ENVIRONMENTAL IMPACT ASSESSMENT

FOR

Expansion by addition of 2 x 660 MW Hasdeo TPP, Korba West Supercritical Units at Korba, District Korba (Chhattisgarh) by M/s Chhattisgarh State Power Generation Co. Ltd. (CSPGCL)

EXECUTIVE SUMMARY

Environmental Consultant:

Vimta
Driven by Quality. Inspired by Science.

NABET NABL
(Approved Consultant)

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(QCI/ NABET Accredited EIA Consultant Organization.
Sr.No.145 as on 5th January 2022
NABL Accredited & ISO 17025 Certified and MoEF&CC Recognized Laboratory)

Project Proponent:

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CSPGCL

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August, 2023

1.0 EXECUTIVE SUMMARY

The development of the power sector plays a vital role in the economic growth and Human development of any country. Electricity demand in the country has increased rapidly and is expected to rise further in the years to come. In order to meet the increasing demand for electricity in the country, massive addition to the installed generating capacity is required for efficient and effective Production of Goods and Services.

Chhattisgarh State Power Generation Company Limited (CSPGCL), a Govt. of Chhattisgarh Undertaking, commissioned 4x210 MW & 1x500 MW Hasdeo Thermal Power Plant together with all other infrastructures at Darri village in Korba district of Chhattisgarh in three stages i.e. Stage-I, Stage-II & Stage-III respectively using coal from Kusmunda coal mine of Coal India's South Eastern Coal Field Limited (SECL).

CSPGCL now has proposed to set up two (2) units of 660 MW capacity each within the premises of existing Plant and surrounding land based on Super Critical Technology in the proposed space considered for the proposed 2x660 MW units.

1.1 Purpose of the Report

As per Environmental Impact Assessment (EIA) Notification dated 14th September, 2006, commissioning or operation of thermal power plants (≥500 MW) falls under category 'A' under project type-1(D) and requires prior Environmental Clearance (EC) to be obtained from MoEF&CC before the commencement of ground activity.

In line with the aforesaid notification, TOR online application (Form-1 & Pre-feasibility report) for Environmental Clearance (EC) was filed to MOEF&CC vide proposal no. IA/CG/THE/417530/2023 dated 09.02.2023.TOR for EIA Study for expansion by addition of 2 x 660 MW based on Super-Critical Technology was accorded by MoEF&CC vide letter No J-13012/24/2004-IA.II (T) dated 24.04.2023.

Environmental Impact Assessment (EIA) report addresses the environmental impacts of the proposed expansion project and the mitigation measures. This report is prepared, based on the TOR conditions received from MoEF&CC. Copies of the TOR letter No J-13012/24/2004-IA.II(T) dated 24.04.2023 and their compliance to the conditions is enclosed as **Annexure-I & Annexure-IA** of EIA/EMP report respectively.

Vimta Labs Limited, Hyderabad, an accredited agency with Quality Council of India (QCI) / National Accreditation Board of Education and Training (NABET) vide registered no. NABET/EIA/1922/RA0226 dated 22.08.2023 is assigned to undertake Environmental Impact Assessment (EIA) study and preparation of Environment Management Plan (EMP) on various environmental components, which may be affected due to the impacts arising out of the proposed expansion of thermal power plant. The Comprehensive EIA Report was prepared by M/s Vimta Labs Ltd based on data generated from March 2023 to May 2023.

1.2 Environmental Setting

The project site is located within the Hasdeo Thermal Power Station Plant site at Darri village, Katghora Tehsil, Korba District, Chhattisgarh State.

The project site is located in Chhattisgarh state. 40 villages are falling from Korba district of Chhattisgarh in the 10 km study area.

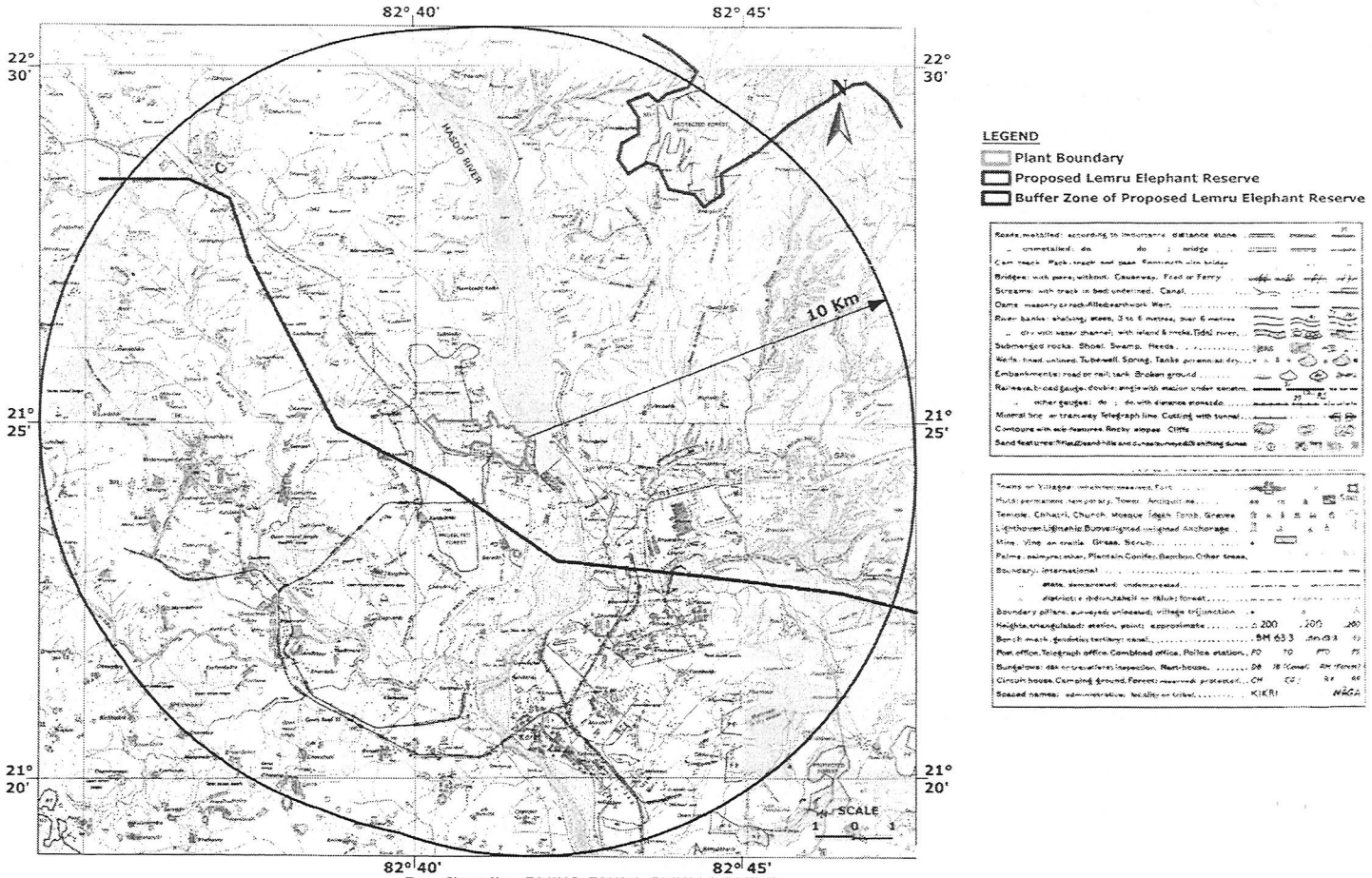
The proposed main plant is located at the coordinates 22°24'38.5" N to 83°41'39" E. The coordinates of ash pond are at 22°27'28.47" N to 82°40'8.76" E.

The main plant, township, ash pond and other areas for proposed addition of 2x660 MW shall be accommodated in the land acquired for HTPS Korba West The additional land requirement for the proposed expansion is about 70.73 ha. The undisturbed area of 67.61 ha at HTPS will be utilized for the proposed expansion and 3.12 ha land of Irrigation colony of Govt. of Chhattisgarh (GoCG) adjacent to the plant boundary will be acquired.

The topography of the project site is undulating. Elevation of the proposed thermal power plant ranges from 292 m to 316 m above Mean Sea Level (MSL) and the general slope is towards North to North East. The site involves 111.761 ha of forest land for which Stage-II forest clearance has been accorded by MOEF&CC. The nearest villages from the project site are Darri (Adj,S) and Jamnipalli (1.2 km, WNW).

The nearest national highway is NH-149B which is adjacent in direction of S. The nearest railway station is Korba railway station at a distance of 7.7 km in SSE direction. The nearest airport is Swami Vivekananda Airport which is about 240 km in South West direction.

The nearest reserve forests from the project site are Ajgarbahar PF (7.6 km, NE) and PF near Kharmora village (8.0 km, SE). The nearest water bodies from the project site are Hasdeo River (0.2 km, E), Darri Dam (0.2 km, SSE) & Belgari Nallah (1.5 km, SE). There is no national park, no wildlife sanctuary located within 10 km of radius of plant site. However, Lemru Elephant Reserve is located at about 7.6 km in NE direction. The study area showing 10 km radius are shown in **Figure-1.1.**



Topo Sheet Nos. F44K10, F44K11, F44K14 & F44K15
(64 J/10, 64 J/11, 64 J/14 & 64 J/15)

FIGURE-1.1
STUDY AREA MAP (10 KM RADIUS)

1.3 Brief Description of Project

1.3.1 Nature of the Project

HTPS Korba West (2 x 660 MW) will be a coal based thermal power project based on super critical boiler parameters. The proposal involves construction and operation of two units of 660 MW each. The main components of the project include:

- Steam generator, turbine generator and auxiliary units;
- Coal handling system including dust extraction and suppression system;
- Water cooled condenser system;
- Water & effluent treatment system;
- Fire protection system;
- Air conditioning & ventilation system;
- Electrostatic precipitators, NOx control and Flue Gas Desulphurization (FGD) system;
- Chimney;
- Limestone and gypsum storage and disposal facilities;
- Ash handling system with dry ash extraction and wet mix system, storage and disposal facilities; and
- Electrical systems: Generator bus duct, transformers, switchgears, switch yard etc.

1.4 Salient Features

The salient features of the proposed expansion of HTPS Korba West is given in **Table-1.1**

TABLE-1.1
SALIENT FEATURES OF PROPOSED EXPANSION OF STPP

Sr. No.	Particulars	Details
1	Stage- I Stage- II Stage-III Stage-IV	2 x 210 MW (In operation) 2 x 210 MW (In operation) 1 X 500 MW (In Operation) 2 x 660 MW (Proposed)
2	Project Expansion Cost in Crores	12914.6
2	Technology	Super critical
3	Total area of the plant	The total area of the Plant is 529.64 ha out of which the land Required for Expansion is about 70.73 ha (67.61 ha is available within existing premises + 3.12 Ha land of Irrigation Colony of GoCG adjacent to the plant boundary shall be acquired.
4	Fuel	Coal
A	Source of fuel	The Standing linkage committee of MoP has recommended to grant Long term coal linkage vide MoM dtd 09.06.2023.
B	Fuel transportation	LDCC (Long Distance Coal Conveyor)
C	Average fuel requirement (Coal)	6.50 MTPA with 85 % PLF (Design Coal)

D	Average calorific value range	3300 kcal/kg (Design Coal)
E	Ash content	45 - 47 %(Max)
F	Sulphur content	0.51%
5	**Ash generation** Fly ash Bottom ash	 196.78 TPH 54.66 TPH
6	Water requirement	Raw water requirement is 28 MCM (3200 Cu.M/hr)
A	Source of water	Hasdeo barrage.
B	Cooling system	Semi-open recirculating condenser cooling system with wet-type natural draft cooling tower.
7	Power evacuation	Power generated from the proposed 2x660 MW units would be evacuated at 400 kV level through new/ existing lines.
8	Coal Handling System	Coal crushers, Stacker cum reclaimers and associated conveying system. Suitable interconnection with existing coal handling system will be kept to meet emergency requirement of the proposed units.
9	Ash Disposal System	For Bottom Ash - Extraction in wet form and disposal to ash pond through lean slurry mode. At the starting phase existing ash dyke for 4 x 210 MW shall be used, However to cater future requirement 133 ha land shall be identified and acquired to make starter dyke as per MoEF&CC Guideline (i.e 0.1 ha / MW) Fly Ash - dry extraction would be adopted for gainful utilisation. Provision for disposal by High Concentration Slurry Disposal (HCSD) mode to the ash disposal area shall also be kept to operate during exigency.
10	Ash Transportation	It is envisaged to transport Fly ash through railway wagon by installing Rapid Loading System (RLS)
11	Discharge	Zero Liquid Discharge
12	Fire fighting system	Adequate firefighting systems as per Tariff Advisory Committee (TAC) and OISD guidelines will be provided

Source: CSPGCL

1.5 Resource Requirement

- *Land Requirement*

The land acquired for the project shall be mainly used for establishing main power house complex. Greenbelt will be developed wherever the vacant place is available. In addition, large scale afforestation and plantation activities shall be undertaken in and around main plant and township areas in all available spaces.

The total land requirement for the proposed expansion is about 70.73 ha. The available area of 67.61 ha at HTPS Korba West will be utilized for the proposed expansion. 3.12 Ha land of Irrigation Colony of GoCG adjacent to the plant boundary shall be acquired.

- *Water Requirement & its Source*

  Make up water requirement for this project would be about 3200 m^3/hr. The source of water for the project is from Hasdeo barrage on Hasdeo river at a distance of about 0.2 km from the plant site.

- Coal

  The coal requirement for the proposed expansion of 2 x 660 MW power plant shall be about 6.5 MTPA at 85 % PLF. The coal requirement shall be met from Kusmunda coal mines allotted to SECL. Mode of coal transportation from the coal mines to the power plant is by LDCC.

- *Manpower Requirement*

  The project will generate direct and indirect employment opportunities as well as opportunities for self-employment. Power projects have mechanized and automated plants. The no. of CSPGCL employees during construction and operation phases are 50 and 1213 respectively. employment opportunities in subsidiary industries and service sectors as well as self-employment opportunities shall also be generated. The employment power from the existing 4 x 210 MW will be diverted to the proposed 2 x 660 MW post demolition of the existing plant.

- *Power Requirement & Source*

  The requirement of the construction power supply for the project would be met from the CSPGCL HTPS existing Plant or from CSPDCL. Power generated from the proposed 2x660 MW units would be evacuated at 400 kV level through new/ existing lines. For this, the new 400 kV switchyard will be constructed to accommodate the following bays required for proposed units' Power evacuation. Two nos of 400 kV circuits for Generator Transformers, Two nos of 400 kV circuits for Station Transformers, Three nos of 400 kV circuits for outgoing lines to nearest grid S/S and One no of 400 kV circuit for bus reactor.

1.6 Process Description

In a thermal power plant, the chemical energy of the fuel (coal) is first converted into thermal energy (during combustion), which is then converted into mechanical energy (through a turbine) and finally into electrical energy (through a generator). It has the following steps:

- The coal is transferred from the coal handling plant by conveyor belt to the coal bunkers, from where it is fed to the pulverizing mills, which grind it to fine powder. The finely powdered coal, mixed with air is then blown into the boiler by a fan where it burns like a gas;
- The process of combustion releases thermal energy from coal. The boiler walls are lined with boiler tubes containing high quality de-mineralized water (known as boiler feed water). The combustion heat is absorbed by the boiler tubes and the heat converts the boiler feed water into steam at high pressure and temperature. The steam, discharged through nozzles on the turbine blades, makes the turbine

to rotate, which in turn rotates the generator coupled to the end of the turbine. Rotation of generator produces electricity, which is passed to the step-up transformer to increase its voltage so that it can be transmitted efficiently. The power is evacuated via switchyard through a transmission system;

- During combustion, the non-combustible part of coal is converted into ash. A small part of ash (about 20%) binds together to form lumps, which fall into the ash pits at the bottom of the furnace. This part of ash, known as bottom ash is water quenched, ground and then conveyed to pits for subsequent disposal to ash disposal area or sale;
- Major part of the ash (about 80%) is in fine powder form, known as fly ash, and is carried out of the boiler along with the flue gas. The flue gas, after heat recovery, is passed through the electrostatic precipitators, where the ash is trapped by electrodes charged with high voltage electricity;
- The flue gases exiting from the Electrostatic Precipitators (ESPs) shall be treated in Flue Gas De-sulphurisation (FGD) system and discharged through a tall chimney for wider dispersal of remaining ash particles and gases. The ash collected in the ESP hoppers is extracted in dry form and conveyed to dry ash storage silos from where it is supplied to user industries;
- Any unused part of fly ash is mixed with water and conveyed to ash disposal area in a slurry form; and
- The steam, after passing through the turbines, is condensed back into water in Water Cooled condensers and the same is re-used as a boiler feed water for making steam.

1.7 Baseline Environmental Status

The baseline data monitoring studies have been carried out for three months from 1st March 2023 to 31st May 2023, covering pre-monsoon season.

The project site is located in Chhattisgarh state. Hence, the baseline monitoring locations for ambient air quality, noise, soil and ecology are covered in state of Chhattisgarh. The following villages considered for Baseline monitoring are Sonpuri, Darri, Kohariya, Khatakhatipura, Barampur, Dagnikhar, Semipalli, Tihli, Chorbathi.

1.7.1 Meteorology

The meteorological parameters were recorded on hourly basis during the study period and comprises of parameters like wind speed, wind direction (from 0 to 360 degrees), temperature, relative humidity, atmospheric pressure, rainfall and cloud cover. The meteorological parameters have been recorded and are presented in **Table-1.2**.

TABLE-1.2
SUMMARY OF THE METEOROLOGICAL DATA GENERATED AT SITE

Month	Temperature (°C)		Relative Humidity (%)		Rainfall (mm)
	Max	Min	Max	Min	
Pre-Monsoon Season (1st March 2023 to 31st May 2023)					
March 2023	36.2	18.3	49	33	17.6
April 2023	42.1	20.9	59	32.1	10.9
May 2023	43.7	21.3	61	39	19.1
Range	**18.3 – 43.7**		**32.1 – 61.0**		**47.6**

1.7.2 Ambient Air Quality

Ten ambient air quality locations were monitored in and around project site.

Observations of AAQ Data (1st March 2023 to 31st May 2023)

Pre-Monsoon Season

The minimum and maximum concentrations for PM_{10} were recorded as 21.0 µg/m^3 and 77.20 µg/m^3. The minimum and maximum concentrations for $PM_{2.5}$ were recorded as 16.0 µg/m^3 and 49.10 µg/m^3.

The minimum and maximum SO_2 concentrations were recorded as 10.1 µg/m^3 and 29.5 µg/m^3. The minimum and maximum NO_2 concentrations were recorded as 12.0 µg/m^3 and 35.5 µg/m^3.

The minimum and maximum CO concentrations were recorded as 250 µg/m^3 and 965 µg/m^3. The minimum and maximum O_3 concentrations were recorded as 5.6 µg/m^3 and 18.8 µg/m^3.

1.7.3 Land Use

As per satellite imagery, the built-up land is 23.7 %, forest land occupies 5.4 %, agricultural land is about 37.2 %, water body is 11.6 % and remaining wastelands comprises about 22.1%.

1.7.4 Soil Characteristics

Pre-Monsoon Season

The pH of the soil in the study area ranged from 6.54 to 7.53. The electrical conductivity was observed to be in the range of 125.0 µs/cm to 254.0 µs/cm. The nitrogen values range between 48.38 to 97.61 kg/ha. The phosphorus values range between 46.51 to 115.61 kg/ha. The potassium values range between 507.05 to 763.89 kg/ha. The chlorides were found to be in the range of 84.97 to 169.95 mg/kg of soil.

1.7.5 Water Quality

The baseline water quality status in the region is established by analysing samples at 23 locations consisting of 17 ground water samples and 6 surface water samples. The ground and surface water samples were analysed and found that ground water quality is well within the drinking water quality limits.

Ground Water Quality

The analysis results of ground water samples showed the pH in range of 6.28 to 8.14. Colour of the samples ranged from 1-3 Hazen. Electrical conductivity of the samples ranged from 150 - 1327 µS/cm. The Total Dissolved Solids of the samples ranged from 92 to 871 mg/l. Calcium concentrations ranged from 10.0 to 88.0 mg/l. Magnesium concentrations ranged from 6.08 – 29.16 mg/l. The Total Hardness of the samples ranged from 55 - 305 mg/l.

Surface Water Quality

The analysis results of surface water samples indicate that the pH value was observed to be 7.18 to 7.35. Electrical conductivity of surface water samples was observed to be 127 to 305 µS/cm.

The total dissolved solids were observed about 78 to 194 mg/l. Total hardness was observed in the range of 70 to 105 mg/l. Sulphates were found to be in the range of 5.22 to 19.80 mg/l and Nitrates were found to be in the range of 0.82 to 2.90 mg/l which are within the prescribed limits only. Fluoride concentration was found to be 0.41 to 1.68 mg/l at all the locations.

1.7.6 Noise Levels

The day time noise levels are ranged from 46.8 – 66.8 dB (A). The night time noise levels are ranged from 31.7 – 51.7 dB (A).

1.7.7 Flora and Fauna

The fauna in the buffer zone is confined in the respective schedules of the Wildlife (Protection) Act, 1972 such as Schedule –II, III, IV and V. Due to anthropogenic interventions and mining interests in the district, green cover and conservation areas are fragmented.

Two numbers of Schedule I species (Asian Elephant and Indian Pangolin) as per The Wildlife (Protection) Act, 1972 are observed. The fauna of buffer zone is much more diversified. Cattles, goats, buffaloes, cows, bullocks, pigs etc. are the common domesticated animals in the buffer zone.

1.8 Anticipated Environmental Impacts and Mitigation Measures

1.8.1 Impact on Land Use

The land selected for proposed expansion of power plant project is majorly within the premises of HTPS Korba West, which is categorized as industrial area. The additional land requirement for the proposed expansion is about 70.73 ha. The undisturbed area of 67.61 ha at HTPS will be utilized for the proposed expansion and 3.12 ha land of Irrigation colony of GoCG adjacent to the plant boundary will be acquired.

There is no additional ash pond proposed for expansion project. The ash pond for stage-II and III will be used for the proposed expansion. The present land use of the area falls under industrial category. The project site will not be having any adverse impact on the surrounding land use during the operation period.

1.8.2 Impact on Soil

The impact on soil during operation of the project could result due to deposition of residual particulate matter and gaseous emissions on the soil. The soil within the deposition zone of pollutants may undergo physico-chemical changes due to deposition of PM (ash particles) and washout of gases (SO_2 and NO_2) during the rains. The impacts on soil due to operation of the power plant and gaseous emission are likely to be negligible as the incremental concentration of particulate matter (PM), SO_2 & NO_2 levels are observed within limit.

1.8.3 Impact on Air Quality

The major air pollutants from a power project are Particulate Matter (PM), SO_2, NO_2 and CO which are emitted continuously from the stacks (point sources), attached with coal combustion boilers. The fugitive emissions of coal dust are also contributed by coal handling activities at storage yard, wind erosion, spillages from conveyor system, pulverization etc.

Prediction of impacts on air environment has been carried out employing mathematical model based on a steady state Gaussian plume dispersion model. The incremental concentrations of the proposed project are super imposed on the maximum baseline data to arrive at resultant concentrations during operational phase of the proposed project.

The incremental concentrations when superimposed over the existing maximum baseline concentrations, the resultant concentrations are observed to be within the permissible levels for residential/rural conditions. The resultant GLC's during Pre-Monsoon season from March 2023-May 2023 for parameters PM_{10}, SO_2 & NO_x are observed to be 78.09 $\mu g/m^3$, 31.25 $\mu g/m^3$ & 37.25 $\mu g/m^3$ during the worst-case scenario of all units (2 x 660 MW; 1 X 500 MW; 4 X 210 MW) operating simultaneously.

The mitigative measures recommended for control of air pollution in the plant are:

- Installation of ESP of efficiency more than 99.90% to limit the particulate matter (PM) concentrations below 30 mg/Nm^3;
- Installation of flue gas de-sulfurization (FGD) system;
- Combustion control for NO_x (Low NO_x burner);
- Provision of twin/single flue stack of 125 m height for wider dispersion of gaseous emissions;
- Online flue gas monitors as well as flue gas flow rates and temperature measurement shall be provided for all stacks;
- Dust suppression and extraction system in coal handling plant;
- Provision of water sprinkling system at raw material storage yard; and
- Asphalting of the roads within the plant area.

1.8.4 Impact on Water Resources

➢ *Water Resources*

Make up water requirement for this project would be about 3200 m^3/hr. HTPS Korba West will abstract its entire water requirement from the Hasdeo Barrage being created on river Hasdeo by Government of Chhattisgarh.

DM plant discharge shall be treated in neutralization pit to adjust pH prior to using in ash handling unit. Since there will be no effluent discharge from proposed project, the impact on water quality of surrounding water bodies will be insignificant.

➢ *Impact on Ground Water*

As no ground water is proposed to be used for plant during operation phase, there will be no impact on availability of ground water during operation of plant.

➢ *Impact on Hydrology*

The storage at Hasdeo barrage is confined within banks and therefore it shall not cause any submergence of land beyond the banks. The river carries sufficient flow during monsoon season.

For the present proposal the estimated water requirement is 28 MCM (3200 m^3/hr). It is proposed to obtain allotment of additional 28 MCM raw water from GoCG An application is under submission for Hasdeo STPP shall have no adverse impact on downstream water users. It may be concluded that the withdrawal of water for Hasdeo Korba West TPP (2 X 660 MW), shall not cause any adverse impact on the availability of water to downstream users.

➢ *Water Pollution Mitigation Measures*

An effluent management scheme, consisting of collection, treatment, recirculation and disposal of effluents shall be implemented in order to optimize the makeup water requirement as well as liquid effluent generation. The detail of water system for the project is described as follows:

- The filter backwash water of PT plant shall be collected and recycled back to the DM clarifier;
- The sludge from clarifiers of water PT plant shall be collected in a sump/ pit and shall be pumped to bottom ash slurry sump for disposal to bottom ash dyke;
- The waste effluents from neutralization pits of DM plant and condensate polishing plant shall be collected in the respective neutralization pits and neutralized before pumping to the ash slurry sump before final disposal;
- A coal settling pond shall be provided to remove coal particles from coal handling plant waste. Decanted water shall be pumped back to the coal dust suppression system;
- Service water effluent collected from plant drains shall be led to a sump. From the sump the service water shall be pumped upto tube settler/ clarifier for treatment of suspended solids. Treated service water shall be sent back to service water tank to the extent possible for re-use;
- All the plant liquid effluents shall be mixed in Central Monitoring Basin (CMB) and finally to ETP/Recycling point;
- The plant shall have two different systems for ash disposal - conventional wet ash slurry disposal system with Ash Water Recirculation System (AWRS) for Bottom Ash and High Concentration Slurry Disposal System (HCSD) for fly ash. HSCD system will require less quantity of water and there will be no effluent from the fly ash disposal site;
- Efficient operation of various treatment schemes shall be ensured so that the quality of treated effluent from CMB conforms to relevant standards, prescribed by regulatory agencies. The treated effluents shall be recycled/reused to the existing plant water system; and
- 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 to the extent possible.

1.8.5 Impact of Solid Waste

Ash generated due to combustion of coal will be the main industrial/ solid waste generated from the project. About 80% of the ash shall be generated as fly ash while 20 % of the ash shall be generated as bottom ash. With average annual coal requirement of 6.5 MTPA (Design coal) and average 45 % ash in coal, it is estimated that about the total ash generation would be 251.44 TPH.

In addition, gypsum shall be generated as solid waste from FGD system, which shall be utilized/ disposed off in an environmentally suitable manner. The details of the solid waste generated in the plant are given in **Table-1.3.**

TABLE-1.3
EXPECTED SOLID WASTE FROM THE PROPOSED EXPANSION PROJECT

Sr. No.	Plant	Quantity	Mode of Disposal
1	**Ash generation** Fly ash Bottom ash Total ash	 196.78 TPH 54.66 TPH 251.44 TPH	Ash will be supplied to cement industries. In case the ash could not be lifted, the same will be disposed in ash pond using HCSD disposal method.
2	Gypsum Generation	400 to 500 tonnes /day	Byproduct used by cement industries

1.8.6 Impact on Noise Levels

The main sources of noise and vibration during operations will be:

- Delivery of equipment and raw materials by trucks;
- Transfer of coal through railway line;
- Operation of generators and turbine inside the power house; and
- Operation of various pumps, fans and motors.

Scheduling deliveries to daytime as much as possible would minimize noise generation by truck movement. Turbines, transformers, compressors, pumps, vehicles and miscellaneous equipment during plant operation, will generate noise. However, proper acoustic enclosures would be provided to control the noise level within 80dB, as per the requirement of Occupational Safety and Health Administration Standard (OSHA).

Noise Pollution Mitigation Measures

In the process, various equipment's like pumps, compressors and boilers etc will generate the noise. Greenbelt, landscaping with horticulture at power block areas to reduce noise impacts is already being implemented. The recommendations to mitigate higher noise levels are:

Equipments should be designed to conform to noise levels prescribed by regulatory authorities:

- Provision of acoustic barriers or shelters in noisy work places;
- Provision of hoods to noise generating equipments like pumps;
- Provision of thick greenbelt to attenuate the noise levels; and
- Provision of personal protective equipment (PPE) such as earplugs, earmuffs to the workers working in high noise level area.

1.8.7 Impacts on Socio-Economics

The requirement of unskilled manpower will be met from nearby villages during construction phase. The project will also help in generation of the indirect employment apart from direct employment. This will be a positive socio-economic development for the region. There will be a general upliftment of standard of living in the region.

1.9 Environmental Monitoring Program

Post project environmental monitoring is important in terms of evaluating the performance of pollution control equipment installed in the project. The sampling and analysis of the environmental attributes will be as per the guidelines of CPCB/ Chhattisgarh Environment Conversation Board (CECB). The frequency of air, noise, surface water and ground water sampling and location of sampling being as per the directives of CECB.

1.10 Risk Assessment and Disaster Management Plan

Risk assessment has been carried out to quantify the extent of damage and suggest recommendations for safety improvement for the proposed expansion project. Risk mitigation measures based on consequence analysis and engineering judgments are incorporated in order to improve overall system safety and mitigate the effects of major accidents.

An effective Disaster Management Plan (DMP) to mitigate the risks involved is in place for proposed expansion of power plant. This plan defines the responsibilities and resources available to respond to the different types of emergencies envisaged. Training exercises will be held to ensure that all personnel are familiar with their responsibilities and that communication links are functioning effectively.

1.11 Project Benefits

The beneficial impact of proposed expansion project on the civic amenities will be substantial after the commencement of project activities. As corporate social responsibility various activities will be started like welfare for poor/widows/physically challenged persons. Capacity building programs, sports events, assistance to government schools, scholarships will be done. For community development trainings will be provided for woman for self employment, community toilets, drinking water facilities etc. A separate budget will be made for these activities during operation of plant. Medical camps/health awareness camp will be organized in nearby villages

1.12 Environmental Cost

An Environmental cost provision of Rs. 1216.19 crores have been kept towards the environmental control measures.

1.13 Conclusions

The proposed expansion project would add significant value to Indian economy. The project will not only help ensure our country by becoming self-sufficient in terms of power generation, but will also drive macro-economic growth.

The proposed expansion project would have minimal impacts on the environment. However, with proper and judicious implementation of the mitigation and environment management measures, the impacts can be further minimized and can be maintained well within the permissible limits specified by the regulatory authorities.

Thus, it can be concluded that with the strict implementation of the pollution control and mitigation measures, with proper environment management system in place the proposed expansion project will be beneficial to the society and will contribute to the economic development of the state in particular and the country in general.