EXECUTIVE SUMMARY

EXPANSION OF RAIGARH THERMAL POWER PLANT

BY ADDING 1600 (2X800) MW CAPACITY TO THE EXISTING 600 (1X600) MW

AT VILLAGE CHHOTE BHANDAR, BADE BHANDAR, SARVANI, & AMLI BHANUNA, TEHSIL PUSSORE, DISTRICT RAIGARH, CHHATTISGARH

PROJECT PROPONENT

ADANI POWER LIMITED

ENVIRONMENT CONSULTANT

M/s Greencindia Consulting Private Limited

NABET/EIA/2326/RA 0297

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Executive Summary

1.1 INTRODUCTION

Adani Power Limited, Raigarh, owns and operates a 600 MW (1x600 MW) coal based Thermal Power Station situated at villages Chhote Bhandar, Bade Bhandar, Sarvani, & Amli Bhanuna of Raigarh District in Chhattisgarh. The Power Station was commissioned in March 2014. Adani Power Limited, Raigarh proposes to set up an Ultra Super-Critical Thermal Power Project with configuration of two units of 800 MW each deploying the state of-the-art technology in the field, to have an installed capacity of 1600 MW. The proposed project is envisaged as an expansion of the existing 1x600 MW capacity situated within the plant premises.

The site in Villages Chhote Bhandar, Bade Bhandar, Sarvani & Amli Bhanuna, Tehsil Pussore in Raigarh District which has an existing operational plant of 1x600MW & land available for set up of 2x800MW power plant. The major advantage in planning the proposed Thermal Power Plant at Raigarh district may be summarized below: Land is adequate for installation of the proposed power plant with all facilities. The existing dyke will be used for disposal of unutilized ash from Phase-II (2X800 MW); existing plant Infrastructure can be shared to the extent possible and feasible; site is well connected by road; nearest railway station at Kirodimal is within 19.85 Km from the site; water required for the proposed project will be from Mahanadi River within 5 Km from the site; reasonable distance from coal source would assure less delivered cost of coal.

1.2 PROJECT DETAILS & REQUIREMENTS

The estimated Cost of the Proposed Expansion Project will be Rs. 13,600 Crores. The specific project cost appears to be Rs. 8.5 Crores per MW based on the estimated Project Cost. A land area of about 879 Acres for the Project which includes the existing 1x600 MW unit, land area for accommodation of coal stockyard, water reservoir, township and roads, green verge, etc. The existing ash dyke will be used for disposal of ash from Phase-II (2X800 MW).

The coal requirement is estimated at 6.6 million MTPA at 85% plant load factor with Coal GCV of 3700 kCal/kg. Coal requirement for existing 1x600MW Ph-I is 3.25 million MTPA. The primary fuel for the proposed expansion project is Coal. The Coal transportation up to plant through Rail from Bijahan coal mines. The secondary fuel for the proposed Power Project i.e. LDO/HSD shall be sourced from the refineries located nearer to the Project.

Auxiliary fuels, viz. LDO /HSD would be required for start-up and flame stabilization at lower load. LDO /HSD is proposed to be cold start-up, warm up, startup/commissioning activities till stabilization at lower load (up to 30% BMCR).

Mahanadi River is the primary source of water for the Project. The total consumptive water requirement for 1600 MW Project capacity is 4000 m^3/hr (35.04 MCM/year) considering specific water consumption limited to 2.5 m^3/hr/MWh by MoEFCC. It may be noted that Water Resource Department (WRD), Government of Chhattisgarh has allotted 15 MCM/Year water to APL, Raigarh for operating existing 1x600 MW Raigarh Thermal Power Plant. The site is located at a distance within 5 km from existing intake point at the Mahanadi River. APL, Raigarh has submitted application for obtaining additional water allocation of 36 MCM/year for proposed 1600 MW (2 x 800 MW units) expansion project from WRD, Government of Chhattisgarh vide no. APL/RAIGARH/ENV/WRD/23-24/01 on 4th Jan' 2024. The total water allocation after expansion will be 51 MCM/Year (15+36 MCM/Year).

The power will be evacuated to nearby STU sub-station of Chhattisgarh state at 400 kV level. The STU will be further informed to initiate study as power evacuation will be from Adani Power Limited, Raigarh 400 kV ex-bus.

The proposed expansion project of 1600MW capacity power plant is mooted to deploy the state-of-art technology and accordingly two units of 800 MW are being considered with ultra-supercritical steam parameters to attain high cycle efficiency.

Process & Methodology

The steam generator units proposed for the station will be Ultra Super-critical, once through, outdoor, pulverized coal fired, balanced draft, single reheat, dry bottom type with two pass or tower type arrangement as per manufacturer's standard. For improved efficiency at part loads and flexible operability, boiler capable of sliding pressure operation is favoured. An added advantage in this type of boilers is feature of Boiler circulation pumps which shorten the start-up time and heat loss during start-up period.

The combustion system will be provided for pulverised coal firing with Low NOx type coal burners. The steam generators will be designed for continuous satisfactory operation with the range of coal. The furnace would be conservatively designed for fuel to burn completely and to avoid any slagging in the furnace and excessive fouling in the super heater sections of the boiler. The design flue gas velocities would be carefully selected to minimise erosion of pressure parts and other vital components on account of ash. The steam generators would be designed in accordance with the latest provisions of Indian Boiler Regulations.

Capacity of steam generating units would be so selected as to ensure adequate margin over the requirement of Turbine at 100% MCR in order to cater to auxiliary steam requirement for soot blowing operation, and also for start-up of the adjacent unit, and de-aerating of the steam generating units after prolonged use. The steam generators would be designed to operate with "the HP Heaters out of service" condition (resulting in lower feed water temperature at Economiser inlet) and deliver steam to meet the turbo-generator requirement at base load. Economiser section of the boiler would be non-steaming type with provision for recirculation during start-up, chemical cleaning etc. Super heater section would be divided in convection and radiant zones and designed so as to maintain rated steam temperature at outlet over the range of 60% to 100% MCR load. Main steam de superheating stations with provision for spraying water tapped off from feed water piping would be provided. Air preheaters, preferably of rotary type would be provided with a set of soot blowers of automatic sequential electrically operated type, arranged for on-load cleaning of the heat transfer surfaces.

Draft system of each boiler would be provided with Forced Draft and Induced Draft Fans with suitable capacity and control arrangement, each independently capable of meeting the requirement at 60% boiler MCR load. The forced draft fans would control total airflow to boiler and the induced draft fans will control furnace draft of the boiler through automatic control loops. The coal will be received to the coal bunkers of about 16 hours storage capacity and the same will be fed to the coal pulverises utilising gravimetric feeders. The pulverised and conditioned coal will be then distributed to the Low NOx coal burners from each mill for combustion in the furnace of the boiler thro' coal conveying pipes. HSD/LDO will be required as secondary fuel for start-up, load carrying and flame stabilization at low load.

The complete boiler will be top supported type and would be provided with all supporting steel structures, platforms, galleries, elevator and stairways for easy approach and maintenance of the unit. Adequate weather protection would be provided for instruments and operating personnel.

The steam turbine would be 3000 rpm, tandem compound, single reheat, regenerative, condensing, horizontally split, three-cylinder machine with extractions for regenerative feed heating. The turbine would be designed for main stream parameters of corresponding to the boiler output of pressure and temperature, before emergency stop valves of HP turbine and reheat steam parameters to IP turbine. The LP turbine will exhaust to condenser. At turbine valve wide open (VWO) condition the turbo-generator set will be able to operate continuously with a throttle steam flow of about 105% turbine MCR condition.

The bypass station will act not only as a protection to the unit during pressure rise resulting from sudden load throw off but also enable operation of the unit at loads lower than the controllable range of load. This will also permit quick, repeated hot starts of the unit on its tripping.

A fully automatic gland sealing system will be provided for the turbine which will have provision for receiving steam from auxiliary steam header during start-up and low load operation. The turbo-generator will be equipped with electro-hydraulic governing system ensuring stable operation under any grid fluctuation and load throw off condition. The turbo-generator will be equipped with turning gear. The unit will also be provided with self-contained lubricating oil system for supplying oil to turbine and generator bearings and also to hydrogen seal oil system of the generator. The lubricating oil will be cooled by Closed Circuit Cooling Water System utilising sea water as cooling medium.

Generator will be connected to its unit step up transformer. The auxiliary power requirement of the unit will be drawn from its unit auxiliary transformer tapped off from the generator bus duct. All auxiliaries like turbine oil purification system, generator seal oil system etc. as well as necessary protective and supervisory system will be provided to ensure trouble-free, safe and efficient operation of the turbo-generator. The unit will be guaranteed to generate required output at generator terminals continuously. The turbine will be suitable for wet steam washing for which set of auxiliary equipment necessary for the units will be provided.

Ash Handling System

For each unit, Bottom ash will be collected in wet form; while fly ash will be collected in dry form to facilitate utilization. Fly ash and bottom ash shall be disposed via High Concentration Slurry disposal (HCSD) system to Ash dyke in case of exigencies. Ash extraction system is unitized basis and ash disposal systems will be common for Two (02) units. Provision for truck disposal of both bottom and fly ash is provided.

For the design of the Ash Handling System, the following data has been considered for each Unit. Necessary design margin shall be considered while selecting the equipment capacity.

It is envisaged that the bottom ash will be collected in wet. Efforts will be made to utilize 100% bottom ash as per MoEFCC guidelines. Un-utilised bottom ash if any shall be disposed to the ash pond/low lying area filling. Ash collected in Bottom ash hopper (B.A + Eco Ash) shall be transported to hydro bins through jet pumps and slurry pumps. Inside the hydro-bins, water shall be removed from the slurry. In case of exigencies the bottom ash from Hydrobins shall be crushed and transferred to ash mixing tank, where fly ash and water shall be mixed with bottom ash and the resultant slurry shall be ultimately disposed to Ash Dyke via HCSD Pumps and Pipelines.

The fly ash handling system shall be provided to remove fly ash from ESP hoppers and APH hoppers to transport fly ash to fly ash silos (main fly ash silos / HCSD fly ash silo) via ash transfer piping system which utilizes vacuum conveying up-to intermediate surge hopper and pressurized conveying up to main fly ash silos/HCSD fly ash silo. From the fly ash silos, fly ash shall be transported in dry form through rail / road for possible utilization. The fly ash conveying system will be sized such that fly ash collected in 8 hours shall be evacuated in 5.5 hours.

Ash water system shall be common for two units. Ash water system consists of Ash water tank and pump house to house 3 nos. (2W+1S) HCSD LP water pumps, 2 nos. (1W+1S) HP water pumps, 3 nos. (2W+1S) LP water pumps, 2 nos. (1W+1S) Economizer water Pumps, 2 nos. (1W+1S) HP seal water pumps, 3 nos. (2W+1S) LP

Seal water pumps and 1 no. HCSD emergency water pumps. Settling and Surge Tank shall be provided for recirculation of water (I.e. BA hopper overflow water, decanted water from Hydrobins) for use in the Ash Handling system.

All efforts shall be made to promote utilization of ash to the fullest extent (100% ash utilization envisaged). However, in case of exigencies, unutilized ash will be disposed into Ash dyke of Ph-II. Ash dyke shall be provided with lining and green belt. APL, Raigarh has not envisaged Ash Pond for proposed expansion as it is estimated that the ash pond stock will be utilized by 50% approx. by the time 2x800 MW commissioning is completed and the same empty space in existing Ash Pond will be used for unutilised ash.

APL, Raigarh focus to utilize ash from start of operation phase. 100% Ash will be utilised in Cement Industries, reclamation of abandoned mines, manufacturing of bricks, road construction, aggregate replacement in concrete, etc. as per Fly Ash Notification, 31st December'2021. An MoU has been signed between APL Raigarh and ACC Cement Limited and Ambuja Cement Limited for utilization of fly ash sale for the proposed1600 (2x800) MW USCTPP (PH II).

Pollution Control Measures

A wet limestone-based flue gas desulphurization (FGD) system will be installed downstream of the steam generator, capturing SO_2 gas in a limestone slurry to produce gypsum. The system includes auxiliary equipment like cyclones, filters, conveyors, pumps, and storage vessels. It will have a bypass system and operate with a 95% efficiency or higher. The chosen system is a forced oxidation wet limestone-based FGD due to its proven effectiveness and location suitability. Each unit will have an independent absorber and operate alongside pulverized coal-fired generators, tapping off from the combined ID Fan discharge duct.

Limestone is needed for the Flue Gas Desulfurization (FGD) system to ensure compliance with SO_2 emission regulations. An annual quantity of approximately 175,350 metric tons will be required for the expansion of a 2x800 MW power plant. The source and transportation method of limestone are still being studied.
The limestone will be transported by trucks to the Thermal Power Plant (TPP) and unloaded into either a Bulk Receiving Unit (BRU) or Surface Feeder (SF). Two BRUs/SFs will be installed with a conveying capacity of about 100 tons per hour. The limestone will then be crushed in a lime crusher house from a size of (-) 250 mm to (-) 20 mm. Conveyors will transport the crushed limestone to two limestone day silos. From there, it will be sent to vacuum belt filters and lime mills for the preparation of lime slurry. Additionally, a limestone storage shed with a minimum seven-day storage capacity will be provided.

A wet limestone-based flue gas desulphurization (FGD) system will be installed to capture SO_2 gas in a limestone slurry, producing gypsum at a rate of 280,560 MTPA from a 2x800 MW expansion TPP. Gypsum will be transferred to storage yards via two individual conveyors equipped with telescopic chute arrangements for truck loading. Seven days' storage capacity for gypsum from both units will be provided. A memorandum of understanding (MoU) has been established between APL Raigarh and ACC Cement Limited and Ambuja Cement Limited for utilizing gypsum from the proposed 1600 MW USCTPP (PH II).

1.3 BASELINE CONDITION

The baseline study was conducted during the post monsoon season, 2023 i.e. October to December'2023. The nearest Railway Station is Kirodimal Nagar Railway station which is at an approx. distance of 19.85 km NNE from the project site. The nearest airport is the Veer Surendra Sai Airport, Jharsuguda 80Km (approx.) connecting it to many cities in the country and, by regular flights operated by private and govt. pliers. There is no National Park, Wildlife Sanctuary, or wildlife corridor within 15km of the project site.

The entire state of Chhattisgarh falls in two seismic zones according to the vulnerability atlas of India[1] viz., Zone III: Moderate Damage Risk Zone (MSK VII) and Zone II: Low Damage Risk Zone (MSK VI or less). The district Raigarh also has both the zones mentioned here i.e. Zone II and Zone III. The project site falls in low damage risk zone. According to the wind vulnerability atlas, Chhattisgarh falls in Moderate Damage Risk Zone - A (Vb=44 m/s) Moderate Damage Risk Zone - B (Vb=39 m/s), where Vb is the basic wind speed. Raigarh district as well as the project site fall in Moderate Damage Risk Zone B.

Soil: It has been observed that the pH of the soil in the study area during post monsoon season ranged from 7.4 to 7.8 corresponding to the 'Slightly Alkaline' category as per ICAR classification. The maximum pH value of 7.81 was observed at S5 whereas the minimum value of 7.44 was observed at S3.
The electrical conductivity of soil is actually a measure of salinity. Excessively high salinity can affect plants in the following ways: Specific toxicity of a particular ion (such as Sodium), higher osmotic pressure around the roots prevents an efficient water absorption by the plant. Some plants are more susceptible to electrical conductivity than others and each species has an electrical conductivity threshold, beyond which yield decreases. The electrical conductivity was observed to be in the range of 344 µmhos/cm (S1) to 506 µmhos/cm (S5).
According to the study of soil texture, the soil of the study area was of sandy clay loam type. Sandy clay loam soil has a good balance of sand, silt, and clay, which allows it to retain moisture while still providing good drainage. This is beneficial for plant growth as it ensures that plants have access to water without becoming waterlogged.

In the study area organic matter varies between 0.83% to 1.22%. As per ICAR classification, the organic matter found in the study area is "sufficient" to "more than sufficient". The quality of soil is rather dynamic and can affect the sustainability and productivity of land use.

Climate: Temperature of the study area is generally high during April to June. As per the IMD Climatological table (1991 – 2020) the maximum temperature was recorded in the month of May & The minimum temperature is recorded in the month of January. The annual rainfall is 1400mm. It rains 12 months and the intensity varies from 9.3mm to 367.7mm per month. The maximum annual rainfall is received during the months from June to September. The humidity is highest in July to September with average relative humidity of 58.4%. As per IMD station at RAIPUR, the dominant wind direction throughout the year is from WSW and during the post monsoon the pre-dominant wind direction is from NNE. The wind-speed was found to be highest during the monsoon month of June-July with the average wind speed of 7.7 m/s.

Air quality: The 98th percentile value of PM_{10} varies between 72.0 µg/m^3 at AAQ1 to 51.2 µg/m^3 at AAQ10 and the 98th percentile value of $PM_{2.5}$ varies between 47.8 µg/m^3 at AAQ1 to 31.5 µg/m^3 at AAQ9. The higher concentration of PM_{10} may be due to its proximity to industrial area and vehicular pollution and the dominant wind direction. Anthropogenic sources including fuel combustion, domestic cooking in some area and fuel

[1] https://vai.bmtpc.org/th.html

combustion for vehicles in the study area. Concentration of $PM_{2.5}$ were observed in all sites remain within the limits except for locations within project site.

The source of SO_2 in the study area is mainly from burning fuels containing sulphur or emissions from coal combustion depending on the Sulphur content in the coal. Sulphur dioxide reacts with other substances in the atmosphere to form sulphate aerosols (USEPA, 1982)[2]. Since most sulphate aerosols are part of $PM_{2.5}$, they may have an important role in the health impacts associated with fine particulates (WHO, 1979)[3]. However, the values of Sulphur pollutants in this case were found well below the NAAQ standard. The 98th percentile value of SO_2 in the study area ranges from 32.3 µg/m^3 in AAQ1 to 22.9 µg/m^3 in AAQ10.

In the study area, the 98th percentile of NO_2 varies between 19.9 µg/m^3 at AAQ1 to 11.1 µg/m^3 at AAQ6. The values of Oxides of Nitrogen were found well below the NAAQ standard. The primary sources of NO_2 are motor vehicles, electric utilities and residential sources that burn fuels. NO_2 is one of the main ingredients involved in the formation of ground level ozone, which can trigger serious respiratory problems. It reacts to form nitrate particles, acid aerosols, as well as NO_2, which also cause respiratory problems (NAPAP 1991)[4]. The 98thpercentile values of CO in the study area varies from 0.92 mg/m^3 at AAQ1 to 0.32 mg/m^3 at AAQ10. The values recorded were below the prescribed standard of NAAQ.

Noise: The noise levels (Leq) range from 66.8 dB (N1: Project Site) to 50.5 dB (N9: Ruchida) in daytime and 44.3 dB (N6: Bunga) to 40.4 dB (N4: Kalma) at night time. The factor attributing to the increase level of noise may be the traffic movement in nearby highway.

Surface water: pH is an important chemical parameter that determines the suitability of water for various purposes. pH of water is very important for the biotic communities because an average pH is adopted by most of the aquatic organism. pH of the study area varied from 7.26 to 7.56. TDS was observed in the range of 206 mg/l at SW6 to 416 mg/l at SW10.). The maximum total hardness of surface water samples in study area was found to be 188 mg/l in sample at SW10 and the minimum was observed as 94 mg/l in the sample at SW6 which is at moderate to high levels. All surface water samples were within the permissible limit recommended by BIS (600 mg/l) and WHO (450 mg/l). The range of Ca^{2+} and Mg^{2+} are also remaining within the acceptable limits 32.8-65.6 mg/l and 2.88-5.76 mg/l respectively. The alkalinity of water is caused mainly due to OH^-, CO_3^-, HCO_3^- ions. Alkalinity is an estimate of the ability of water to resist change in pH upon addition of acid. The maximum alkalinity of water bodies samples was found to range between 60-120 mg/l in the study area. The maximum chloride concentration (90 mg/l) was found at SW10 and the minimum (45 mg/l) was recorded at SW5. The level of fluoride ranged between 0.35 mg/l to 0.55 mg/l and were found to be within the acceptable limit of drinking water.

Ground water: The data revealed that the pH value of ground water samples varied from 7.33 to 7.54. The water samples are slightly alkaline. The reasons for such conditions may be due to different types of buffers that may be present in the ground water and presence of weak basic salt in the soil. The total suspended solids are composed of carbonates, bicarbonates, chlorides, phosphates and nitrates of calcium, magnesium, sodium, potassium, manganese, organic matter, salt and other particles. All samples are within the permissible limit as per ISO 10500:2012.

[2]USEPA (United States Environmental Protection Agency). 1982. *Air Quality Criteria for Particulate Matter and Sulfur Oxides.* EPA-600/8-82-029, December, Research Triangle Park, N.C.

[3]WHO (World Health Organization) 1979, "Sulfur Oxides and Suspended Particulate Matter," *Environmental Health Criteria* 8Geneva

[4]NAPAP (National Acid Precipitation Assessment Program). Various years, 1987–91, Washington, D.C.: Government Printing Office.

The maximum total hardness of ground water was found to be 328 mg/l in sample at GW5 and the minimum was observed as 190 mg/l in the sample at GW8. All the samples were reported to be within the permissible limit recommended by BIS (600 mg/l) and within the acceptable limit (except GW8) of IS0 10500:2012 as well. The range of Ca^{2+} was reported to be within the permissible limit of 200 mg/l also. Mg^{2+} was also found remaining within the permissible limits and the acceptable limit of 30 mg/l and 100 mg/l respectively. The alkalinity of water is caused mainly due to OH^-, CO_3^-, HCO_3^- ions. Alkalinity is an estimate of the ability of water to resist change in pH upon addition of acid. The minimum alkalinity of ground water was found to be 140 mg/l in sample at GW2 and GW10 and the maximum was observed as 220 mg/l in the sample at GW5.

The maximum chloride concentration (75 mg/l) was found at GW5 and the minimum (45 mg/l) was recorded at GW9 and GW10. The samples were compared with the BIS standard and all the samples were within the acceptable limit of 250 mg/l. Fluoride in groundwater has drawn worldwide attention due to its considerable impact on human physiology. Though fluoride is considered as an essential element at very lower concentration for human beings, higher concentration leads to health defects. The maximum average level of fluoride (0.45 mg/l) was found in GW5 and the minimum value (0.25 mg/l) was found at GW9 and GW10. All samples were within the acceptable limit of 1mg/l as well as within permissible limits of 1.5 mg/l.

Traffic: The results of the survey, the existing PCU of each location were compared with the capacity of each type of road as suggested by Indian Road Congress thus determining the existing Level of Service (LoS) for each location. The existing conditions shows A Level of service at T1 which implies a free flow condition.

Ecology: To understand the floristic composition, a Phyto-sociological study of vegetation in reference to trees, shrub & herb layer was conducted in three forest patches in the study area of the proposed project. At each selected site, random vegetation sampling was done with the help of quadrat (Size 10m X 10 m for tree & shrub layer and $1m^2$ quadrat for herb layer). *Tectona grandis* and *Calotropis gigantea* are found to be the most dominant tree species and shrub species respectively, at EB 1 location. *Dalbergia sissoo*, followed by *Anogeissus latifolia* are found to be the dominant tree species at EB 2 location. *Tectona grandis* is the dominant species at EB 3 location.

A habitat survey carried out in the study area. Using photos and a field handbook, birds in the research region were spotted and identified. Regarding mammals, data regarding recent observations or reports of mammals made by the villagers/locals were gathered. Indirect sampling was used to identify carnivores, and the mammals were identified by footmarks, faeces and other marks/signs created by them. Out of 19 mammalian species, 3 species are under Schedule I of WPA, 1972 reported outside the study area. 38 avifaunal species were recorded in the study area and 2 species were under Schedule I of WPA, 1972 outside the study area. The survey also reported 5 species of reptiles of which 1 is Schedule I species observed outside the study area.

Social environment: There are 164 villages in the study area. These villages have a total population of 114532 (in 2001) & 143521 (in 2011). The average household size in the study area was found to have reduced from 4.8 in 2001 to 3.8 in 2011. According to the survey, the gender ratio of study area was 1020 in 2011 and 993 in 2001. The child population (population between age of 0-6 years) was found to be 18436 (in 2001) & 16548 (in 2011), with a decadal growth of 2.15%. As per the 2011 census, the study area has about 14.92 % scheduled caste population and 27.59% scheduled tribe population.

1.4 IMPACT AND MITIGATION

Some of the impacts identified in various construction & operation phases are insignificant and do not warrant much attention whereas some others are important especially with respect to the existing site context. Therefore,

such impacts which are significant and require a detailed analysis for decision-making or formulating adequate management measures have been identified. This section deals with an assessment of impact of various activities during construction & operation phase on environmental conditions. The methodology of assessment is based upon identification and description of the project activities as well as environmental components followed by predicting the impact of the proposed project and associated activities on the environment. The environmental components that are likely to be influenced or modified during construction phase are: (i) Air environment, (ii) Noise level, (iii) Water resources, (iv) Soil quality; (v) Water quality; (vi) Biological environment and (vii) Socio-economic status of the area.

1.4.1 DURING CONSTRUCTION

Soil: Soil compaction may occur due to the movement of trucks bringing construction material and transporting construction debris which may affect the soil characteristics like soil fertility, infiltration rate, porosity etc. This ultimately restricts the growth of deep-rooted plants which finally leads to stagnation of succession. Contamination of the soils of surrounding area due to spillage of construction materials such as cement, sand etc. Truck movement shall be carried out through existing roads. Any unpaved roads shall be avoided to prevent accidents. Trucks shall be covered with tarpaulin and overloading shall be avoided.

Air: Dust will be the main pollutant affecting the ambient air quality of the area during the construction phase. Activities such as site preparation, operation of heavy machinery and vehicle movement shall generate fugitive dust. Vehicle movement shall also emit gaseous pollutants. Necessary dust suppression measures like water sprinkling using road tankers etc. will be deployed to mitigate the dust emissions. Suitable surface treatment to the roads and regular sprinkling of water shall be provided which will reduce the dust generation. Proper tuning of vehicles will be done and a pollution certificate to keep the gas emissions under check will be made compulsory. Necessary pollution control measures as per the requirement under local laws and regulations, and otherwise also, will be provided.

Noise: The operation of construction equipment will generate noise. The noise produced during the construction will have a significant impact on the existing ambient noise levels. There will be noise generation from construction equipment and material handling equipment. Vehicles carrying construction materials will also generate noise. Any machinery or equipment generating excessive noise levels will be taken out for maintenance. Use of proper personal protective equipment will be encouraged which will mitigate any significant impact of the noise generated by such equipment. Well-tuned vehicles will be used, and loud noise will be checked every day which help in reducing noise during operations.

Water: During the construction phase, site preparation (leveling, excavations etc.) and erection of structures may have temporary effect on the water quality of receiving water body. The flow of loose materials (soil and construction material) into the drains, especially during monsoons, may result in higher turbidity and suspended solids content. Stagnation of water may create unhygienic conditions. the following: The wash off will be directed to a sedimentation basin before discharge. As the site and drainage network is already developed, the impacts shall be controlled effectively; Fuel oil, lubricants and grease etc. shall be stored in closed containers in dykes in storage areas with impermeable floors.

Adequate arrangements would be made to ensure proper drainage and disposal of the wastewater; so that water does not stagnate promoting the breeding of mosquitoes and creating unhygienic conditions.

Ecology: As the land is already under possession of APL and is under industrial use, the direct impact on terrestrial ecology (loss of flora and fauna) during construction phase is likely to be insignificant.

Construction activities may result in fugitive dust emission. The dust deposition on pubescent leaves of the surrounding vegetation may lead to temporary reduction of photosynthesis. The runoff from construction area may lead to a short-term increase in suspended solids and decrease in dissolved oxygen near the discharge point in receiving water body. This may lead to a temporary decrease in the photosynthetic activity of phyto-planktons, rise in anaerobic conditions and food chain modification. As the site infrastructure facilities are already developed, construction activities will be confined to the proposed project site and the impact will be marginal for a short time period. Fugitive dust emission shall be minimized through regular water sprinkling in dust-generating areas and green belt development. All the stormwater runoff shall be channelized through sedimentation basins to control suspended solids.

Demography: The social impact during the construction stage will be beneficial in nature. During construction phase, people from neighbourhood will be engaged by contractors on daily average basis as most of the construction work is labour intensive. Local people would be preferred for secondary employment with contracting agencies, depending upon their skill and experience. During construction, due to influx of labour, economic activities in surrounding areas will increase. Construction material like stone chips and sand may be procured locally. Thus, there is the possibility of generation of local trading opportunities for a limited period of time.

1.4.2 DURING OPERATION

Soil: During the operation stage, the project will generate fugitive dust and gas emissions. The transportation of ash and coal will also have some spillage which will have limited impact on localized soils. The soils 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 NOx) during the rains. The soil microbial environment undergoes changes as a result of accumulation of pollutants. Fugitive dust (including ash particles) induced alterations in soil properties ultimately affects plant growth. Spillage of fly ash while transportation may lead to change in soil characteristics. Transportation vehicles will have tarpaulin to avoid dust emission.

The impacts on soil due to operation of the power plant and gaseous emission are likely to be under control as the incremental concentration of particulate matter PM_{10}, $PM_{2.5}$, SO_2 & NO_2 levels are observed within NAAQS in the surrounding areas. PM_{10} and $PM_{2.5}$ from boilers will be controlled by the installation of ESP Dust suppression and bag filters for the coal handling systems will control PM emissions. FGD and De-NOx systems shall be provided to effectively control SO_2 and NOx emission levels. Ash silos will be provided for collection of fly ash in dry form for further transportation to utilities.

Bottom ash will be collected by HCSD Systems.

Solid & Hazardous Waste: During the operation stage, the project will generate fly ash and bottom ash. 11330 tonne/day of ash will be generated from the proposed 2x800 MW unit. Approximately 80% (9064 tonne/day) of it will be fly ash and the balance 20% (2266 tonne/day) will be in the form of bottom ash. During the operation stage, the project will not generate Hazardous Wastes from processes but only some spent oil and waste oil from DG sets and Vehicles. The quantity will be insignificant. Ash utilization shall be made as per MoEF&CC notification. Dry ash will be handled by pneumatic conveying systems and will be supplied to ash brick/ash product manufacturers. Wet ash will be handled using HCSD systems and used for low land filing. The spent oil and waste oil will be collected in drums and sent to authorized re-user.

Air quality: To control PM from TPP Stacks, Electrostatic Precipitator (ESP) is proposed. For control of SO_2, Flu Gas Desulphurization (FGD) with lime scrubbing is proposed. To control NOx emission, De NOx system of SCR / NSCR type with low NOx burner is proposed. With these controls, Hg emission is expected to be brought below the emission limits as measured in various other TPPs in India.
Necessary dust suppression arrangement and bag filters will be used in railway siding and coal handling plant. The top surface of coal wagons will be adequately sprinkled to reduce fugitive emissions during transportation. Belt conveyors will be covered to minimize the fugitive dust emissions. Auxiliary fuel transportation will be occasional; hence its impact will be for a limited time period. The fly ash silos will be provided with bag filters to control emission. Regular housekeeping will be done at plant roads, platforms, and storage area.

Noise: During operation, the maximum expected noise level will be from turbine generator and other sources like cooling tower, boiler, mills, transformer, compressors, etc. Exposure to prolonged or excessive noise has been shown to cause a range of health problems ranging from stress, poor concentration, productivity losses in the workplace, and communication difficulties and fatigue from lack of sleep to other more serious issues.

Water: A thermal power plant requires a huge quantity of water for its continuous operation. The water requirement for the existing unit is 15.0 MCM/year while additional water requirement for the proposed unit is 35.04 MCM/year. The entire water 50.04 MCM/year shall be sourced from Mahanadi River allocated by Water Resources Department, CG. Wastewater will be treated, recycled & re-used to reduce freshwater consumption, and make it more sustainable & efficient.

Ecology: Emission of particulate matter, SO_2 and NO_x from the proposed plant.
CPCB adopted the injury symptoms and pollution dose thresholds of tolerance by sensitive species of plants developed by W.H. Smith (1981) which stipulates that SO_2 at 0.70 ppm (1820 µg/m^3) after 1 hour exposure or 0.18 ppm (468 µg/m^3) after 8 hours' exposure gives rise to visible injury symptoms in vegetation.
Similarly, NOx at 20 ppm (38x103 µg/m^3) after 1 hour exposure or 1.6-2.6 ppm (3000-5000 µg/m^3) after 48 hours' exposure or 1 ppm (1900 µg/m^3) after 100 hours' exposure is likely to bring about injury symptoms in vegetation.
However, such high ambient air concentration of SO_2 and NO_X is not likely to occur in the area. As per modeling studies done, the maximum resultant concentration of SO_2 and NO_x in the ambient air even after the power plant comes into operation will be 11.72 µg/m^3 & 4.53 µg/m^3 respectively. The details of the incremental concentration of the pollutants at existing forest blocks, along with distance and direction from project site shows that the values are too low to induce any significant impact on vegetation. Suitable screens are provided at the intake point of water to prevent entrapment of organisms. The greenbelt shall have 3-tier plantation as per the CPCB guidelines with re-densification of existing greenbelt. Neither liquid effluents nor air emissions will be sufficient enough to cause any adverse impact on flora and fauna.

Social: The proposed project will improve the basic infrastructure & the people of nearby villages will be able to use these amenities. During operational phase, manpower of 396 (direct) & 500 (indirect) are anticipated for operation, maintenance and general requirements of the power station. The skilled manpower will be in general sourced from the present pool, while the semi-skilled and unskilled workers will be sourced locally as per qualification and skill.

1.4.3 AIR MODELLING

Short-term simulations, for 24-hourly average as applicable is carried to predict the concentrations at the various receptors to quantify the likely impact on the ambient concentration level over an area covering 10-km radius from the point of emission source. The maximum incremental ground level concentrations (GLCs) are predicted taking the worst-case scenario of emission from the project. The maximum incremental GLCs due to the proposed expansion project for PM_{10}, SO_2 and NO_x are superimposed on the ambient baseline concentration of PM_{10}, SO_2 and NO_X recorded at all the monitoring locations during the field monitoring period of post monsoon season i.e., October to December, 2023.

It can be observed that the resultant GLCs of all pollutants are well within the NAAQS. Thus, from the prediction of the proposed project, it is clear that even the highest contribution on the ground level concentrations of PM10, NO2 and SO2 are very low. The resultant concentrations at all locations are found to be within the permissible limits of NAAQS. Therefore, after implementation of the units of project, the maximum GLCs for PM, SO2 and NOx are predicted to be within the prescribed 24 hours NAAQS for Industrial, Residential, Rural and Other Areas Hence impact on air quality is considered to be insignificant due to the proposed project.

1.5 ALTERNATIVE ANALYSIS

The proposed project is an expansion by adding 2x800 MW to the existing 1 x 600 MW at the village Chhote Bhandar, Bade Bhandar, Sarvani, & Amli Bhanuna in Raigarh District in Chhattisgarh by Adani Power Limited. The total land area is 879 acres out of which the expansion is proposed in the existing land available. The project will benefit from the available infrastructure, logistics, water source & proximity to the coal mine sources. It also provides all other necessary infrastructure to cater to the requirement of the enhanced capacity which will be developed while also using the facilities of the existing plant. Hence, no alternative site was explored.

The present Project is being implemented by utilizing coal from Bijahan Coal Mine in Sundargarh District of Odisha. The Govt. of India has opened up the coal mining sector, allowing private sector to mine coal for any end use. Coal transportation up to plant through Rail from coal mines. For the presently proposed power Project of 1600 MW, the maximum daily coal requirement @TMCR would be about 24,600 TPD and annual fuel requirement is estimated at 6.6 million MTPA at 85% plant load factor with Coal GCV 3700 kCal/kg.

The benefits of Ultra-Supercritical Technology, may be summarized as:

- Improved thermal efficiency attainable.
- Reduced fuel cost.
- Reduction of CO_2 emission by as much as 15% per unit of electricity generated compared to typical sub-critical units. This may help in meeting country's GHG Reduction target.
- Very good part load efficiency.
- Very low emissions of NOx, SO_2 and PM achievable using modern flue gas clean-up equipment.
- Initial investment requirement marginally higher than super critical technology and less than other clean coal technology. This, however, depends on the unit size considered.

1.6 ENVIRONMENT MONITORING PROGRAMME

The purpose of the monitoring program is to ensure that the intended environmental measures are achieved and result in desired benefits to the target population. To ensure proper implementation of the Environment Monitoring Programme, it is essential that an effective monitoring program is designed and carried out. The parameters, frequency and location for post EC monitoring is provided in detail in chapter 6 of the EIA report. Data generated from monitoring and analysis of the samples will be compared with the prescribed/stipulated

limits. If any parameter is not found within the prescribed/stipulated limit appropriate control measures will be taken to satisfy the limit. A report with recommendations will be prepared and submitted to the regional offices of SPCB/CPCB and other concern authority of MoEF&CC for their further assessment. A full record will be kept as part of normal contract monitoring. Reporting and Monitoring Systems for various stages have been proposed to ensure timely and effective implementation of the Monitoring Plan.

1.7 ADDITIONAL STUDIES

The additional studies as suggested in Para 7 & Appendix-III of EIA Notification 2006 amended to date are (i) Public Consultation; (ii) Risk Assessment; (iii) Social Impact Assessment and (iv) Rehabilitation & Resettlement (R&R) Action Plan. As the expansion will take place within the area of existing plant, there will be no applicability of R&R Action Plan.

CER: Adani group has been pioneers in implementing Environmental & social responsibility / Corporate Environmental Responsibility and made significant contribution to improve quality of people's life and Environment in all the regions they are operating in. Around the nearby villages, APL have started key initiative in support of sustainable development.

APL shall provide infrastructure to help set up local schools, centres for primary learning and education, and repair/construction of primary schools in neighbouring villages. APL is committed to inclusive development and will further strengthen its activities for improvement in education, sanitation and health, livelihood, rural infrastructure, plantation drives and rural sports. The CER Activity aims at bettering the Environment around the operated area as well as socio economic and cultural status of local people and taking account of all suggestions as raised in public hearing. A total of INR 37.75 crores is envisaged for the activities under CER for a period of 5 years.

Risk Assessment: A classical definition of hazard states that it is the characteristic of system/process that presents potential for an accident. Hence, all the components of a system/process need to be thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident. In a coal based TPP, fuel oils are needed for start-up operations. Hazardous substances in fuel oil storage may be classified into three main classes namely flammable substances, unstable substances and toxic substances. The fuel storage details of the project and properties are LDO/ HSD /HFO which falls under Class B Flammable Liquids.

Storage of coal would be designed in such a way that the air content in the coal pile is minimized. Dimension of the coal stack, particularly the height, is a very important parameter for making storage of coal safe and adequate care would be taken while designing the same. Regular watering of stock pile will be done to temperature within limits.

Preliminary Hazard Analysis: Two scenarios are considered for the **Preliminary Hazard Assessment (PHA)**: (i) Spillage of chemicals while handling and (ii) Leakage of chlorine. Recommendations for these are: Any unintentional spills must be handled in accordance with the MSDS for each chemical; All chemical storage tanks must be housed inside a ditch with a wall that is 1 metre high to prevent spills from occurring from ruptures or leaks in joints outside; A copy of the MSDS must be maintained in the warehouses and chemical laboratory. All tanks storing chemicals shall be kept within Dyke with wall of 1m height so that spillage due to rupture or leakages in joints does not take place; The source of the spillage shall be immediately identified and plugged; The spilled chemical shall be washed with copious water and the washed water shall be collected in floor wash tank and shall be treated as per waste treatment procedure till it is exhausted. An automatic chlorine leak

absorption system shall be provided for chlorination plant to neutralize chlorine leakage; Chlorination plant shall be provided with required chlorine containers, instrumentation panels, chlorine leak detectors etc; Ammonia spray or swab for identifying leakage shall be used (a white cloud indicates Chlorine leakage); For persistent leakage, a flexible hose pipe shall be connected and the pipe to be put in the tank containing caustic soda.

A total of two storage tanks each of capacity 500 KL are envisaged for LDO for the Plant. The tanks will be kept within Dyke with wall of 1 m height. In the event of spilling its contents through a small leakage or due to rupture of the pipeline connecting the tank and on ignition, fire will eventuate. As a worst, case it is assumed that the entire contents are leaked out from the storage tank into the tank bund. Catastrophic rupture of LDO storage tanks could lead to formation of pool on the surface, which on ignition would lead to pool fire. The damage distances computed for 62.0 kW/m^2, 37.5 kW/m^2, 25 kW/m^2, 12.5 kW/m^2, 4.5 kW/m^2, 1.6 kW/m^2 and 0.7 kW/m^2 are 10.5 m, 13.5 m, 16.5 m, 23.4 m, 39.0 m, 65.4 m and 98.9 m respectively.

Industrial hazards are threats to people and life-support systems that arise from the mass production of goods and services. When these threats exceed human coping capabilities or the absorptive capacities of environmental systems, they give rise to industrial disasters. Raigarh USCTPP has already implemented a Disaster Management Plan for existing unit. New units shall also be included in the same plan.

Events like explosion pool fire, toxic release and fireball are such calamities, which had never been foreseen, and for the persons working in the plant doing routine type of operations, the procedure becomes so monotonous that they forget that such type of events could occur any moment. Under these circumstances, as the people are unaware, they flee in all directions by vehicles or on foot. Although the traffic is halted, it leads to a massive jam making access to the site impossible for the rescue team. Due to explosions and smoke leading to confusion of common people, coordination becomes difficult and without the cooperation of these persons, the situation becomes uncontrollable. Emergency preparedness planning can be divided in two subsections: **(i) Onsite Disaster Management Plan and (ii) Off-site Disaster Management Plan**

Onsite Disaster Management Plan: The Onsite Disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operation in this same order of priorities. Considering the process and the material used at Raigarh USCTPP, the following hazards are identified along with the probable areas of occurrence as summarized in chapter 7.

Off-site Disaster Management Plan: During preparation of off-site emergency plan, the district authorities and other organization in the vicinity and pollution control board would be consulted. The key feature of a good off-site emergency plan is the flexibility in its application to emergencies.

A natural disaster is the result of a natural phenomenon (e.g. flood, tornado, earthquake, Tsunami, Cyclone and land slide, epidemics, pandemics etc.). It leads to financial, environmental or human losses. The resulting loss depends on the vulnerability of the affected population to resist the hazard, also called their resilience. Chhattisgarh State Disaster Management Authority is a nodal agency for preparation of disaster management plan of natural disaster for Chhattisgarh.

As per the recent categorization, the country has been divided into four zones (II, III, IV and V) and the project site is coming under Moderate Earthquake Zone (i.e. Zone-II). The plant and surrounding area fall in a moderate damage risk zone as per the recent earthquake categorization zone.

The problems envisaged at construction and erection stage can mainly be due to accident, fugitive dust emissions and noise. To overcome these hazards, the contractors in charge of construction and erection activities have to maintain noise levels within threshold limit values and the workers should be provided with personnel protective equipment. Mobile water sprinkler and wet drilling will be used to control dust emissions. The problems envisaged during the operation and maintenance phase are accident, exposure to heat, noise, chemicals etc. Suitable personnel protective equipments should be provided to all employees, likely to be exposed to these situations. In addition, medical facilities should be made available round the clock for attending any medical emergency.

1.8 PROJECT BENEFIT

The proposed expansion of Adani Power Ltd. - Raigarh Ultra Super Critical Thermal Power Plant by adding 1600 (2x800) MW will benefits local and regional economy. It will bring improvement in the standard of living of the local population by providing employment opportunities and improved infrastructure. The project will also attract the high-income groups to invest in the region and thus bring about economic growth of the region.

- Infrastructure development.
- Direct & indirect employment opportunity
- Revenue generation to central & state government.
- Allocation of 2% of the profit towards the ESC activities.
- Trickledown effect of enhance profitability to the local populace
- Skill development and capacity building like vocational training, income generation programmes and entrepreneurship development program
- Awareness programme and community activities, like health camps, medical aides, family welfare camps, sanitization/ cleanliness awareness programme, immunization camp, sports & cultural activities, plantation, etc.
- Awareness about water borne diseases and pandemic diseases etc. will be done to local villagers.

Adani Foundation is the CSR arm of Adani Group of companies implementing CSR projects and activities at different locations in India. Adani Foundation is implementing various CSR projects in 15 peripheral villages including 4 core villages of plant focusing on Health, Education, Sustainable Livelihood, Community Infrastructure Development, and Skill Development of the youths.

All CSR initiatives were aligned with Sustainable Development Goals (SDGs). Present year we took up many new initiatives like;

- Adani Competitive Coaching Centre,
- Utthan Project in 8 Govt. schools,
- Kabaddi Training for girls,
- Kamdhenu- Dairy Development Project in partnership with BAIF.
- 100 girls were trained in tailoring course,
- Micro-entrepreneurial development with SHGs for mushroom and vegetable cultivation.
- Constructed Community centre and shed at village Bade Bhandar and Kalma.

1.9 ENVIRONMENTAL COST BENEFIT ANALYSIS

Cost-benefit analysis provides an organizational framework for identifying, quantifying, and comparing the costs and benefits (measured in monitory values) of a proposed policy action. While this sounds logical enough, cost-benefit analysis has been cause for substantial debate when used in the environmental arena. The benefits of

environmental regulations can include, for example, reduced human and wildlife mortality, improved water quality, species preservation, and better recreation opportunities. The costs are usually reflected in higher prices for consumer goods and/or higher taxes. The latter are market effects readily measured in monitory values, while the former are non-market effects for which monitory values are not available. In addition to complicating the practice of cost-benefit analysis, this raises ethical issues. Monitory values cannot be assigned with respect to undisturbed natural places, to save human and animal lives. If such things are too 'priceless' to assign monitory values, we lose the ability to use cost-benefit analysis to inform the decision.

1.10 ENVIRONMENTAL MANAGEMENT PLAN

The major environmental considerations involved in the construction and operation of the thermal power station will be taken up by a full-fledged multi-disciplinary Environmental Management Division/ Cell (EMD) with key functions of environmental, safety and occupational health for management of the entire plant and surrounding environment.

The EMD will comprise a team of environmental engineers, chemists, horticulturists, safety specialists and well-trained staff for operation and maintenance of pollution control equipment. Staff training programmes in the areas of environment, ambient air, water quality monitoring, solid waste management, noise abatement, safety and health aspects would be conducted. The pollution control equipment would be provided with spares and maintenance facilities. Staff would be trained to operate ESP and other pollution control equipment at optimum efficiency. APL has Environmental Management Division (EMD) headed by a very senior manager and is assisted by a team of engineers, chemists, operating staff etc. This EMD will take up additional responsibility of environmental functions related to proposed mega power plant.

Operation Head would represent the Project's Company's interest in the operation & maintenance of the power station and would oversee the functioning of O&M Cell Company. He would be assisted by a team covering the following functional areas:

Technical: For monitoring overall plant performance, purchase of spare parts, consumables, etc., metering energy sent to the grid and for resolving any other technical aspects required to be resolved.

Finance & Accounts: For monitoring the O&M Cell's company's expenses in operation & maintenance of the plant, billing for energy sent into the grid, ensuring periodic repayment of loans and interest on loans, staff salaries and expenses and arranging for renewal of insurance covered at required intervals.

Administration & Personnel: For providing administration support such as secretarial, clerical and transport services & providing personnel services and managing the staff colony.

Ash Utilization Plan: Provision will be made for collection of fly ash in dry form in silos for further utilization/transportation through rail wagons / closed trucks to adjacent Cement Plants. 100% Ash will be utilised in Cement Industries, reclamation of abandoned mines, manufacturing of bricks, road construction, aggregate replacement in concrete, etc. as per Fly Ash Notification, 31st December'2021. Provision will be made for disposal of un-utilized ash in high concentration slurry form to ash dyke. An MoU has been signed between APL Raigarh and ACC Cement Limited and Ambuja Cement Limited for utilization of fly ash sale for the proposed1600 (2x800) MW USCTPP (PH II).

Rainwater Harvesting: The rainwater available for harvesting is calculated 163594 m^3 or 0.16 MCM per annum (Table 10.1). There is no extraction of groundwater for project. To harvest this recharge structure design of about 60m depth is proposed. Periodic maintenance required for reliable and higher quality water supply. During

raining season, the entire system to be checked before and after rains and cleaned after every dry period. Before first shower storage tanks should be cleaned and flushed of all sediments and debris. Also, the roof top will be cleaned before monsoon and coarse mesh is used to prevent the debris on the entrance of the water at roof. The first shower should be flushed so the any sediment can be washed away.

Solar Power: For harnessing solar power, all road lights will be solar based. In addition, the building structures will be so designed that daylight enters the shops through roofs. Daylighting can be especially helpful in industrial environments where natural light is often non-existent, presenting a prime opportunity for implementation.

Greenbelt: The green belt will consist of native and fast-growing trees. Trees will also be planted around the coal stock pile area and ash disposal area to minimise the fugitive dust pollution.

Mix culture of trees species will be preferred over monocultures. Line and rows of green belt will be break with the resistant tree species. This practise will help in improving the life of green belt by improving the disease resistance. The treated sewage water will be used for developing the green belt area. The survival rate of trees & plantation should be more than 95%, and it can be achieved by proper administration and good technical skill.

Existing area of the greenbelt is 167 acres. A total of 2,67,000 trees (since commissioning) & 20,026 trees (Plantation in FY2022-23 i.e. till 31.03.2023) have been planted on the existing land. Further, 123 acres of greenbelt & plantation is proposed to be developed to achieve plantation on 33% of the site area. The greenbelt shall have 3-tier plantation as per the CPCB guidelines with re-densification of existing greenbelt.

Social Enhancement Measures: The education and training of employees in good safety practices will be the responsibility of management. Employees will be instructed in the proper use of all equipment operated, safe lifting practices, location and handling of fire extinguishers, and the use of personal protective equipment.

An experienced O&M crew will be placed at an early stage to introduce the best system and operational management and practices. O&M crew will be assisted by a group of experienced technical personnel, to carry out the operation of the plant. The O&M crew will be associated with the plant commissioning stage itself to get them fully familiar with the plant. A suitable training schedule will be developed for this purpose. Employees required for 2x800MW Units O&M are estimated to be around 300 nos. excluding contract labour.

Cost of EMP: A cost provision **Rs. 2110.33 crores** towards providing environmental measures have been earmarked and the recurring cost (Operations & Management will be about **2.10 Cr. per annum. The heads for EMP are:** Electrostatic Precipitator, Chimney, Cooling Tower including civil works, Ash Handling including ash water recirculation, Ash disposal civil work, Dust extraction & suppression system, DM Plant Waste Treatment System, Sewerage collection, treatment & disposal, Green Belt & landscaping, FGD and SCR, Rainwater harvesting, Solar power harnessing, Environmental Laboratory & Environmental Monitoring, CEMS, CAAQMS, EQMS monitoring system & Main gate display board and Wind Breaking Wall, Dry Fog System & RCC Flooring in Coal Storage Area.