacts would, however, be confined mostly to the initial periods of the construction phase and would be minimized through water sprinkling. During operation phase, since the predicted ground level concentration of pollutant in ambient air is well within the Indian Standards for Ambient Air Quality. The Impact on the surrounding agricultural field and trees will be insignificant.


3.9 Aquatic Ecology

Larger organism tend to get entrapped and impinged in the intake system. However, this will be minimized by providing suitable structures at the intake location. Smaller organisms as phytoplankton, zooplankton is entrainable and subject to entrainment in the treatment system. The entrapped organisms would be subjected to a combination of physico-chemical and mechanical stresses, leading to their destruction.

There would not be any tangible change in the water quality of the receiving water due to the wastewater discharges from the plant operation. As such, it may be concluded that no adverse effects on the existing aquatic biota are envisaged due to the discharges from the project during operation.

3.10 Green Belt Development Plan

Provision of 100 meter width green belt around main plant area has been kept in the layout for green. belt development. In addition, extensive plantation will be undertaken in and around the project site.

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3.11 Potentiality of Ash Utilization

The main areas of ash utilisation are manufacturing of fly ash based products (portland·pozzolana cement, brick, light weight aggregates, asbestos cement products, cement concrete etc.) and use in land fills, structural fill etc. for development of land. NTPC Ltd will take all possible actions to utilize the ash in above mentioned areas. Provisions such as facilities for 100% extraction of dry fly ash, segregation of coarse and fine ash and fly ash storage and loading facilities; providing infrastructural facilities to the entrepreneurs, etc will encourage utilization of ash based products in the area.


4.0 ENVIRONMENTAL MONITORING PLAN

The post operational environmental monitoring programme has been formulated.

5.0 ENVIRONMENTAL MONITORING PROGRAMME

Post project environmental monitoring is important in terms of evaluating the performance of pollution control equipments installed in the project. The sampling and analysis of the environmental attributes will be as per the guidelines of CPCB/MSPCB. Following attributes will be covered in the post project environmental monitoring in and around the project site:

- Ambient air quality monitoring on bi-weekly, 24 hours basis in the plant area and in the surrounding villages with respect to SPM, RSPM, SO₂, NO_x and CO;
- Source emissions will be monitored on monthly basis. Automatic continuous online monitoring system shall be installed in the stacks;
- Water quality monitoring at intake point, surface water bodies and ground water in the surrounding villages. Further, the wells around the ash pond area will be identified and monitored on the monthly basis;
- Treated wastewater before routing to clarifier will be analyzed on fortnightly basis. The pH, temperature, electric conductivity, TDS and flow will be monitored regularly;
- The noise levels will be recorded in and around plant. The noise levels at boundary of the plant will be recorded on monthly basis;
- The soil quality around ash pond area will be monitored on six monthly basis for the fertility of the soil;
- All the results will be compiled and thoroughly analyzed to assess the performance of the power plant; and
- The results will be reported on regular basis to the Maharashtra State Pollution Control Board and regional office of MoEF.

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6.0 ENVIRONMENT MANAGEMENT PLAN

During operation phase, the impacts on the various environmental attributes should be mitigated using appropriate pollution control equipment. The Environment Management Plan prepared for the proposed project aims at minimizing the pollution at source.

✓ Air Pollution Management

Fugitive and stack emissions from the power plant will contribute to increase in concentrations of SPM, SO₂ and NO_x pollutants. The mitigative measures proposed in the plant are:

- Installation of ESP's of 99.9% efficiency to limit the SPM concentrations below 100 mg/Nm³;
- Provision of 275 m high stack for wider dispersion of gaseous emissions;
- Providing low NO_x burners to reduce the NO_x emissions;
- Dust extraction system will be provided at transfer points of conveyor system;
- Conveyor belt will be closed to prevent dust generation;
- Provision of water sprinkling system at material handling and storage yard;
- The ash will be transported by closed bulkers;
- Asphaltting of the roads within the plant area;
- Development of Greenbelt around the plant to arrest the fugitive emissions.

✓ Water Pollution Management

Wastewater will be generated from cooling towers from the power plant. Additionally, domestic wastewater from canteen and employees wash area will also be generated. The cooling tower blow down water will be discharged into the river.


The measures proposed to minimise the impacts are:

- Provision of sewage treatment plant to treat domestic sewage from plant and township;
- Utilization of treated domestic wastewater for greenbelt development;
- Provision of separate storm water system to collect and store run-off water during rainy season and utilization of the same in the process to reduce the water requirement; and
- Suitable rainwater harvesting structures to be constructed.

Noise Pollution Management

In the process, various equipments like pumps, cooling tower, compressors etc generate noise. The proposed means to mitigate higher noise levels are:

- Equipment will conform to noise levels prescribed by regulatory authorities;
- Provision of acoustic enclosures to noise generating equipments like pumps;

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- Provision of thick greenbelt to attenuate the noise levels; and
- Provision of earplugs to the workers working in high noise level area.

Solid Waste Management

The main solid waste from the proposed power plant will be ash (fly ash and bottom ash). The average coal consumption rate for the power project will be 7.85 MTPA, which will result in ash generation of about 3.689 MTPA. Out of this, the bottom ash will be about 20% of the total ash generated i.e. 0.737 MTPA and the fly ash will be about 2.951 MTPA. It is proposed to utilize 100% of the fly ash generated. Several major cement factories in South India have expressed their willingness to take the entire production of fly ash for their in-house consumption. During emergency the ash will be disposed off safely in ash pond area to avoid environmental hazards. All efforts, however, will be made to utilize fly ash for various purposes. Unused fly ash and bottom ash will be disposed off in the ash dyke in an area of about 222.67 ha. To control fugitive dust emission from the ash pond area water sprinkling would be done. After the ash pond is abandoned, its area will be reclaimed through tree plantation. HDPE liners will be provided in the ash pond in order to arrest any seepage of ash pond water into groundwater.

7.0 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

The risk analysis for fuel storages such as LDO & HFO have been carried out. The possibility of any risks due to fire will be confined to the plant premises only. There will not be any community risks. Suitable disaster management plan has been prepared.


8.0 PROJECT BENEFITS

The proposed project by NTPC Ltd would enable to meet part of the growing power demand due to rapid industrialization and also due to large scale use of electricity for irrigation, domestic and commercial purposes. Further, the proposed power plant will result in improvement of infrastructure as well upliftment of social structure in the area. It is anticipated that the proposed power plant will provide benefits for the locals in two phases i.e. during construction phase as well as during operational stage.

The major benefit due to the proposed project will be in the sphere of generating temporary employment for substantial number of personnel. The construction phase of power plant is expected to span over 51 months. Approximately 2000 persons would be required for the construction work, most of whom would be unskilled workers, although the power plant construction needs a large number of skilled personnel as well. These construction workers shall be taken from the study area to the extent possible. Hence, the proposed project will benefit locals to some extent.

9.0 CONCLUSIONS

The proposed power plant has certain level of marginal impacts on the local environment. However, development of this project has certain beneficial

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impact/effects in terms of bridging the electrical power demand and supply gap and providing employment opportunities that will be created during the course of its setting up and as well as during the operational phase of the project.

In addition to the direct employment mentioned above, there will be indirect employment of local people by utilizing their expertise in different areas like horticulture, site clearing (for power plant construction), etc. Also, due to secondary development in the study area, employment opportunities will be generated. About 1000 people are expected to get indirect employment.

The proposed power project will have marginal impacts on the local environment. However, with the implementation of the proposed pollution control and environment management measures, even the minor impacts anticipated due to construction and operation of the proposed power plant will be mitigated.