PROJECT FEASIBILITY REPORT
FOR
2X800MW MIRZAPUR USCTPP, UTTAR PRADESH

MIRZAPUR THERMAL ENERGY (UP) PVT. LTD.

MIRZAPUR, UP

April-2024

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1 EXECUTIVE SUMMARY

It has been observed from the statistical figures on demand and energy requirement in the 19th Electric Power Survey (EPS), published by Central Electricity Authority (CEA) under the Ministry of Power, Government of India, that the energy demand/supply position for Uttar Pradesh require adequate capacity addition particularly in thermal sector. Electricity being a major input for industrial growth, availability of reliable and quality power at a reasonable price is the key to the success of industrial plant operation as well.

The Project would be developed considering the following intrinsic features: -

- Land availability
- Fuel availability and transportation logistics
- Water availability and transportation to site
- Power evacuation from the Project
- Infrastructural availability and requirement of augmentation

For the main power block of 1600 MW Project and Unit size of 800 MW is favoured in view of:

- Superior thermal efficiency with Ultra Supercritical steam parameters
- More environment-friendly technology

The station planned is located on an identified plot of virgin land near State Highway no.-5 (SH-5) in village Dadri Khurd of Mirzapur district. The nearest railhead, Lusa Railway Station on broad gauge railway line of Northern Railway (NR), is at a distance of 24 kms from the site. The nearest commercial airport is at Varanasi, located at about 95 kms from site. The road access to the site is from State Highway SH-5 located about 1.7 km away from the site and it is also about 23 km from National Highway NH-7. The nearest town from the site is Mirzapur District Headquarters at a distance of about 25 km.

The water will be drawn from River Ganga to Upper Khajuri Dam and from Upper Khajuri Dam to plant site through dedicated pipeline of about 32.6 km in length.

The coal for the project will be transported by railway wagons from nearby coal mines of NCL/SECL/CCL & Commercial Coal Mines.

For auxiliaries' viz. Coal Handing, Ash Handling and Plant Water System, it is proposed to utilise the latest technology with adequate margin to ensure high availability of the Project.

Land area requirement for the proposed power station of 1600 MW capacity is about 365.19 Ha subject to shape and configuration of the plot.

- Forest Land (inside the plant boundary): 0.62 Ha
- Non-Forest Land is 364.57 Ha out of which is:
    - Private Land: 333.19 Ha (presently in the name of WEUPPL in revenue records including 1.01 Ha bearing plot no.180 (Jhari) allotted to WEUPPL in exchange for private land)
    - Government Land: 31.38 Ha (29.30 Ha of Govt. of U.P, land already applied on 22.03.24 and 2.08 Ha Gram samaj land to be applied for exchange)

Proposed Facilities outside Power Plant Premises are:

A) Approach Road (ROW/ROU) - Forest Land outside plant boundary :3.39 Ha
B) Water Pipeline (ROW/ROU) – under survey
C) Railway line (ROW/ROU) – under survey

Forest approval/Clearance for Outside facilities of Power Plant will be obtained after details survey & engineering.

This estimate considers:

- Main plant building with TG hall, steam generators, electro-static precipitators, chimney, transformer yard, 400 kV switchyard and power evacuation corridor.
- Recirculating cooling water circuit with wet type induced draft cooling towers.
- Flue gas desulphurization.
- Water treatment facilities.
- Waste water treatment and disposal system.
- Space for green verge to meet the requirement of State Pollution Control Board/Central Pollution Control Board.
- Land requirement for raw water reservoir and coal storage and handling area.
- Land requirement for ash pond.
- Land for fabrication yard and other facilities.

- Marshalling yard, administrative building, Site Office, Erector's hostel, Power evacuation corridor, etc.

(Land Area in Ha)

SN	Details	2x800MW
1	Plant Area (Considering Future Expansion)	85.80
2	Reservoir	33.18
3	Coal Stock Yard	64.75
4	Ash Dyke	49.37
5	Township	11.57
6	Green Belt	120.51
	Total	**365.19**
7	Forest Patch (Inside Plant Boundary) *	**0.62**
Others (Outside Plant Boundary)		
8	Approach road *	3.39
9	Pipeline#	Under Survey
10	Railway line#	Under Survey

*****Forest Land inside plant boundary 0.62 Ha and approach road 3.39 Ha is part of forest proposal for pipeline & approach road.

#Forest approval/Clearance for Outside facilities of Power Plant will be obtained after details survey & engineering.

2 INTRODUCTION OF THE PROJECT/ BACKGROUND INFORMATION

2.1 Identification of the Project and project proponent

Mirzapur Thermal Energy (UP) Pvt Ltd (MTEUPPL), has conceived setting up a coal based Thermal Power Project (TPP) in Dadri Khurd of Mirzapur district of Uttar Pradesh. MTEUPPL proposes to set up a two-unit station of 800 MW each based on Ultra Super Critical technology, to have an overall capacity of 1600 MW.

The Adani Group is one of India's leading business conglomerates with combined revenues of USD 15 Billion and with business interests spanning across Power Generation (Thermal and Renewable), Power Transmission and Distribution, Port Development & Operations, Development of Industrial Clusters & Special Economic Zones, Shipping & Logistics, City Gas Distribution, Solar Manufacturing, Real Estate, Coal Trading & Mining, Roads, Power Trading and Edible Oil Refining & Agro based infrastructure development, Defence, Aerospace & Airports. The group has demonstrated capabilities in conceptualization and implementation of large projects and excellent records of establishing benchmarks in the industry. The group has

a rich and extensive experience of working with government agencies and development of large infrastructure projects.

In the Energy Sector, particularly thermal power generation group Company Adani Power Limited holds the distinction of being India's largest private sector power producer with an installed operating coal based capacity of 15,250 MW, which includes 40 MW solar plant. A flagship company of the diversified Adani Group, APL has operating thermal power plants across 6 states of India i.e. in Gujarat, Maharashtra, Rajasthan, Karnataka, Chhattisgarh, Jharkhand and Madhya Pradesh.

2.2 Brief Description of nature of the project

General:

Project Authority	:	Mirzapur Thermal Energy (UP) Pvt Ltd (MTEUPPL).
Project	:	2x800 MW Ultra Super-Critical Thermal Power Project
Selected Location	:	The plant is located between 24°58'41.6" to 25°0'16.8" North Latitudes and 82°39'50.4" E to 82°41'03.7" E longitudes. It is located at Dadri Khurd village in Mirzapur Sadar tehsil, Mirzapur district in Uttar Pradesh.
Nearest Major Town	:	Mirzapur District Headquarters is about 25 km
Seismic Zone	:	Zone-III as per IS 1893.
Access by Road	:	State Highway (SH-5) located about 1.7 km away from the site & it is also about 23 kms from NH-17.
Access by Rail	:	Nearest railhead, Lusa Railway Station on BG railway line of Northern Railway is at a distance of 24 kms from the site.
Access by Air	:	Nearest Airport is at Varanasi at a distance of 72 kms from site.
Access by Sea	:	Nearest Seaport is at Haldia West Bengal.

Preliminary Project Particulars:

Main Fuel	:	Coal from nearby coal mines of NCL / SECL / CCL (GCV 3200-4300 Kcal /Kg) Design Coal 3700 Kcal/kg
Fuel Transportation	:	Through BG Railway line BOXN Wagons.
Water	:	The water will be drawn from River Ganga to Upper Khajuri Dam & from Upper Khajuri Dam to Plant site through pipeline.
Land	:	365.19 Ha of land required for the Power Project.
Layout Features	:	2 X 800 MW Ultra Super-Critical Units

Technical Features:

Power Generating Unit	:	Two units of 800 MW turbine generator sets fed by steam from coal fired P.F. boiler operating at Ultra Super-critical range.
Cooling System	:	Closed recirculating condenser cooling system with induced draft cooling tower.
Coal Handling System	:	Coal handling facility, which comprises receipt of coal from nearby coal mines through railway wagons, with in-plant coal handling system and finally feeding the bunker level conveyors.
Ash Disposal System	:	Fly Ash- Evacuation in dry form through vacuum & pressurised air conveying to fly ash storage silos for ultimate disposal by truck/rail wagons for cement and brick manufacturing, filling mines etc. Provision for disposal by High Concentration Slurry Disposal system along with bottom ash from a dedicated HCSD silo to Ash Pond during emergency.

		Bottom Ash- Extraction in wet form and collection in hydrobins for disposal either by trucks or by HCSD system along with fly ash to ash pond.
Power Evacuation	:	At 400 kV level to State Transmission Unit (STU) or Central Transmission Utility (CTU)
Environmental Aspects	:	Elaborate arrangements for Flue gas desulphurization (FGD) and suitable De-NOx systems complying with emission norms as per latest MoEF & CC. Independent steel wet flue for each unit, down- stream of FGD of suitable height as per MoEF & CC guidelines and an adequately designed electrostatic precipitator with more than 99.95% efficiency are envisaged. Wastewater quality to be maintained as per MoEF & CC notification. Zero Plant Discharge facility shall be present since the cooling water, blow down water, wastewater and ash water would be recycled back to the system after suitable treatment for reuse. For coal transportation from mines, conveyor technology will be adopted to mitigate environmental concerns.
Rehabilitation Requirement	:	NIL

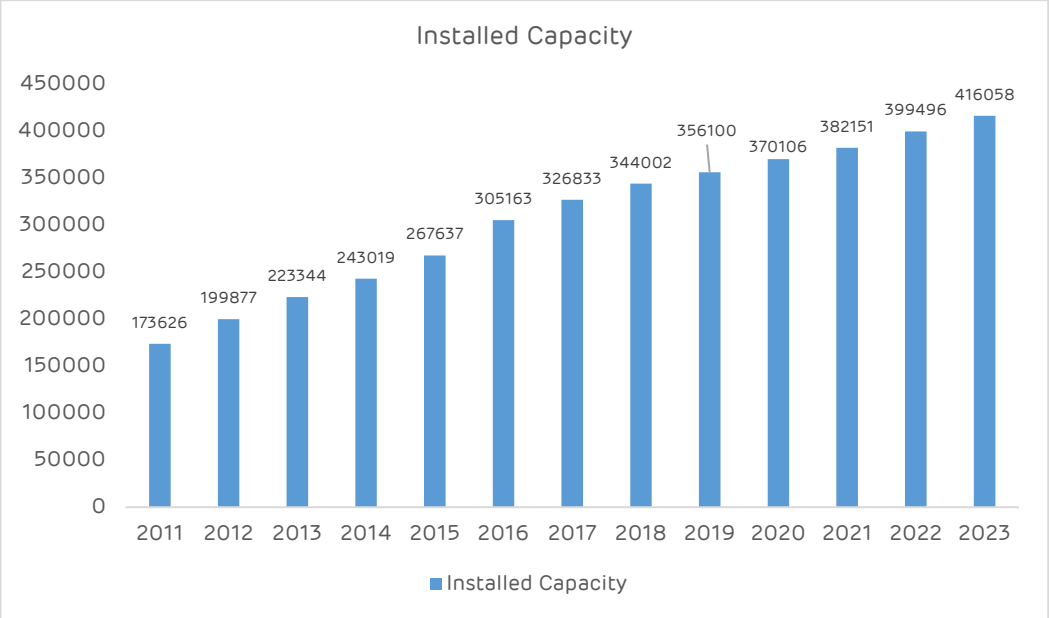
Other Facilities:

Township	:	Township with civic amenities would be developed.
Mode of Implementation	:	The Project would be implemented on EPC concept.
Project Time Frame	:	54 months from Zero Date i.e., the date of 'Financial Closure' for Commercial

Operation of Unit#1 and 60 months for Unit#2

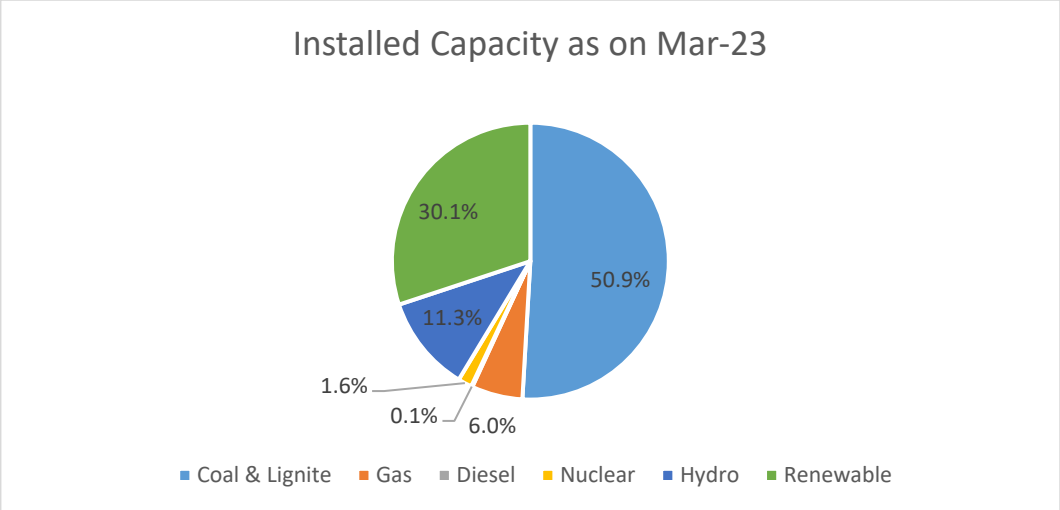
2.3 Need for the project and its importance

India's power sector has grown into a massive 416 GW system over the years and India is now the world's third largest electricity producer, only behind China & US.



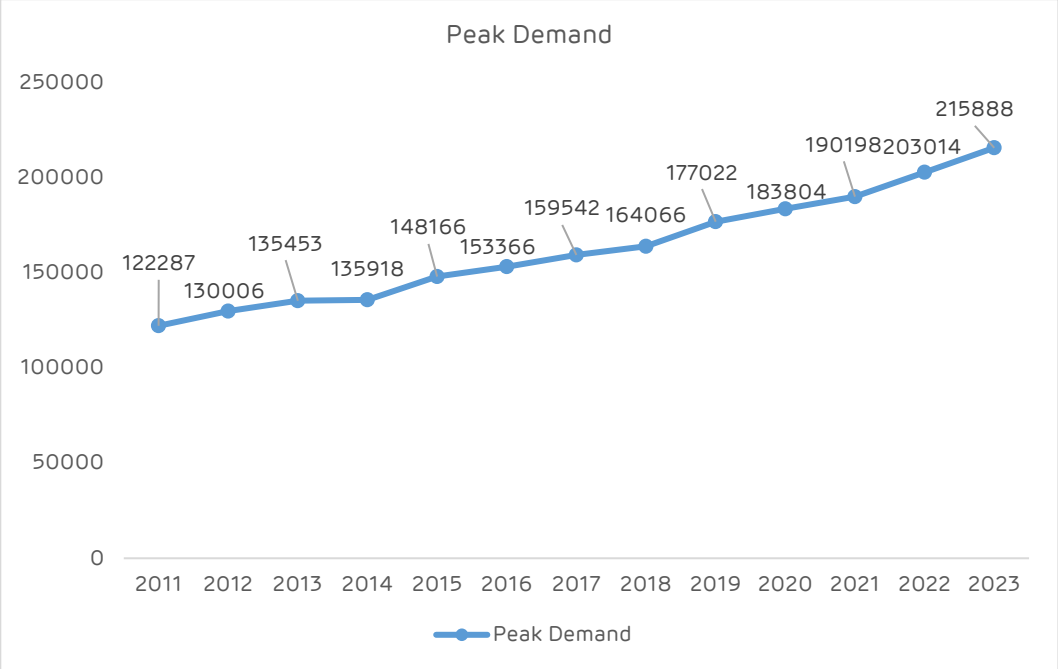
Source: CEA

India's power generating capacity represents a healthy mix of different types of generation sources, with coal accounting for a majority of the same.



Source: CEA

With sustained economic growth and industrialization over the past decade, India's electricity demand has also grown consistently, averaging at over 4.8% Y-O-Y.



Source: CEA

Between the year 2005 and 2022, per capita electricity consumption doubled from 631 Unit to 1255 Unit in India, making it the third largest electricity market in the world. With improving standards of living, and increasing electronic appliance penetration even across rural areas, the per-capita consumption and consequently overall power demand is likely to grow significantly.

2.4 Demand-Supply Gap

Access to cost effective and reliable power supply is the single biggest catalyst for inclusive growth and it is critical for industrial growth as well as for ensuring social growth of citizens and a high human development index.

Demand for electricity in India is expected to grow at a sustained pace given the government's massive push towards 'Make-In-India', increasing industrialization and improving incomes & standards of living.

As per the National Electricity Plan (NEP) published by the Central Electricity Authority, MoP in March-2023, India's Peak Electricity Demand is likely to

increase to around 366 GW in FY 2031-32 from the current Peak Demand of around 216 GW in FY 2022-23. The Base Demand is also expected to increase to 2473 BU by FY 2031-32. CEA also predicts that India's likely Installed Capacity by the end of FY 2031-32 will be around 900 GW, up by around 484 GW as compared to the present Installed Capacity.

As per the CEA's report on optimal capacity mix published in April-23, the share of coal-based capacity is ~51% in total capacity mix as of March-2023 whereas it contributed to about 73% of the total electricity generation of the country during 2022-23. In the studies, CEA estimates a Coal based capacity addition of over 16 GW by Year 2030 (i.e., apart from capacity under construction). In terms of PLF of coal-based plants, CEA studies indicated that super critical/ultra-super critical plants (600 – 800 MW unit size) will enjoy PLF's of around 65% as compared to smaller sized plants.

Thus, it is evident that as is the present case, coal based power will still be the dominant fuel in at least few years and coal-based power will continue to play a significant role in meeting India's demand of affordable electricity in the long term as well.

2.5 Justification of the Project

As we have seen, over the years, India's electricity demand has been continuously risen due to rapid industrialization and urbanisation. Over the years installed capacity of Renewable system has also grown significantly. (Out of present installed capacity of ~416 GW of India, Hydro and Renewable Energy contributes ~172 GW). However, the Renewable power is not available on round the clock basis due to its inherent intermittent nature and Hydro power capacity majorly depends on the rainfall which is uncertain. This makes coal-based power plant very essential for India to meet the demand continuously and reliably. Moreover, the coal-based power will continue to play a significant role for base load requirement.

As previously stated, The CEA anticipates an increase in coal-based power generation capacity exceeding 16 gigawatts by the year 2030, in addition to the capacity currently under construction. Consequently, without the installation of new thermal power plants, the nation could potentially

experience a significant electricity shortfall in the future, resulting in an inability to meet the growing demand for electricity. Therefore, the current 1600 MW Thermal Power Plant (TPP) project proposed by MTEUPPL will play a crucial role in mitigating this deficit and fulfilling the nation's future energy needs.

The state of Uttar Pradesh has been on the path of Industrialization. Due to consistent support and growth strategy adopted by the State Government, the large, medium and small-scale units are being set up every year. This process of industrialization further boosts the demand for power in the state.

Besides making India self-sufficient nation in energy generation, the proposed Project of MTEUPPL would also be helpful to the country for following benefits:

(i) Investment friendly image: As the power plant would entail investment of thousands of crore rupees which is a significant to boost the investment friendly image of the country.

(ii) Growth in Ancillary business: Apart from the direct investment, several other opportunities are also created for ancillary business and support activities such as transportation, hotels and restaurant industry, development of petty contractors including labor and manpower supply, construction equipment hiring, etc. Since most of these activities tend to be developed/ sourced locally, it directly benefits the country and citizenry.

(iii) Employment Generation: The Construction as well as operational phases of any Thermal Power Plant are both labor intensive and provide ample job creation and employment generation opportunities. During the construction phase and operational phase, significant direct & indirect job & employment opportunities are expected to be generated.

(iv) Revenue generation: There will be substantial revenue generation to the government(s) in the form of Electricity Duty / Environment Development cess on Auxiliary consumption of power plant for the entire life of the project. Moreover, there shall be revenue to the government in form of cess, Duties on goods/ equipment to be purchased, applicable taxes on the purchase/production of coal, etc.

Moreover, the proposed power plant will be operated based on ultra super critical technology and will have operational Flue Gas Desulfurization units from its Commercial Operation Date. Therefore, the power plant will be developed using state of the art technology in the thermal power sector and will be complying with all the stringent norms described by Ministry of Environment, Forest and Climate Change for a thermal power plant.

The major advantage in planning the proposed Thermal Power Plant at Dadri Khurd in Mirzapur District, Uttar Pradesh be summarized below:

- Land adequate for installation of the proposed power plant with all facilities is available.
- The site is well connected by road.
- The nearest rail head at Lusa Railway Station on BG railway line of North Railway is at a distance of 24 Km from the site.
- Water required for the station can be assured from Ganga River.
- Coal from nearby coal mines of NCL / SECL / CCL.
- The nearest towns, Mirzapur district headquarters is about 25 km.

The above advantages make the site adequately suitable for development of proposed 2x800 MW units at Dadri Khurd in Mirzapur District, Uttar Pradesh

3 PROJECT DESCRIPTION

3.1 Location

Location	Details
Villages	Dadri Khurd
Tehsil	Mirzapur Sadar
District	Mirzapur
State	Uttar Pradesh

3.2 Water – Requirement, Availability and its source

River Ganga is considered to be the source of water for the station. Water from River Ganga will be pumped to Upper Khajuri Dam and from Upper Khajuri Dam it will be further pumped to the raw water reservoir within the plant. The maximum consumptive water requirement of the proposed 2x800 MW station is estimated at around 4000 m3/hr considering disposal of Bottom Ash and Fly Ash in High Concentration Slurry Disposal (HCSD) mode. The requirement of plant water will be met by drawal of water through intake structure with pump house to be constructed near River Ganga and at Upper Khajuri Dam.

In a conventional fossil fuel-fired Thermal Power Project, water is used to meet the following basic consumptive requirements: -

a. To meet cooling requirement for steam condenser which acts as a heat sink for the thermodynamic cycle and other auxiliary cooling such as, bearing/lube oil coolers, compressors, generator stator, etc.

b. To meet the heat cycle make-up and other process requirements.

c. Flue Gas Desulfurization (FGD) and suitable De-NOX control system based on requirement as per New MoEF & CC guidelines

d. For miscellaneous services viz.

- Fire fighting
- General services viz. A/C and ventilation, floor washing etc.
- Sealing and cooling water for equipment of ash handling system
- Dust extraction and dust suppression in coal yard
- Potable use in the Project and housing complex
- Transport media for ash in case of wet disposal of ash (under exigency condition)
- Horticulture

The total consumptive water requirement for 1,600 MW Project capacity is 3200 m^3/hr (28MCM/year considering specific water consumption 2.5 m3/MW as per MoEFCC.

It is desirable that the water is free from high level of suspended and dissolved solids. The water is to be free of heat pollution at the intake point. The intake location and design have to ensure trouble-free operation throughout the year. The schematic representation of the water balance diagram is enclosed.

3.3 Fuel - Requirement, Availability & Transportation

The following features in system design are considered:

- Coal from nearby coal mines is envisaged.
- Height of coal stock is contained within 10 m.
- Crushed coal is stacked to avoid self-ignition.

Coal from nearby coal mines of NCL/SECL/CCL is considered as the primary fuel for the proposed plant. The mine blocks to be used will have adequate mineable reserve to cater to the requirement of the Complex for the life of the plant.

It is planned to convey coal from the mine to the Plant site through broad gauge railway line of Northern Railways (NR).

Coal will be received in sizes of (-) 300 mm after primary screening, crushing and sizing at mine end.

The gross calorific value of design coal will be about 3700 KCal/kg with sulphur content around 0.55% (max.). design coal for the station will have an ash content of about 34%.

For the presently proposed power Project of 1600 MW, the maximum daily coal requirement @ TMCR would be about 20,600TPD and annual fuel requirement is estimated about 6.4 Million MTPA at 85% plant load factor with coal GCV of 3700kCal/kg.

Based on further inputs, the actual consumption of coal for the Plant would be calculated in the DPR stage.

Auxiliary Fuel:

Auxiliary liquid 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).

Fuel Transportation:

Coal from nearby coal mines of NCL/SECL/CCL is considered as the primary fuel for the proposed plant. The mine blocks to be used will have adequate mineable reserve to cater to the requirement of the Complex for the life of the plant.

It is planned to convey coal from the mine to the Plant site through broad gauge railway line of Northern Railways (NR).

The secondary fuel for the proposed Power Project i.e. LDO/HSD shall be sourced from the refineries located nearer to the Project. As the quantity and frequency shall not be significant and distance is short, it is suggested that the required quantity shall be transported by road.

3.4 Power Evacuation

Power Generated by the station will be stepped up to 400 kV level through Generator Transformers. A 400 kV Switchyard has been envisaged at the Power Plant. Power evacuation to the grid will be at 400 kV from the Power Plant switchyard to nearby 400 kV UPPTCL/UPPCL grid substation.

3.5 Other Infrastructural Facilities

Miscellaneous infrastructural requirements for setting up a power Project are:-

- Access road
- Availability of housing for construction staff and finally operating personnel.
- Availability of market, health care, education facility, entertainment centre etc.
- Availability of skilled and unskilled manpower.
- Telecommunication facility.
- Other facilities like workshop, bank, post office, police station etc.

Heavy-duty class National Highway NH-7 and State Highway SH-5 runs in close proximity of the proposed plant area. Access road will have to be suitably constructed up to the plant for movement of men and materials. The station will also be connected by rail route. The station will be equipped with workshop, stores, training centre, safety and security sections, fire station, well-planned township with civic amenities, etc. All associated facilities like market complex, schools, hospital, post office, police station, communication facilities, temple, community center, playground etc. will be developed to attract skilled manpower for the plant. During construction stage, basic infrastructural facilities will be developed for skilled/unskilled manpower with civic amenities as nearest major town, Varanasi is located quite far off from the site, around 95 KM.

Ammonia Requirement, Availability and Transportation

Ammonia (19% aqueous ammonia or 99.5% anhydrous ammonia) will be required as the reagent if decided to go for SCR system for De-NOx control to meet the requirement of NOx outlet emission as per MoEF & CC.

If 19% aqueous ammonia will be used as a reagent, annual requirement will be around 24000 tons for 2x800 MW. In case anhydrous ammonia is used as a reagent, then annual requirement will be around 4650 tons. Type of ammonia to be used will be decided based on the recommendation from technology provider and the availability & transportation options.

Limestone Requirement, Availability and Transportation

Limestone will be required for FGD system to meet requirement of SO2 outlet emission.

Annual requirement of limestone will be around 1,75,350 tons for 2x800 MW. Limestone source and mode of transport is under study.

3.6 Quantity of wastes to be generated.

i) <u>Ash Disposal</u>

The annual ash generation @85 % PLF is 3.11 MMTPA. Fly ash has high pozzolanic properties and form cementaceous material when mixed with lime and water and it is suitable for the following commercial uses:

- Cement Industry
- Brick Industry
- Light Weight Aggregates
- Road Sub-base
- Grouting material
- Roads / paving - used as filler in asphalt mix for roads.
- Road enlargement
- Land filling material

Ash Management Plan will be developed and implemented for achieving 100 % utilisation of fly ash within the time period prescribed by MoEF from time to time

- Disposal of fly ash from silos to nearby small-scale industries like cement manufacturing, Construction work (RMC plant, Roads, Highways), Brick Manufacturing, etc.

- Bottom ash generated shall be supplied to the Road Mix Concrete (RMC) / brick producers / filling of low lying area / filling of mine

voids as per the statutory guidelines thereby eliminating the need for separate area shall be explored.

In case of any exigencies, unutilized ash will be transported to the ash dyke as high concentrate slurry using high concentrate slurry pumps.

Ash evacuated from ESP/Economiser/Air Preheater collecting hoppers is transported in closed pipelines by pneumatic means. At the time of unloading fly ash into the silos, some ash laden air would get vented out. In order to restrict the fugitive emission of ash dust particles to the limits of <30 mg/Nm3, a vent filter will be installed on top of each of the fly ash silos.

The following pollution control measures will be installed for ash disposal:

- It is proposed to use closed trucks for fly ash transportation in order to avoid dust nuisance. To reduce the dust nuisance while loading the ash into the trucks from fly ash silos, the fly ash is conditioned with water spray.
- Water sprinkling system has been commissioned in the ash disposal area to restrain flying of fine ash to wind.
- It is also proposed to dispose un-utilised fly ash to ash dyke.

The dust nuisance in the ash disposal area will be contained by ensuring that the ash is always kept wet.

ii) Solid Waste Management

The power plant, being Coal-fired, would generate coarse as well as fine ash. All efforts will be made to utilize the fly ash for various purposes. Ash Management Plan will be developed and implemented for achieving 100 % utilisation of fly ash within the time period prescribed by MoEF. The unused ash, till such time, would be disposed in the ash dyke.

Apart from this, all the kitchen waste will be collected separately and disposed of as per the Solid Waste Management Rules, 2016 and construction waste shall be reused in back filling & levelling of ground.

iii) Hazardous Waste Management & Its disposal

The Coal-fired thermal power plant would generate hazardous waste like used oil / spent oil, oil-soaked cotton waste, empty barrels / drums (from paint or oil containers), spent ion resin and other which will be collected & stored on a designated storeyed with proper shed & impermeable flooring. These Hazardous Waste will be disposed off in timely manner as per the guidelines of MoEF&CC and CPCB vide Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

iv) Storage of hazardous materials

Hazardous material anticipated to be stored at site during construction include petrol, diesel, welding gas, weld inspection material, radiographic material, paints, cleaning chemicals, DM plant chemicals etc. These materials will be stored in accordance with prescribed safety norms in ventilated enclosures. Safety instructions and signage will prominently be displayed at appropriate points/locations.

3.7 Project Description with Process Details

POWER GENERATING EQUIPMENT

Introduction

MTEUPPL intends to implement a coal based 1,600 MW capacity Power Project firing domestic Indian coal sourced from nearby mines. The Project would be located at Dadri Khurd village, Mirzapur Sadar tehsil, Mirzapur district, Uttar Pradesh. The proposal is mooted to deploy the state-of-the-art technology and accordingly two units of 800 MW are being considered with ultra-supercritical steam parameters to attain high cycle efficiency. Water would be sourced from Ganga River, Water from Ganga River shall be pumped to the Upper Khajuri dam and from Upper Khajuri Dam water will be further pumped to plant raw water reservoir by means of Intake Water Pumps. River Ganga is located approx. 23 km upstream of Upper Khajuri Dam and the Upper located Khajuri Dam is approx.7 km from the plant.

The basic plant design would consider unitised concept as far as possible. Judicious provisions would be considered for reasonable spare capacities in various systems and system components and inter-changeability of

equipment/system. State-of-the-art technology has been considered for design of the proposed station. Based on ambient parameters, operational aspect, evaporation loss and site-specific data, the size and capacity of reservoir is suitably considered to ensure continuous plant operation.

Basic design parameters for equipment and systems are as follows: -

a) Ambient dry bulb: 39.2 ºC maximum, 13.2 ºC minimum.

b) Maximum relative humidity: 85%

c) Average relative humidity: 65%

d) Design wet bulb temp.: 27.1 deg C.

e) Total annual rainfall: 1464.8 mm in 1953 (total monthly rainfall: 846.1 mm in 1976)

f) Seismic zone: Zone-III as per IS-1893

g) Mean Wind Speed: 7.3 km/hr.

h) Altitude: About 180 M above mean sea level

Selection of Technology

The Project under consideration at Dadri Khurd village, Mirzapur Sadar tehsil, Mirzapur district, Uttar Pradesh. as conceived by MTEUPPL is being planned as a base load station. However, based on potential of increased utilization of renewable power, the plant will have provisions to operate in flexible mode, as per fluctuations in the supply of renewable component in the grid.

From the viewpoint of available state-of-the-art technologies, three alternate proposals attract attention for planning the thermal power station under consideration. For electric power generation deploying Rankine Cycle, applications of sub-critical, supercritical and ultra-supercritical steam parameters are in vogue. Sub-critical steam cycle operate well below the steam/water critical pressure of 221.2 bar. However, plant thermal efficiency as well as improved environmental performance can be attained by increasing the operating pressure and temperature of steam. The technology deploying supercritical steam parameters in once-through mode was initiated in early 50's but was not pursued in USA due to poor plant availability. However, the technology was pursued in Europe and Japan to

avail the intrinsic benefit available in terms of lower specific fuel consumption. With improvement in metallurgy of heat exchange surfaces by newer alloying elements, the technology has attained desired level of success with high availability of plant in the 90's. With extensive research in the field, the technology has now achieved acceptance both in developed and developing countries and is the current dominant technology for large scale utility power generation offering improved thermal efficiency.

In supercritical / ultra-supercritical (pressure & temperature at critical point are 22.1 MPa & 374.2 ^{0}C, respectively) boiler, as heat is applied to water, temperature rises but water does not boil. With addition of further heat, water molecules gradually get agitated, inter molecular space increases uniformly and fluid becomes less dense. Transition from dense phase water with compact molecular arrangement to wide spaced random arrangement of vapour is uniform. No internal bubbles are formed. Enthalpy changes uniformly and all other physical properties change uniformly from liquid to vapour stage with gradual rise in temperature.
Unlike sub-critical boiler each tube in a supercritical and ultra-supercritical boilers receives same quantity of heat input since all tubes pass through all heat zones minimizing variation in enthalpy.

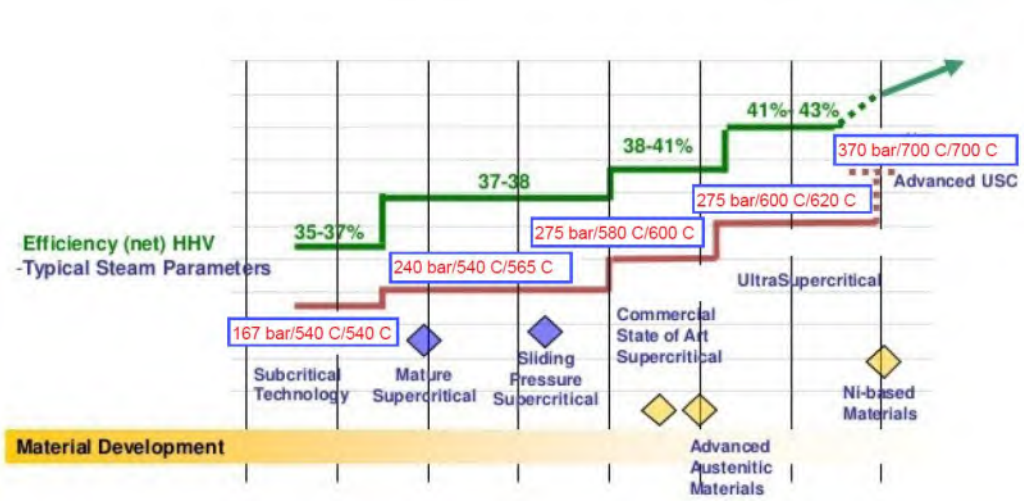
Steam generator consists of a number of parallel circuits connected by inlet and outlet headers. Pressurised water enters the circuit at one end and leaves as superheated steam at other end. Supercritical and ultra-supercritical boilers are essentially "once-through type".

Once-through boilers have been designed in both two-pass and tower type design. Since flow is once-through, furnace wall tube temperature tends to increase at low load. Assisted circulation mode is superimposed to overcome this problem.

The volume of the evaporator system of once-through boiler is much smaller compared to a natural circulation boiler. This leads to smaller amount of water in the evaporator. Due to smaller inventory of stored water and steam, theoretical rate of response of supercritical and ultra-supercritical units are much faster than drum type unit. In comparison to the sub-critical unit, the supercritical and ultra-supercritical units have low thermal inertia resulting

in a shorter start-up time, faster rates of load change and shorter time of forced cooling operation during emergency shutdown. Pressure changes could be achieved more easily and a true sliding pressure operation mode with reasonable load change capabilities becomes possible. In supercritical and ultra-supercritical units, main steam temperature is controlled by water-fuel ratio control with back up spray attemperator. As a result, rated steam outlet temperature could be achieved at all loads with all types of fuel. With ultra-supercritical parameters, there is an improvement of cycle efficiency attributable to elevated pressure and temperatures. However, for smaller units the improvement in heat rate is marginal. Using ultra-supercritical parameters is more advantageous for larger units where thermal efficiency improvement is more pronounced. An approximate efficiency gain of 3 - 5% points compared to conventional supercritical technology can be obtained by selecting ultra-supercritical steam parameters. The below figure depicts the progression of plant efficiency gain commensurate with technology upgrades.

Many plants with ultra-supercritical parameters are in operation in China, Europe and US. Some USC plants are under execution in India. With the increasing penetration of renewable energy generation technologies, there have been lot of questions of how the system operator will be able to balance the grid to ensure that the consumers receive uninterrupted, quality power supply without any voltage or frequency variations, and the electrical equipment connected are not damaged due to wide swings in voltage and frequency. Hydroelectric power and gas based power have been internationally considered to be best for playing this balancing or complimenting role. However, India has limited hydro power, and it is going to be difficult to develop more of hydro resources due to the issues related to forest destruction, wildlife and massive scale rehabilitation and resettlement. So, coal fired power plants will remain an important component of India's power mix for significant time to come, and plants based on super-critical or ultra-supercritical technology, which have faster ramp up and ramp down times will be the most suitable for meeting the unique needs of the Indian electricity network.



In addition to faster response times, ultra-supercritical technology, increase in overall plant thermal efficiency results in reduction of fuel consumption per unit of electricity generated, which in turn also reduces CO_2 emissions in coal fired power plant. Ultra-supercritical units also emit less SO_x and NO_x. Improvement in thermal efficiency also causes substantial reduction in emission of suspended particulate matter to the environment. Last but not the least good efficiency is associated with lower fuel costs.

Single or double reheat is selected for the STG, the reheater final steam temperature may be selected adequately high (about 600 / 610 ^{0}C at Turbine inlet) to avoid wet vapour in the later stage of the turbine and attaining a high cycle efficiency.

In general, water is considered as a good solvent and steam as poor one. This generalisation becomes increasingly less valid as operating pressure increases. As densities of two phases in equilibrium approach each other so do their solvent characteristic. Common impurities, like silica, sodium chloride, sodium sulphate, calcium sulphate, etc., remain soluble in water and their solubility in sub-critical steam is less. But above critical pressure solubility of these substances become higher in steam phase and since there is no phase separation, impurities get carried to steam phase. Hence, supercritical / ultra-supercritical units needs extremely pure feed water, resulting in the best possible feed water treatment. The make-up water and condensate must be purified also since marginal blowdown is available to remove impurities. Thus, condensate polishing unit is a must in the condensate circuit for supercritical units.

For identical size, although once-through boilers avoid thick-walled components like drum and replace it with small diameter separator vessel, the installation costs of supercritical / ultra-supercritical plants are 3 to 5% higher than sub-critical plants. Due to high pressure and high temperature, superheater and reheater require costly alloy steel, so also HP/IP turbine section, which require higher Chromium, Molybdenum, Vanadium and Nickel content to retain tensile strength of the material at a higher temperature. All these added together raises the installation costs. The wall-thickness of HP turbine section needs special consideration. While the wall-thickness should be high enough to withstand elevated pressure and temperature, the thickness has to be as low as possible to avoid massive material in order to increase the thermal flexibility and fast load changes. The wall thickness of the tubes and headers of once-through boiler needs to be designed to match the planned pressure level.

Globally, supercritical and ultra-supercritical plants are in operation. As per available information, their availability and maintenance costs are comparable to sub-critical plants, if not better. The benefits of ultra-supercritical technology, may be summarised as:

- Improved thermal efficiency attainable
- Reduced fuel cost
- Reduction of carbon-di-oxide emission by as much as 15% per unit of electricity generated compared to typical sub-critical units. This may attract incentive permitted as per governing CDM norms.
- Very good part load efficiency.
- Very low emissions of NO_x, 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.

It is needless to mention that significant research and development work in the field are being carried out to optimize on:

- Cycle layout and heat rate
- Requirement of auxiliaries

- Environmental impact
- Initial cost
- Plant availability.

In Indian context, the following features need special attention compared to the technologies available in other Countries:

- Dependence on imported materials for heat transfer surfaces and the turbine parts handling high temperature steam will offset the cost advantages normally available in advanced countries.

- Indian coal has high ash content, which is also abrasive in nature. This aspect may be given due attention during furnace design.

- Suitable training of O&M staff and indigenous vendors would be necessary.

- Superior water treatment along with 100% condensate polishing being essential requirement needs to be ensured.

An evaluation of steam cycle performance shows that a cycle efficiency in excess of 42% is attainable in ultra-supercritical applications compared to 38 – 40% % attainable with super-critical steam parameters. At a more specific level, improvements are possible and are being attained through:

- Increase in main and reheat steam temperatures, main steam pressure including transition to ultra-supercritical conditions.
- Changes of cycle configuration, namely, increasing number of reheat stages, feed heaters with associated increase in final feed water temperature. For example utilizing topping de super heater (dry heater) over and above normal regenerative feed heating arrangement and utilizing LP drip pump with feed forward arrangement.

- Changes in the boundary conditions of the cycle, namely, flow and temperature of flue gas at the outlet, condenser pressure etc.
- Improvements in steam turbine efficiency through optimized flow paths & last stage blade design improvements
- Reduction in auxiliary power consumption.

- Improvement in the performance of the individual plant components, which in turn, has an effect on the other areas listed above (coal combustion, turbine efficiency, pump efficiency, condenser performance etc.).

For the proposed Power Project a two unit configuration of 800 MW each has been planned with overall capacity of 1600 MW with ultra-supercritical steam parameters by the Project proponent. The choice of ultra-supercritical steam parameters in once-through boiler is prima facie guided by the improvement in combustion efficiency as listed above. The choice is, however, beset with use of higher alloy steels in the heat transfer surfaces.

For the present study, the details of power cycle equipment for 800 MW ultra-supercritical units are given below:

Equipment	Details
Boiler	Re-circulation
Turbine	1HP+1 IP+ 2LP
Generator (MVA)	940
LP Heaters	Four (4) to Five (5) Nos.
HP Heaters	Three (3) Nos. + one (1) dry heater
Deaerator	One (1) No.
Condensate Extraction Pumps	3 x 50%
Boiler Feed Pump	2x50% TD + 1x30% MD
Vacuum Pumps	4 x 50%
Condensate Polishing Units	4 x 33.3%
HP Bypass Valves	Two (2) Nos.
LP Bypass Valves	Two (2) to Four (4) Nos.
Recirculation Pumps	Two (2) Nos.

The steam parameters and basic inputs are given here under:-

800 MW Ultra Supercritical : M.S. – 270 Bar(a), 600 °C, 2195 TPH
R.H. – 600 / 610 °C
Feed Water Temp. : 194.8^{0}C (BFP Outlet)
Condensate Flow : 1435 TPH

The above values are computed based on technical parameters mentioned in published document and is subject to changes as per manufacturer's

design conditions. Approximate improvement in plant thermal efficiency on weighted average basis as indicated for 800 MW ultra-supercritical sets over conventional super-critical 800 MW machine is approximately 3 - 5% points. From the above, it may be inferred that for a typical 800 MW unit, the advantages in terms of improvement in heat rate is marginally eased out by high investment requirement. But with the improvement in cycle efficiency, lower fuel costs and incentive for CDM available and the environmental benefit attainable, the choice tilts in favour of the ultra-supercritical unit. The marginally high capital investment requirement for ultra-supercritical boiler and turbine generator sets is attributable to high priced quality alloy steel involved. In recent past and current scenario, with considerable R&D efforts and sustained selection & usage of superior quality and high creep strength alloy steel for boiler tubes (T91/ T92/ Super 304H / HR3C) as well as thick-walled steam headers (P92) in multiple operating super & ultra super critical projects world-wide, the techno-economic viability of superior materials is proven. With the above in view, for the proposed 2x800 MW Project of MTEUPPL at Mirzapur deployment of ultra-supercritical steam parameters is favoured.

Turbine Generator Unit

Steam Turbine Plant:

The turbine component and its auxiliaries will be designed and selected to meet the stringent requirements in respect of superior thermal performance, excellent product reliability and operational flexibility.

The turbine manufacturer will have turbine designed based on modular design approach that divides the turbine into three main parts:

High-pressure (HP) section,
Intermediate-pressure (IP) section and
Low-pressure (LP) section.

Turbine

The proposed turbine will have one HP, one IP and two double-flow low-pressure casings. All components will be selected based on long-proven records and standardized modules. The turbines will be of the tandem compound design. The individual shafts of the cylinders and the generator

rotor shaft will be coupled rigidly together, and all the shafts will be machined from single forgings. The turbo-generator set would be designed for a maximum throttle steam flow at turbine Valve Wide Open (VWO) condition of 105% of Turbine Maximum Continuous Rating (MCR) flow.

HP Turbine

The HP turbine will be designed with single flow. This will have a double-shell casing consisting of inner casing carrier and barrel-type outer casing. Main steam to the HP turbine will be supplied through two combined stop and control valves. The exhaust branch will be located below the turbine.

IP Turbine

The IP-turbine will be designed with single or double flow based on OEM design. This will have a double-shelled casing with horizontally split inner and outer casing. Reheat steam will be admitted through two combined stop and control valves of the turbine. The valves will be arranged on either side of IP casing. The exhaust branches will be on the top of the casing. The steam flows to the LP Turbine through a crossover pipe.

LP Turbine

The LP-turbine will comprise horizontally split multi shell casing. The outer casing will consists of two end walls, a bracing system, the top half and the sidewalls. The inner casing will be double shell axially split supported by support arms that are bolted to it and that rests on the bracket supports of the bearing pedestals. The bearing pedestals will be mounted on the foundation. They will carry the shaft seal casings, which shall be joined to the outer casing by means of expansion joints.

Valves

The HP-Turbine will be fitted with two combined stop and control valves and one overload control valve for main steam admission. Two combined stop and control valves will be installed at the IP-Turbine for hot reheat steam admission.

Each combined valve consists of a stop valve and a control valve that will be mounted on a common body. Every stop valve and control valve will be equipped with an electro-hydraulic-actuator. The main steam valves will be

directly mounted on the HP-turbine. A quick acting HP and IP bypass station would be provided as a part of the turbine package.

Gland Steam Sealing System

A fully automatic gland sealing steam supply system will be provided for the TG Set and the turbine drives of BFPs. HP & IP turbine shaft glands will be sealed to prevent escape of steam into the atmosphere and the LP turbine glands will be sealed for preventing leakage of atmospheric air into the turbine. Steam will be used for sealing these spring backed labyrinth glands.

During start-up and low loads (say 40% load), seal steam will be supplied to the turbine glands from the auxiliary steam header or cold reheat line through a seal steam-regulating valve. During normal operation (above 40% load), the HP and IP turbines will be of self-sealing type and under that condition the auxiliary/CRH steam source will be cut off and the leak-off steam from HP and IP glands will be used for sealing the LP glands. The excess leak-off steam shall be led to the condenser. A gland steam condenser will be provided to condense and return to the cycle, all gland leaks off steam including that from BFP turbines. A desuper-heating type bypass will be provided during outage of gland steam condenser. 2x100% capacity vapour exhausters will be provided to remove non-condensable gases from the gland steam condenser. The exhaust gases will be led over the TG hall roof level.

Shaft Glands

All shaft glands will be of the axial-flow labyrinth type. The glands on the LP turbine will be mounted in gland casings that will be bolted to the bearing pedestals.

Lube Oil System

The oil system will supply oil for lubrication and cooling of turbine and generator bearings, and to the hydraulic shaft turning gear during start-up and shutdown. This system will be provided with AC & DC powered oil pumps. To improve lubrication of the bearings during start-up and shutdown, a jacking oil system will be installed which also supplies motive oil to the hydraulic turning gear with hydrometric gear motor.

A separate, self-contained high-pressure fluid system with dedicated pumps will be provided for valve actuation. The system will specifically include the following:

The main oil pump will be centrifugal/gear type. The turbine shaft will directly drive it. It will have sufficient capacity to handle lube oil requirement of the bearings and emergency seal oil requirements.

2 x 100% AC Aux. Oil pumps for start-up, slowdown of TG unit and as standby to MOP for automatic operation. These pumps will be in service during start up till the main oil pump takes over the supply.

1 x 100% DC emergency oil pump for meeting lube oil requirements of bearings during emergency with automatic starting on low lube oil pressure preset value.

One (1x100%) each AC & DC motor jacking oil pumps will be provided to lift the rotor at the bearing during turning gear operation.

Each unit will be provided with an oil tank of sufficient capacity for oil changes. 2 x 100% duty vapour extraction fans. The 2 x 100% capacity oil coolers will be provided for oil cooling.

A lube oil purification unit will be permanently installed for each unit for the total oil charge on a continuous basis.

Turbine Control Fluid System

For the governing and control system of the turbine a complete self-contained control fluid system will be provided. Fire resistant fluid will be employed to eliminate fire hazards. The system will comprise:

A control fluid reservoir of adequate capacity to ensure fluid supply.

2 x 100% AC motor driven pumps to pump the fire resistant fluid from the reservoir.

2 x 100% capacity control fluid coolers designed for service with DM water.

A control fluid purifying unit will be provided for the turbo-set for purifying at least 2% of the total fluid charge in the system per hour on a continuous bypass basis. 2 x 100% capacity AC motor driven purification pumps to circulate oil through purification system will be provided. Necessary filters, strainers, piping, fittings, valves and instruments shall be provided.

Governing/Regulation Systems

The turbine will have throttle or nozzle controlled type governing. The steam turbine generator unit will be equipped with an electro-hydraulic governing system backed up by 100% mechanical-hydraulic or electro-hydraulic control system. The governing system will be highly reliable and operationally safe and it will be capable of controlling with stability, the speed of the turbine at all power outputs between zero and the specified maximum power output when the unit is operating isolated, or the energy input to the steam turbine when the unit is operating in parallel with other units in the grid. The turbine governing system will be designed for high accuracy, speed and sensitivity or response. The governing system will limit the over speed of the turbine on loss of full load to value less than 8% of the rated speed.

Turbine Drain System

To avoid thermal stress and possible deformation of the turbine casing, the condensate produced by the condensing steam during warm up of the turbine will be discharged into a standpipe of the condenser.

HP – LP Bypass Station

60% (BMCR) HP and LP Turbine bypass station will be provided to act not only as a protection to the turbine during pressure rise resulting from sudden load throw-off but also to enable operation of the unit at loads lower than the control load. Further HP/LP bypass will permit quick, repeated hot starts of the unit on its tripping.

The LP bypass station will be connected to the hot reheat line and discharges the steam into the condenser. The hot reheat steam will be de-superheated by means of condensate injection. The bypass system shall be in operation when the steam turbine is not able to receive the entire steam quantity, e.g. during start-up or in case of a load rejection. The HP and LP bypass stations will be capable of meeting the following requirements:

Quick start-up of the steam generator from cold, warms & hot conditions.

Parallel operation of the bypass with turbine under large load throw-off.

House load operation followed by large load throw-off.

To keep the steam generator in operation so as to avoid a trip out the steam generator following full load rejection.

Condensing Plant:

Condensing Equipment & Accessories

The function of the condenser is to condense the steam exhausted from the LP cylinders and to produce and maintain as high a vacuum as possible in order to increase the enthalpy drop, which can be utilised in the turbine.

Design Features

The condenser will be a single-flow box-type surface condenser with water boxes on each end. The steam space will be of rectangular cross-section to achieve optimum utilization of the enclosed volume for the necessary condensing surface. The condenser will be located below the LP turbine and form an integral part of it.

The steam dome, shell and hot well are steel fabrications, like the water boxes. The condenser will be fixed supported on the foundation beneath.

The double-flow LP turbine outer casing will be connected to the condenser through the steam dome. The steam dome will be welded to the exhaust casing of the turbine with the result that the LP turbine cylinder and the condenser form a unit.

The direction of circulation water flow will be at right angle with the turbine axis and in one pass. The condenser tube bundles, on which the exhaust steam from the turbine condenses, will consist of straight tubes with smooth surfaces and running right angle with the turbine axis in the steam space of the condenser. The condenser tubes rest in tube support plates at regular intervals along their length to prevent impermissible tube vibration when the condenser is in service. Tube sheets on the circulating water inlet and outlet sides will act as partitions separating the steam space from the cooling water side. Both ends of the tubes, through which circulating water flows, are roller-expanded into the tube sheets. On the cooling waterside the water boxes will be provided with a coating to prevent contact corrosion.

The condenser tubes will be divided into tube bundles designed to promote uniform flow. The following general aspects of possible improvements will be considered:

i) Lowest possible condenser inlet pressure influenced by the pressure drop between the LP-turbine diffuser and condenser tubes, the heat transfer coefficient of the tubes and the activation of the entire heat-exchange surface

ii) Smallest possible condenser heat losses.

iii) Minimized oxygen content in the condensate

Air Extraction

The unit will comprise of 4x50% vacuum pumps along with all accessories and instrumentation for condenser air evacuation. The vacuum pumps and accessories will be used to create vacuum by removing air and non-condensable gases from steam condenser during plant operation. Vacuum pumps will be of single/two- stage liquid ring type with both stages (if two-stage pump is selected) mounted on a common shaft. Vacuum pumps will be sized as per latest HEI requirements.

Condensate Extraction Pumps

Each unit will have 3 x 50% capacity motor driven condensate extraction pumps (two operating and one standby). The condensate pumps will be vertical canister type, multistage centrifugal diffuser design with a double suction first stage designed for condensate extraction service having low suction head requirement. The pumps will be capable of handling the condensate from the condenser together with feed heater drains when the machine is operating at maximum unit output with HP Heaters out with 1% make-up and discharging this quantity through the LP heaters to the deaerator. The pump will have adequate margins on capacity and head to cater for most adverse conditions of operation such as:

HP & LP bypass in operation.

HP heaters out of service and unit operating at its maximum load during an under frequency operation.

Regenerative Feed Heating Cycle

Regenerative feed heating plant will be designed for all operating conditions including transients like sudden load throw-off, HP-LP bypass in operation, one or two heaters going out of service etc. The condensate from the condenser will be pumped by the condensate extraction pumps through the train of LP heaters to the deaerator. In deaerator, the condensate will be heated to saturation temperature and fed to the boiler feed pump, which increases the feed water pressure to suit the steam generator requirements. Finally the feed water is fed to the boiler through a feed regulating station.

HP & LP Heaters

Regenerative feed heating cycle will consist of LP heaters and HP heaters. The number of LP & HP heaters will be based on the optimisation of feed heating cycle.

Feed water will be heated by uncontrolled turbine extraction steam from turbine inter-stage tap-offs and cold reheat line in feed water heaters. The deaerator will normally be operated under variable pressure on extraction steam from IP-Turbine. Each feed water heater will be capable of handling the drains from the preceding heater under operating conditions of the unit.

The equipment will be designed in accordance with latest applicable standard/codes of Heat Exchanger Institute. ASME, IBR etc. The feed water heaters will be of U-tube with welded stainless steel tubes in LP Heaters and seamless carbon steel tubes in HP Heaters, surface type and horizontal with integral condensing and drain cooling zones. The HP heaters will also have de-superheating zone.

Deaerator

Horizontal spray cum tray type deaerator with a storage tank or Stork type deaerator will be provided. The deaerator will be capable of de-aerating the dissolved oxygen and carbon dioxide in condensate & HP Heater drains. The minimum capacity of the deaerator will be 6 minutes between normal operating level and low level with a filling factor of 0.66. The deaerator will be normally operating by taking extraction steam from IP turbine except during low load operation and start up when the steam is drawn from the auxiliary steam header.

Boiler Feed Pumps

The unit will comprise of 2 x 50% turbine driven and 1 x 30% motor driven boiler feed pump per unit with the booster pumps mounted on the common shaft. Each pump will be designed to give parameters to suit the steam generator requirements. Motor driven feed pump will be used for start-up of unit and will also act as standby BFP. Turbine driven boiler feed pumps will be located on operating floor and the motor driven pump will be located on ground floor. The feed pump will be able to handle feed water of pH 8.5 to 9.5 and of temperature up to 200 ^{0}C (tentative).

The boiler feed pumps will be of horizontal, centrifugal type with single shaft design. The boiler feed pumps outer casing will be of barrel type with end removal. The inner pump assembly comprising of shaft, impellers, stage casings will be capable of being removed and replaced as a unit without disturbing the feed piping. Each feed pump will be provided with ON-OFF/modulating type re-circulation control valve to protect the pump under low flow condition. The boiler feed water system will be designed to operate primarily in an automatic mode over the range of system design loads. The arrangement will provide automatic start-up one of the standby motor driven feed pump under conditions like tripping of the running TDBFPs and/or discharge header pressure low etc.

Throttling the drive turbine steam inlet control valve in case of turbine driven pumps whereas hydraulic coupling will be utilised to achieve speed control of motor driven pumps for control of the feed flow. Provisions will be made for warm up to standby pump, if required.

Lube Oil Purification System

A suitably sized centrifuge type or coalesce type turbine oil purification plant will be provided as an auxiliary of the proposed turbo-generator set to condition the turbine oil continuously to remove the water and other impurities. In addition, a common turbine oil storage unit comprising one clean oil tank, one dirty oil tank, one purifier unit with necessary pumps, vent fans etc. will be kept. This would also receive the refill of turbine oil from outside. The

purification plant will be complete with oil purifiers, storage tanks, filters, necessary pumping sets and vent fans.

Condensing Equipment & Accessories

The supply would be complete with single flow, horizontal, surface type, clarified water-cooled condenser. The condenser unit would be transverse mounted and would condense exhaust steam by circulation of cooling water (inlet temperature 33 °C max.) in a re-circulating cooling water system using wet type cooling tower. Condenser outlet water temperature may be maintained within 42 °C. Clarified river water would be the cooling medium in the condenser and other auxiliary coolers. Stainless steel heat exchanger tubes, with rolled steel tube sheet, baffle plates, etc. are envisaged to ensure all steel construction. Cathodic protection with Zn or Al sacrificial anode would be provided, if required. The condenser would be designed as per HEI code or equivalent. The heat load of the condenser will correspond to the turbine operating condition with VWO having 105% MCR steam flow, 1% make-up, 90% tube cleanliness factor and a maximum cooling water inlet temperature of 33 °C to maintain rated condenser pressure. The condenser should also be capable of accepting full HP-LP bypass steam flow safely without undue pressure rise, vibration, noise or other detrimental effects. Oxygen content of condensate leaving condenser hot well will not exceed 0.015 cc per litre over the entire load range.

The condenser would be provided with 2x100% or 4 x 50% capacity vacuum pumps to remove non-condensable gases and maintain vacuum in the condenser at the desired level during normal operation. The condenser would be spring mounted with rigid connection to the turbine exhaust. Alternatively, condenser may be on solid footing with corrosion resistant flexible metallic bellow connection with the turbine exhaust.

Condensate Extraction Pumps :

The condensate/feed water cycle would also comprise 3x50% capacity motor-driven, vertical condensate extraction pumps of CAN-type construction. Connection between condenser and each pump will be through a block valve and removable strainer. The pumps will discharge through check valve and motor operated stop valves into a common

discharge header. Connection for condensate supply to the following major services will be tapped off from this condensate discharge header.

a. LP bypass de-superheating spray
b. Turbine exhaust hood spray
c. Gland sealing system de-superheating

Condensate will then pass through the gland steam condenser before being passed through the low pressure feed water heaters.

Steam Generators

Ultra-Super Critical Pressure ("USCP") power plant is envisaged with a view to capture better plant efficiency; minimizing basic fuel coal consumption and most important criteria being the drastic reduction of emission quantities of SO_2, NO_x, and particulate matters etc. as per MOEF & CC norms. The USCP technology have been presently accepted in India and is adopted by NTPC for their 660MW Khargone plant and Adani in their 800MW Godda thermal power plant.

Boiler Configuration and Technical Features:

1. Furnace Type

i) Two pass / tower type

Furnace configuration is derived from each plant manufacturer's specialty. Two-pass type is mainly adopted in Japan and tower type is typical in Europe.

No significant difference is observed in the applicability to kind of coal. It is because boiler design can be adjusted in accordance with coal characteristics.

ii) Spiral (plain/bare tube) Wall and Vertical (rifled/ribbed tube) Wall Type.

The principal concern with a variable-pressure/sliding pressure super / ultra-supercritical pressure design is the requirement for once-through operation. The mass flow in the furnace-wall tubes must be sufficiently high to avoid overheating or departure from nucleate boiling (DNB) while generating steam at sub-critical pressures and to avoid excessive metal temperatures and uneven steam outlet

temperatures when operating at super / ultra-supercritical pressure at higher boiler loads.

To accomplish these objectives, the spiral-wall design is used for the unit. The principle of the spiral- or helical-wall furnace is to increase the mass flow per tube by reducing the number of tubes needed to envelope the furnace without increasing the spacing between the tubes. This is done by arranging the tubes at an angle and spiralling them around the furnace. For instance, the number of tubes required to cover the furnace wall can be reduced to one half by putting the tubes at a 30-degree angle. The centre line spacing or pitch (P) is made the same as on a vertical wall to prevent fin overheating. Additionally, by spiralling around the furnace, every tube is part of all the walls, which means that each tube acts as a heat integrator around the four walls of the combustion chamber.

The spiral-wall concept thus addresses two major challenges of the full variable pressure supercritical / ultra-supercritical pressure boiler.

- Achieving the required mass flow to avoid overheating and excessive metal temperature by reducing the number of tube circuits.
- Minimizing difference in tube-to-tube heat absorption by exposing each tube to all four-furnace walls.

Spiral-wall furnaces have been in operation in Europe and Japan for many years and have given satisfactory performance.

As an alternative to the spiral-wall design for larger-size steam generators, a certain manufacturer offers a tangentially fired unit with vertical walls consisting of rifled tubes for ease of fabrication, erection, and maintenance. A stable fireball is formed in the centre of the furnace with tangential firing, with essentially equal distribution of the lateral heat absorption on all furnace walls. Unbalances are minimized and lateral heat absorption patterns are predictable over the entire load range.

Rifled tubing is used in the furnace walls to avoid overheating or DNB at sub critical pressures.

iii) UP type / Benson type

UP type is applied to constant pressure once through boiler and Benson type is applied to variable pressure once through boiler. Variable pressure Benson type boiler is suitable to improve plant efficiency at partial load and flexible operability.

2. Start-up System

In the case of UP type (constant pressure) boiler, it is necessary to keep the super critical pressure at boiler and the minimum water flow rate at water wall from the early stage of unit starting in order to prevent the water wall from tube burning-out, while the turbine needs low pressure superheated steam at starting. For these purposes, UP type boiler usually has flash tank drainage start up system and uses de-pressurized steam from flash tank for starting turbine. This start up system requires so-called ramping operation which means switching operation from starting system to main system during load increasing operation, because this start up system capacity is only around 10% of turbine TMCR. This ramping operation is so complicated operation under the large differential pressure that some valves are required with enough durability.

On the other hand, Benson type boiler can start from under the low pressure condition because Benson type boiler has availability of variable pressure operation owing to spiral structure of water wall tube (or rifled tube used for vertical water wall), and circulation system with Boiler Circulation Pump (BCP) can be applied to this type of boiler. This system can shorten the start-up time and heat loss during start up period.

3. Minimum Load with Dry Range/Control Range

Changing point (Benson Point) or dry/wet condition is about 30% TMCR load. Minimum control range is set at 50% TMCR load with

consideration of undershoot during load reducing, turn-down of pulverizers, ignition stability, etc. There is no difference is spiral water wall and vertical tube water wall in minimum load requirement.

4. Material Selection

The materials for the range of steam temperature to the level of 600/610 °C are already proven. There is no difficulty in technical aspects in material selection.

On the other hand, the applicable materials shall be selected considering the combination of applied temperature and pressure levels.

Table below shows the typical material selection in boiler pressure parts. This material application just shows the general concept and each manufacturer has his criteria considering his design concept.

Temperature Range / **Component**	**270-280 Kg/Cm^{2}g 600 ^{0}C / 610 ^{0}C**
Super heater tubes	SA213-T12/T22/T91 / T92 / Super 304H
Reheater tubes	SA213-T12/T22/T91/ T92/ Super 304H / HR3C
Main steam pipes, headers, valve bodies	P92
High temperature re heater pipes	P92

** Material shall be as per ISO/ ASME Sec 1 and shall conform to current Indian Boiler Regulations.*

5. Emissions

Coal consumption is reduced with efficiency improvement led by upgrading of steam conditions. Consequently, emission of CO_2, NO_x and SO_2 is reduced.

i) CO_2 emissions
Ultra-Supercritical plants reduces CO_2 emission 2-3% compared to supercritical plant.

ii) SO_2 emissions
Flue Gas Desulfurizer (FGD) will be adopted to reduce SO_2 emission less than 100 mg/Nm^3 as per MoEF & CC norms. Chimney height will be as per MOEF&CC norms considering FGD installation.

iii) NO_x emissions
The amount of NO_x generation is estimated as 300 - 400 mg/Nm^3 when unit is operating at MCR. Use of suitable De-NOx technology will be adopted to restrict the NOx emission as per MoEF & CC norms.

iv) Particulate Emissions
MOEF guidelines for particulate emission of less than 30 mg/Nm^3 under guarantee point condition at TMCR load firing range of coal with one field of ESP out of service.

The steam generator will be designed to achieve the maximum continuous rate (BMCR) with an appropriate control margin to achieve rated power output over entire design life.

Boiler Auxiliaries:

1. **Draft System:** The draft system comprises of two (2) sets of FD fans each set rated for 60% of BMCR capacity. The FD fans will be axial type, blade pitch/inlet guide vane control arrangement offering a favorable efficiency for regulation purpose. Two (2) Induced Draft (ID) Fans each rated at 60% of BMCR flow will be axial with blade pitch / inlet vane control type. The equipment will be complete with lube oil, hydraulic regulations and all other accessories required for continuous operation and all equipment would be suitable for outdoor installation.

2. **Primary Air System Type:** With cold primary air system, it is possible to reduce the capacity of Primary Air Fans (PAF) compared with hot primary air system. Cold primary air system is adopted in all cases.

3. **Pulverized Fuel Preparation System:** For firing high ash content abrasive coal pulverizes of slow speed large capacity bowl mills or ball and race mills will be provided having low auxiliary power consumption; and relatively high life expectancy of grinding parts and armour plating. The mills size and numbers will be selected such that on an average one mill remains standby while one of the mills is under maintenance.

   Considering the grinding fineness required, it is suggested equipping the mill with rotating classifiers having speed adjustment to control

grinding fineness. The firing system will employ latest the 'state-of-the-art' burners and permit load variation from 40 to 100% BMCR without use of support fuel. The ratio of fuel and air flow will be controlled. Due to sufficient burner wall distance and the burner swirl direction, operation with low excess air is possible without the risk of wall damage.

4. **Start-up Fuel System:** The fuel oil system will be provided for boiler start up; and for flame stabilization during low load operation with or without coal firing. Light Diesel Oil (LDO) / High Speed Diesel (HSD) oil will be used for boiler start up and for low load operation & flame stabilization (30% of BMCR), as necessary. Micro/Minor oil gun ignition system will be explored to reduce specific oil consumption during cold start up.

5. **Electrostatic Precipitators**

It is proposed to install high efficiency electrostatic precipitators having an efficiency that will limit the outlet emission to 30 mg/Nm^3 with one field out of order while the boiler is operating at its BMCR, firing worst coal having maximum ash content.

The electrostatic precipitators will have four (4) or more parallel gas streams, isolated from each other on the electrical as well as gas side and will be provided with gas tight dampers at inlets and outlets of each stream, so as to allow maintenance to be carried out safely on the faulty stream, while the unit is working. Electrostatic precipitator will be provided with microprocessor based programmable type rapper control system and ESP management system to ensure the safe and optimum operation of ESP. ESP transformer rectifier sets will use high fire point oil as the cooling medium. The dust collection hoppers at all strategic locations will have a minimum storage capacity of eight (8) hours. The hoppers will have heating arrangements to prevent ash sticking to the sloping sides and down pipes. Level indicators to indicate and trip the ESP in case of high ash levels in the ash hoppers, which will jeopardize the safety of ESP otherwise.

6. NO_x Control System

NOx emission control technologies are grouped as combustion control and post combustion process. Combustion controls reduce the level of NOx emissions by altering or modifying the firing conditions under which combustion is achieved.

Low NOx Burners (LNB) operate on the principle of fuel and air staging during fuel injection, which results in fuel-lean and fuel-rich combustion zones in the furnace. The fuel lean zone enveloping the fuel rich zone further reduces NOx formation as it has low combustion temperature and also helps in complete combustion and prevent CO generation.

By adopting various combustion control techniques along with advanced Low NOx burners, the base NOx level at the outlet of boiler can be lowered to 300-400 mg/Nm3. Suitable post combustion control technology if required separately will be adopted in the proposed plant to meet the NOx emission limit as per MoEF & CC norms.

Post Combustion Control Technology:

Selective Non-Catalytic Reduction (SNCR) technology is generally used when desired de-NOx efficiency is limited and in the range of 30-40%.

Selective Catalytic Reduction System (SCR)

Selective Catalytic Reduction System (SCR) technology is used when desired de-NOx efficiency is high in the range of 50-80%. This technology uses special catalyst_which stimulates the NOx capture from flue gas within the optimized temperature range (320-400˚C).

Aqueous / Anhydrous ammonia is generally injected into hot flue gas between economizer and APH where flue gas temperature is in the range 340–400˚C through an injection grid. The flue gas is mixed with reagent and passes through catalyst surface where NOx is converted into N2 and water.

Ammonia unloading and storage system will be common whereas ammonia forwarding, evaporation & injection system will be unitized.

7. Flue Gas De-sulphurisation System (FGD)

The FGD system, to be installed, will be kept behind ESP. The design and layout of steam generator and its auxiliaries will be such that a wet flue gas desulphurization system, taking suction from duct after Combined ID fans and feeding the de sulphurised flue gases back to the chimney with provision for bypassing the FGD system.

Flue Gas Desulphurisation unit shall be installed to reduce the concentration of SO_2 emission.

FGD is classified into three types:

a. Sea water-based flue gas desulphurisation system
b. Dry Flue gas desulphurisation system
c. Wet Limestone based flue gas desulphurisation system.

Advantages and Disadvantages of various systems:

The advantages and disadvantages of the various systems are mentioned below:

a) Sea water-based flue gas desulphurisation system:

The alkalinity present in the sea water is utilised for removal of the SO2 present in the flue gas. Though the capital cost of the system is less, the system requires huge quantity of sea water and the hot water from the process needs to be treated for acidity and the temperature needs to be reduced before being discharged to sea. Sea water-based flue gas desulphurisation system installed only in coastal plants.

b) Dry Flue gas desulphurisation system:

Dry flue gas desulphurisation system adopts lime or sodium bicarbonate for removal of the SO_2 present in the flue gas and the flue gas after treatment will not be saturated. This type of systems is adopted for smaller quantity of flue gas flow and the efficiency of the system is comparatively low when compared to wet limestone-based process. In this type, the dry end product cannot be recovered.

c) Wet Limestone based flue gas desulphurisation system:

The forced oxidation wet limestone based FGD system adopts limestone slurry for the removal of the SO_2 present in the flue gas and the flue gas after treatment will be saturated. The system will have efficiency of 95% or more.

Considering the advantages of higher efficiency the forced oxidation wet limestone-based system is being adopted in the plant. The sources and mode of transport of limestone are being identified for the proposed Units.

Forced oxidation wet limestone Flue gas Desulphurisation:

The FGD system shall be based on Wet Limestone Forced Oxidation process. Each unit shall be provided with an independent absorber. The FGD system(s) shall operate in conjunction with pulverized coal-fired generators taking tap off from combined ID Fan discharge duct. The forced oxidation wet limestone Flue gas Desulphurisation system shall comprise of following systems / equipment:

a) Absorber

The plant shall be provided with independent / dedicated absorber systems for each unit. The following absorbers designs are deemed acceptable:

- Counter-Current Open Spray Absorber
- Counter-Current Double Loop Absorber
- Counter-Current Tray Absorber

The Absorber system distribution headers and nozzles shall be sized to achieve the desired L/G ratio required to meet the guaranteed SO_2 removal efficiency. If the absorber is provided with multiple levels of spray nozzles, each spray level shall be provided with independent slurry recirculation pumps. The slurry recirculation pumps shall have a minimum margin of 10% of flow and head, over the actual requirement for meeting the guarantee and design point condition. The Absorber shall be designed to have 2 numbers of mist elimination and forced oxidation lance nozzles. The absorber shall be designed of MS structure with glass flake / C276 lining.

The Absorber slurry holding / recirculation tanks shall be designed to meet process requirement of each unit. Sufficient number of agitators shall be provided for thorough mixing of recirculating limestone slurry and to avoid settlement / clogging of limestone / gypsum slurry in Absorber slurry storage tank.

b) Absorber Slurry Recirculation Pump

The slurry recirculation pump selection shall have a minimum margin of 10% on flow and 10% on frictional head, over the actual requirement for meeting the guarantee and design point conditions.

The slurry recirculation pumps shall be wear-resistant and equipped with flushing devices to prevent sedimentation and shall be designed in a manner to allow easy replacements, repair and maintenance. The slurry recirculation pumps shall be equipped with oil level indication, coupling guard and collecting equipment for leakage, made of resistant material. Single mechanical seals with automatic flushing with a connection for additional manual flushing shall be provided. One spare spray level with recirculation pump per absorber shall be provided.

c) Absorber Oxidation system

Forced oxidation wet limestone system is designed to inject air directly into the absorber tank to convert most of the calcium sulfite to gypsum. The oxygen required for oxidation shall be supplied by 2 x 100% oxidation air blowers for each absorber. The oxidation blowers shall be sized to supply at least 2.5 times the stoichiometric air requirement of the specified range of coals.

d) Gypsum Bleed Pump

Each absorber shall be provided with 2 x 100 % Gypsum Bleed pumps for supply of gypsum slurry through hydro cyclones to gypsum dewatering system. Gypsum bleed pump shall be sized to bleed-off the gypsum slurry from the absorber with slurry solid concentration not exceeding 15 - 30%.

e) Limestone unloading system

It is envisaged that limestone crushed to suitable size of ~ 20 mm will be available at the plant boundary. The limestone mobile truck shall be unloaded using truck unloader. The limestone is further conveyed to the limestone storage silo by a bucket elevator and belt conveyor and V-plough. The silo shall be designed to have 12 hours storage capacity. The stored limestone from storage yard / shed shall be transferred to unloader / hopper through pay loader. The size of opening chute shall be sufficient to ensure proper flow of limestone. The dust emission from the silo and unloading system shall be reduced by envisaging vent bag filters.

f) Limestone Grinding and Slurry Preparation system:

The limestone from the silo shall be conveyed to the wet ball mill through belt conveyors for further reduction of the limestone particle size. 2x100% or 3x50% wet ball mill shall be envisaged and each mill shall be sized to meet the maximum demand of the Units. The ball mill shall be sized so that 90 % of the fines passes through 325 mesh. The slurry from the wet ball mill is collected in the mill permeate tank. Agitators are envisaged in the tank to avoid particle settling in addition to the re-circulation facility back to the tank. The slurry is further pumped by 2 x 100 % mill circuit pumps through hydro cyclones (2x100 %) and the heavier particles are recycled back to the wet ball mill and the lime slurry shall be stored in two lime slurry tanks. 2 x 100 % lime slurry storage tanks and each tank shall have 2x100% slurry transfer pumps is envisaged to meet the requirement of each absorber.

g) Gypsum dewatering system:

Two stage gypsum dewatering system consisting of primary stage of sets of hydro cyclones and secondary stage of vacuum belt filters (2x100% or 3x50%) shall be provided for dewatering of gypsum from absorber of the Units up to less than 10% moisture (max.) and to obtain gypsum purity of 90% (min). The gypsum shall be stored on the ground floor of the gypsum dewatering building and it shall be adequately sized for three days storage. Additional storage yard of one week storage shall be located near the limestone storage yard.

h) Process water System

The water requirement for Lime slurry preparation, slurry pump gland sealing, emergency flue gas cooling and mist eliminator cleaning of FGD system shall be stored in a process water tank. The water shall be tap off from cooling tower blow down using 2x100% pumps and piping systems. The process water tanks shall designed meet 4 hours process requirement of FGD system. Process water make-up pumps and mist cleaning pumps shall be envisaged to meet the process water requirement of the system. The Process water tanks shall be MS with suitable lining / painting.

i) Emergency slurry system:

Common emergency slurry storage tanks shall be envisaged for draining the slurry from the absorber during maintenance. The capacity of the emergency slurry tank shall be designed for holding slurry volume of the one absorber. The emergency slurry tanks shall be MS with Glass flake lining and shall be provided with agitators to avoid particle settlement in addition to the slurry re-circulation facility.

J) Effluent Treatment

The waste water from FGD system shall be treated / neutralized in neutralization tank / pit and pumped to ash dyke using 2x100% transfer pumps.

AUXILIARY SYSTEMS

Introduction

The philosophy of design of the auxiliary system would be pre-dominantly guided by the site features, technology, basic design parameters, infrastructure and ambient conditions. Adequate redundancy shall be adopted to ensure high availability of the plant.

All the systems and system components would be designed for simplicity of operation and ease of maintenance so as to call for minimum manual labour and low degree of supervision. Redundancies in systems and sub-systems would be considered taking into account the operating experience of similar capacity units being operated elsewhere.

Plant Water System

River Ganga is considered to be the source of water for the station. Water from River Ganga will be pumped to Upper Khajuri Dam and from Upper Khajuri Dam it will be further pumped to the raw water reservoir within the plant. The maximum consumptive water requirement of the proposed 2x800 MW station is estimated at around 4000 m3/hr considering disposal of Bottom Ash and Fly Ash in High Concentration Slurry Disposal (HCSD) mode. The requirement of plant water will be met by drawal of water through intake structure with pump house to be constructed near River Ganga and at Upper Khajuri Dam.

A recirculating cooling water system using wet type evaporative cooling tower would be deployed for the proposed Project. It would be used for the condenser and auxiliary equipment cooling in a semi-open cooling water circuit. The choice of cooling water system is guided pre-dominantly by the GOI guidelines on use of sweet water for cooling purposes. Natural draft (ND) cooling tower has overall advantage, but considering initial investment and installation timeframe required, Induced Draft (ID) cooling tower is preferred for this Project.

During detailed engineering stage year-round water analysis data will be available for establishing appropriate design basis for finalizing the plant water system. For the purpose of the present study a water balance diagram is presented in

For the proposed 2 x 800 MW Project the total raw water requirement is estimated on the basis of 1% heat cycle make-up (ultra-supercritical units), make-up to cooling towers usually associated with average daily plant load apportioned on hourly basis and other consumptive requirements like potable water, make-up water requirements for air-conditioning and ventilation etc. It is proposed to utilise cooling tower blow down in flue gas desulfurization system, ash handling and coal handling plant dust suppression system to the extent possible and remaining quantity shall be feed to the blow down recycling plant for achieving maximum possible water utilization.

To ensure redundancy to the system, raw water reservoir with seven days (7) days' raw water storage capacity has been considered in the plant water schemes.

The reservoir in the raw water system would also functionally assist in removal of substantial portion of suspended solids and will provide adequate redundancy to the system. Raw water will be clarified to remove suspended solids and colloids in clariflocculators. Two (2) clariflocculator units each having 60% capacity is considered for the CW make and service water system with Lime, alum and other coagulant aids dosing system. Separate Two (2) clariflocculator units each having 60% capacity is considered for the RO-MB (DM Plant) feed water system with Lime, FeCl3 and other coagulant aids dosing system.

Clarified water would, thereafter, be stored in a twin chamber semi-underground RCC reservoir having a capacity of 8-hours of clarified water requirement for the proposed Project. Separate Clarified water storage tank for DM feed is to be provided. Clarified water would be supplied as make-up in the cooling tower basin by gravity.

Clarified water will also cater to the requirement of ventilation plant and requirement of filtration plant.

For pre-treatment plant of the RO-MB system filtration system will be provided after clarifier. In the filtration plant, clarified water would be passed through sand bed filters where adequately sized filter beds with redundancy in number as well as capacity shall be provided. The water quality at the outlet of the filtration units shall be maintained within 10 NTU/10 ppm TSS. Filtered water

would be stored in a RCC tank. With storage capacity of 4-hours filter water requirement for the Power Project. Filtered water will be required for potable use and DM plant feed. Filtered water will feed to Ultrafiltration system (UF). UF treated water will be stored in UF water storage tank. UF treated water will feed to RO plant through micron cartridge filter and anti scalant, SMBS chemical dosing. RO-High pressure pump will feed water to RO plant (2X50% capacity) and get RO treated water. RO treated water will be stored in product water storage tank having 2 hrs storage capacity.RO reject water will be used in the coal dust suppression, ASH slurry preparation etc. RO product water will feed to DM plant (3X50% capacity MB vessel). DM water will be stored in 2 nos of DM water storage tanks.

DM water will be used for heat cycle make-up, chemical feed system, hydrogen generation plant, SCR and as primary coolant in heat exchangers for the auxiliary cooling system of boiler, TG auxiliaries and other common auxiliaries. The heated DM water in closed cooling loop would be subsequently cooled in SET of four 3 plate type heat exchangers, one per unit of (TG, Boiler Aux.) & one common for BOP auxiliaries using clarified water from cooling tower basin through a set of auxiliary cooling water pumps in the secondary circuit.

Demineralisation Plant & Heat Cycle Make-up System:

The basic scheme of Demineralised Water System shall be clarifier-PSF-UF-RO-MB. DM plant equipment sizing shall be with 3% heat cycle make-up to ensure adequate redundancy and start-up requirement. Assuming average 3% make-up for the heat cycle, 2X50% RO and 3X50% MB vessel scheme is considered. Total DM water generation capacity (output) shall be 2x90 cu.m/hr. RO single pass or double pass will be decided during detailed engineering.DM Plant will supply heat cycle make-up, the make-up requirement for primary water circuit of stator cooling system, chemical feed system, air-conditioning system make-up and DM water requirement for the hydrogen generation plant, make up requirement for primary coolant in heat exchanger for the auxiliary cooling system for Boiler, TG and other common auxiliaries.

Filtered water would be pumped to the DM Plant for demineralisation. In the DM Plant, the water would be first filtered through pressure sand filter units & UF units to be installed within the DM Plant building. Filtered water will subsequently be passed through BWRO and mixed bed exchangers and the

demineralised water will be stored in DM water storage tanks. Acid and alkali handling, storage and feeding system will be installed for the MB resin regeneration. The DM water produced in the plant would then be taken to two (2) DM water storage tanks, each of 3000 m3 capacity to meet the total requirement including start up and any exigency. DM water from the storage tanks would be transferred to the unit condensate storage tanks by 3x50% capacity DM transfer pumps. Each pump will have capacity to meet the requirement of one unit. The plant would be equipped with 100% unitized condensate polishing unit for ensuring required water quality for operation of once through steam generator with steam parameter in ultra-supercritical range as mentioned earlier.

Wastewater Treatment System

Floor wash and other service water wastes will be led to an ETP where they shall be treated through clarifiers and led to CMB. The treated water shall meet the PCB norms for effluent discharge. Oily wastes shall be treated using oil water separators and the treated effluent led to CMB. Water from CMB shall be used for horticulture. pH corrections shall be made as required for chemical wastes. RO reject shall either be brought to CMB or used for gardening directly.

CW system shall operate at a COC of 5 and the blow down water shall be recycled directly in FGD and Ash Handling systems. Any excess blow down water shall be treated by installing pre-treatment, ultrafiltration, and reverse osmosis. Product water from recycle plant will be used as a make up to cooling tower and reject water will be used for CHP dust suppression AHP make up.
Following recycle scheme/waste water treatment schemes are adopted:

- CW Blow down recycle System
- Plant regeneration waste from Neutralizing Pit
- Boiler Blow down water as applicable.
- Water from Ash water recovery system
- FGD
- STP Filtrate

CW Blow down shall be treated in CW Blow down recycle plant. Product water from recycle plant will be used as a make up to cooling tower and reject water will be used for CHP dust suppression and AHP make up.

Mixed Bed unit and Condensate Polishing Units regeneration waste, RO Cleaning chemicals are collected in the neutralizing pit and pumped to the CMB after neutralization.

Boiler Blow down water if applicable (during start up) is received in a boiler blow down tank and pumped to CMB.

Recovered water from Ash dyke shall be circulated back to Ash water sump for makeup to Ash handling system.

Waste water from FGD system after neutralization and treatment shall be sent to ash dyke.

Filtrate from STP sludge drying bed will be recirculated back to Sewage collection sump.

Recovered water from filter press and miscellaneous non-chemical/floor washing drains will be collected in a common tank and pumped to the horticulture.

Drains from fuel oil and lube oil storage areas & floor wash from maintenance areas shall be passed through oil water separator for treatment and reuse.

Plant is to be designed based on zero liquid discharge.

Sewerage and Sewage Treatment Plant

The sewerage system shall be designed to provide cleansing conduit for speedy and efficient conveyance of foul water, such as wastewater from closets, urinals, bathrooms and pantries. An independent network of lines to carry the storm water drainage and sewerage shall be provided. Sewers shall be designed for desired minimum and maximum velocities.

The plant area shall be divided into different parts based on layout consideration. The sewerage flow shall be made by gravity. Routing of these shall ensure no interference with underground facilities. Manholes shall be provided at every 30 meter along the length of any pipe, at connection points and at every change of alignment, gradient or diameter of sewer pipeline.

A permanent sewage treatment plant (anaerobic treatment) shall be provided to ensure adequate cleaning of the sewerage discharge of the plant. The treated effluent shall be utilized for the irrigation of the landscaped areas. The treatment plant shall be designed to meet all requirements of applicable local bylaws/pollution standards, as well as the conditions stipulated by the State/Central agencies during the environmental clearance to the Project.

Coal Handling System

Coal from nearby mines of NCL/SECL/CCL is considered as the primary fuel for the proposed green field project. For the project, crushed coal (-300 mm) will be supplied from the mine end by railway wagons and will be unloaded using two (2) nos. wagon tipplers with shifter & pusher arrangement. Adequate redundancy has been adopted to ensure uninterrupted operation of the system.

The rated capacity of Coal Handling System both at receiving end and subsequent handling plant is 2 streams of 2000 TPH each (one operating, one standby). The plant is envisaged to run for about 16 hours/day.

Coal in BOX-N wagons will be unloaded through wagon tipplers and conveyed to the boiler bunker through crusher house and a number of transfer houses. Provision has been kept for stacking crushed coal in coal stockyard from where coal will be reclaimed as and when the same will be required in coal bunkers.

Coal from mines (-300 mm) will be directly conveyed to the crusher house where four 60% crusher will crush coal to (-25mm) size. The output of the crusher house will either go to the raw coal bunker of each unit or to the coal yard as per requirement.

In the primary route, coal will be directly taken to the powerhouse via crusher house bypassing the coal yard. This arrangement will be operational under normal conditions during daylight hours till the bunkers are full. Excess quantity will thereafter be stacked in the yard.

In the secondary route, the unloaded coal will be taken to the coalyard and stacked by stacker/reclaimer. The stacker/reclaimer capacity will be 2000 TPH. The reversible type stacker-cum-reclaimer will be rail-mounted, self-propelled

unit with 41m boom length having adequate slewing and fluffing provision to stack coal upto a height of 10 m and reclaiming the same afterwards. For the proposed station two (2) stacker-cum-reclaimers are planned.

The Coal handling plant includes receiving, stacking and conveying equipment upto the bunkers in coal mill building. Twin stream conveying system (2x100% capacity) is proposed for the system to ensure availability. Bunkers will have a storage capacity of about 12 hours' coal requirement for the boilers. The bunkers will be provided with rod and slide gates, arch breakers, etc. to facilitate operation. Necessary belt weighing at bunker level conveyors, electronic type level indicators, coal sampling units, reversible conveyors, flap gates etc. will be provided in the system as required.

Special precautions will be taken for pollution control by providing dust extraction and dust suppression systems in different transfer points and ventilation system for the tunnels. In addition, roof extraction fans will be provided in key areas like boiler bunker floors. Pressurized ventilation system with unitary air filtration unit will be provided for control room and MCC buildings.

Necessary water distribution network for drinking and service water with pumps, piping, tanks, valves, etc. will be provided for distributing water at all transfer points, control rooms etc.

A control room with microprocessor-based control system is envisaged for operation of the Coal Handling Plant. Except locally controlled equipment like dust extraction/dust suppression/ventilation equipment, sump pumps, water distribution systems etc. all other in-line equipment will have provision of remote control. However, provision of local control will also be provided. All necessary interlocks, control panels, MCCs, mimic diagrams, etc. will be provided in the control room for safe and reliable operation of the Coal Handling Plant.

The major equipment for coal handling system is listed below:

1. Wagon Tippler, Shifter & Pusher
2. Side Arm Charger
3. Apron Feeder

4. Belt Conveyors
5. Belt feeders
6. Stacker cum Reclaimer
7. In-line magnetic separators
8. Metal detectors
9. Cross-belt magnetic separators
10. In-line conveyor scales
11. Flow divider
12. Coal sampling unit
13. Flap gates, rod gates, slide gates
14. Bunker Level indicators: 3D acoustic type.
15. Motorized V-plough tripper
16. Bunker Sealing arrangement
17. Roof Extractors
18. Rack & Pinion Type Elevator
19. Electrical & Manual Hoist
20. Dry fog dust suppression system
21. Plain water dust suppression system
22. Dust extraction system
23. Compressors, Air Dryers, Air receivers
24. Chute liners and chute supporting structures
25. V- Plough Discharger
26. Belt Vulcanizer

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.

Design Parameter for Ash Handling Plant for 2x800MW Ph-II	
Parameter	**2x800MW**
Hourly Worst coal (3200kCal/kg GCV) firing rate at TMCR condition based on 100% PLF, per Unit (Approx.)	497.8TPH
Total ash content in Worst Coal	42%
Bottom ash (BA + Eco. Ash) generation @ 20% (T/day)	2,007
Fly ash (ESP + APH Ash) generation @ 80% (T/day)	8,028
Total Ash generation (T/day)	10,035
Annual ash generation @ 85% PLF (MMTPA)	3.11

A. Bottom Ash system

It is envisaged that the bottom ash will be collected in wet. Efforts will be made to utilize 100% bottom ash as per MoEF 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. Provision shall be considered below Hydrobins for loading of ash in semi-wet/conditioned form to trucks for further disposal to low lying area filling.

BA evacuation from BA hopper shall be done for 1.0 hour (per Unit) for every 4 hours (total 2 hours per Unit per shift of 8 hours). At a time only one Unit BA evacuation shall be done (i.e. Unit-1 BA evacuation followed by Unit-2 BA evacuation). 3 nos. Hydrobins shall be provided common for Two (02) Units.

B. Fly Ash system

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 pneumatic ash pipe conveying system. From the fly ash silos, fly ash shall be transported in dry form through bulkers truck for possible utilisation. The fly ash conveying system will be sized such that fly ash collected in 8 hours shall be evacuated in 5.5 hours.

For dry ash conveying to storage silos, 6 nos. (4W+2S) compressors shall be provided common for two (02) units. To facilitate easy flow of dry fly ash, 4 nos. (3W+1S) fluidizing blowers with heaters shall be provided common for all 3 nos. fly ash silos; Dry ash will be transported to 2 nos. main storage silos of RCC construction having combined capacity of 16 hrs storage, common for two (02) units. Each main fly ash silo shall be equipped with two outlet for loading of ash in conditioned form in to open truck and two outlets for dry unloading in to closed tankers/trucks for utilization and two outlets for future use.

1 no. HCSD fly ash silo of suitable capacity shall be provided to cater to feed the fly ash to HCSD system for disposal of fly ash (along with bottom ash) in slurry form to Ash Dyke or in semi-wet form to load the trucks for further transportation to low lying area filling/possible utilization. HCSD fly ash silo shall be equipped with three (03) outlets for feeding fly ash to HCSD system, One (1) outlet for loading of ash in conditioned form to open truck, one outlet for loading of ash in dry form to closed truck for utilization and one outlet for future use.

C. Ash Water System

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.

D. Ash Pond

All efforts shall be made to promote utilization of ash to the fullest extent. However, in case of exigencies, unutilized ash will be disposed in to Ash dyke.

Ash dyke shall be provided with lining and green belt. Ash dyke envisaged would be raised in stages. A suitable Ash water recovery system shall be provided to recover and re-use the Ash water collected in Ash dyke.

E. Mill Reject System

Pressure pneumatic conveying system shall be provided for conveying of mill rejects (pyrites) from Coal Mills to Mill reject Silo. 3 Nos. (2W+1S) Conveying Air Compressors shall be provided common for two (2) Units. 1 No. Mill Reject Silo with 16 hours storage capacity shall be provided for each Unit for collection of mill rejects. Mill rejects from Mill reject Silo shall loaded in to tucks for further disposal. Mill reject system shall be designed considering 1% mill rejects in the coal consumption by each Unit.

Fuel Oil Handling System

The fuel oil handling systems for the proposed 1600 MW Power Project would include unloading, storage, pressurising of Light Diesel Oil / High speed diesel (LDO/HSD). The same would be required for light up and for load carrying purpose and also for flame stabilization up to 30% BMCR load.

System shall be designed meeting the requirements of Pollution Control/Petroleum/Explosive rules of Central and State Governments.

HSD / LDO will be brought to the plant by rail from nearby depots. The unloading area will have facilities to receive and unload oil from tankers to the headers. Three number (2W + 1S) Horizontal, twin-screw type unloading pumps shall be provided. Pump shall be sized for one (1) hour unloading time. Simplex strainer will be provided at each unloading pump suction.

Three numbers (2W+1S) screw / centrifugal type HSD / LDO pressuring pumps shall be designed to supply the HSD / LDO flow requirement for each boiler simultaneously.

The HSD / LDO pressuring pumps shall be selected at 110% of the actual required design flow to account for the wear over the operating life. Configuration shall have individual pumps for each unit with at least one standby. Duplex strainer shall be provided at forwarding pump suction and discharge common header. Design flow capacity of each fuel oil pump for two

boilers: Catering to 30% of the BMCR capacity. HSD / LDO pressuring Pumps Recirculation Control Valves shall be designed to the maximum flow capacity of Full pump discharge flow and minimum flow capacity of 10% of pump discharge flow.

All instrumentation and control facilities including tank level controllers, pressure/temperature gauges, control valves etc. along with a local control panel in the fuel oil pump house will be provided for safe and reliable operation of the system.

The Auxiliary Oil System and its facilities will be designed as per Pollution Control/Petroleum Rules/Explosion Acts/Fire Rules of Govt. of India.

Ventilation & Air-conditioning System

Right environment for operation and maintenance of the plant as well as for proper functioning of the equipment, controls and accessories is an important aspect which has been given due consideration in the proposed Ventilation and Air Conditioning System.

Ventilation System:

Adequate ventilation system has been considered for the powerhouse building, Central Control Building, ESP control building, Air Compressor House, Blower room for Ash Silo & Vacuum Fly Ash System, Switch Yard Control Building and other areas like A/C plant room, Switch gear room for Cooling Towers, DM plant building, CW Treatment Building, Chemical House, DG Building, Hydrogen Generation Plant, Elevator Machine rooms and various pump houses like Ash Slurry pump house, Clarified Water pump house, Fuel Oil Unloading and Pressurizing pump house etc. with their associated Electrical rooms, Workshop and Store, Fire Station Building, Kitchen/ Pantry and Toilet areas of Canteen Building, Service building and Administrative Building etc. to achieve the following :-

i) Dust-free comfortable working environment.

ii) Scavenging out structural heat gain and heat load from various equipment, hot pipes, lighting etc.

iii) Dilution of air polluted due to generation of obnoxious & hazardous gaseous/aerosol contaminants like acid/chemical fumes, dusts etc.

Ventilation system proposed for important areas are described below:

a. <u>Powerhouse and Central Control Building</u>

Supply/exhaust ventilation system with evaporative cooling has been recommended for the powerhouse building. Inside temperature shall be 3°C lesser than outside and +3mm WC positive pressure above atmospheric Ambient air would be drawn through air inlet louver, automatically cleanable water flooded type SS mesh filters, water wetted fill deck and moisture eliminator and will be supplied by means of centrifugal fans to powerhouse through ducting and grilles to achieve proper distribution. The sprayed water over the SS mesh filter will be re-circulated by means of centrifugal pumps, piping, valves and other accessories. Similarly, water dripped over the Fill Deck will also be re-circulated by means of centrifugal pumps, piping, valves and other accessories.

'Exhaust' system consists of axial flow wall/roof-mounted exhaust fans with rain protection cowl/ hood, short ductwork, etc. Part of the supplied air will be exhausted and the rest will ex-filtrate through the various openings in the structure, preventing infiltration of dusty air.

Various non-air-conditioned rooms in the Central Control Building e.g., cable spreader room, switchgear & MCC rooms, SWAS wet panel rooms and Battery Charger rooms etc. will be ventilated by means of the same Evaporative Cooling units for Power House.

Exhaust ventilation system will be provided for the Battery Rooms to evacuate acid fumes and hydrogen. Bifurcated type explosion proof exhaust fans will be employed for this purpose.

Coal tripper floors are proposed to be provided with exhaust system to eliminate building-up of hazardous gases like carbon monoxide, methane etc.

Pressurized Ventilation system will be affected for the Elevator Machine rooms by means of wall mounted Fan-Filter units and back draft dampers.

All toilets will be ventilated by providing wall mounted exhaust fans.

b. ESP and AHP Control Buildings

For ventilation of these building (except the control room), Sheet metal type Unitary Air Filtration unit (UAF) of suitable capacity shall be envisaged for each unit of ESP Building non-AC areas. Inside temperature shall be 3°C lesser than out side and +3mm WC positive pressure above atmospheric. A dedicated plant room shall be provided for UAF unit.

, ambient air will be drawn through unitary air filtration unit comprising fresh air intake louvers, automatically cleanable SS mesh filters (with water spray) and moisture eliminator and supplied to the space by means of centrifugal fans. Water sprayed over the filter will be re-circulated by means of centrifugal pumps.

In addition to filter cleaning, the water spray will have an evaporative cooling effect too. This will produce some cooling effect as an additional advantage.

The supplied air will be exhausted through wall mounted gravity operated dampers (Back Draft Dampers) to maintain an overpressure of +3mm of water column to reduce dust ingress.

c. Other Buildings

Other buildings like Air Compressor House, A/C plant room, DM plant building, CW Treatment Building, Chemical House, DG Building, MCC/ Switch gear room of Switch Yard Control Building, Hydrogen Generation Plant Building, Aeration Blower room for Ash Silo and Blower Room for Vacuum Fly Ash System, Various pump houses, like CW/ACW pump house, Raw Water pump house, Ash Water pump house, Ash Slurry pump house, Clarified Water pump house, Fuel Oil Unloading and Pressurizing pump house etc. with their associated Electrical rooms, Workshop and Store, Kitchen/ Pantry and Toilet areas of Canteen Building , Service building and Administrative Building etc. will be ventilated by means of dry

system comprising axial flow fans, dry filter (wherever required), cowls, ducting (wherever required), gravity dampers (wherever required) etc. Inside dry bulb temperature (DBT) is expected to be higher than ambient by about 3 °C.

Air Conditioning System:

Various control rooms in power Project, housing a group of sophisticated and precision control panels and desks call for controlled environment for proper functioning and for personnel comfort.

Some other facilities like Administrative Building, Service Building, Canteen Dining Hall etc will also call for comfortable environment for the occupants.

The following areas are proposed to be air conditioned:-

a. Control room, control equipment room, Shift Charge Engineers' rooms, computer room, Printer room, Record room, UPS room SWAS dry panel room, CPU Control room, Laboratory room, Central Control Building/Turbine Building.

b. Electrostatic precipitator control room

c. AHP Control Room

d. Coal Handling Plant control room

e. DM plant control room, office and Laboratory area

f. CW control room

g. Raw water pump house control room

h. Cooling tower control room

i. ETP/STP control room

j. Compressor control room

k. Stores- Maintenance office room

l. Stack emission monitoring system control room

m. Fuel oil unloading/forwarding pump house control room

n. Electro chlorination control room

o. Office areas, lecture rooms etc. in the service building

p. Switchyard control room

q. Weighbridge Control room

r. Fire Station Control room

s. AC Plant Control room

t. Hydrogen Generation Plant Control room

u. Other Control rooms housing PLC panels

v. Different floors of the Administrative Building

w. Dining Hall of Canteen Building

To cater to the above requirements the following systems are proposed:-

i) A central chilled water plant to cater to the air conditioning requirement for the Central Control Building, ESP control building, VFD room and Service Building, comprising Vapour Absorption Chiller and stand-by Screw Chillers, condenser cooling water circulating pumps, cooling towers, chilled water circulating pumps, cooling water and Chilled water piping with valves, accessories, fittings, supports, insulation as applicable, steam piping with fittings, supports, insulation, PRDS and associated Electrical items etc. has been envisaged. The chilled water produced in this central Chilled water plant will be circulated through the coils of individual air handling units for the respective air conditioned rooms /areas. This Central Air Conditioning System will be operated and controlled from the AC plant Control room DDC panels and two nos. Workstation PCs.

ii) Individual Water Cooled Precision Air Conditioners (PAC) will be provided for AHP Control room and DM plant Control Room, Office and Laboratory. Condenser Cooling water will be supplied to such PAC units from the Plant ACW system. Such PAC units will be operated and controlled from their built-in Microprocessor based Control console.

iii) Individual Air Cooled Precision Air Conditioners (PAC)/VRF based will be provided for Switch Yard Control Room and CHP Control room. Such PAC/VRF units will be operated and controlled from their built-in Microprocessor based Control console.

iv) Air Cooled Duct-able Split/ Packaged Air Conditioners/VRF system will be provided for Dining Hall of the Canteen Building and Administrative Building. These Air Conditioners will be operated and controlled from their built-in Microprocessor based Control Console/ hand operated Remote Control Panels.

v) Air Cooled Non Duct-able Split Air Conditioners will cater to the AC requirement of Weighbridge Control room, Fire Station Building Control room, Hydrogen Generation Plant Control room, AC plant Control room and other small control rooms housing PLC panels. These Air Conditioners will be operated and controlled from their individual hand operated Remote Control Panels.

Compressed Air System

Six (06) nos. of instrument air & service air compressors is proposed for the 2X800 MW power Project to take care of continuous and intermittent demand. Normally four (4) compressors will continuously run to meet the sustained demand and will also serve on automatic mode and will run to meet the intermittent peak demand. Other two compressors will be kept as operation and maintenance standby. The estimated design capacity (FAD) of each instrument & service air compressors is 60 Nm^3/min. (Normal) at 10.0 Kg/Cm^2 (g) design pressure rating. The instrument air & service air compressors shall be oil-free & screw type and shall be provided with all accessories such as suction filters, inter-coolers, after coolers etc. Common four (4) number of air receivers of capacity min.30 Cu.m shall be provided to absorb pressure pulsations and for acting as reserve supply of compressed air to permit continued operation following failure of the operating compressor until the standby one comes into service.

Six (6) numbers (4 Working+1 Hot Standby+1 Maintenance standby) Heat of Compression (HOC) type regeneration air dryers to match instrument air compressor capacity along with all accessories including control panel, flow meter, online digital dew point meter at the outlet of each dryer, etc.

Plant Air Quality will comply with ISO 8573.1, quality class 2.2.1. For air dryer, Atmospheric dew point shall be -40° C.

One (1) Control valve with manual bypass arrangement provided at the service air distribution header which will close (below a pre-set value) to maintain sufficient pressure at the IA distribution side.

The service air requirement for normal cleaning purposes, atomizing air medium for warm-up guns and ignitors, motive power for burner drive mechanism etc. of air pre-heaters will be met from plant-air compressors.

Service air system will have suitable inter-connection with the instrument air header for augmenting instrument air supply in emergency.

Fire Protection System

A comprehensive fire detection and protection system is envisaged for the complete power Project. This system will generally conform to the recommendations of TAC guidelines, IS standard and NFPA.

Fire protection system includes following:

- Hydrant system
- Automatic high velocity & medium velocity water spray system
- Automatic fixed foam system for fuel oil storage tank
- Automatic inert gas system
- Potable and mobile fire extinguishers
- Fire tender

Hydrant system:

Hydrant system for complete power plant covering the entire power Project including all the auxiliaries, buildings in the plant area. The system will be

complete with piping, hydrants, valves, instrumentation, hoses, nozzles, hose boxes/stations etc.

Automatic high velocity & medium velocity water spray system

Automatic high velocity water spray system for all oil filled transformers located in transformer yard (oil capacity 2000 litre & above) and those of rating 10 MVA and above located within the boundary limits of plant, main and unit turbine oil tanks and purifier, lube oil piping (zoned) in turbine area, generator seal oil system, lube oil system for SG feed pumps, consisting of detectors, deluge valves, projectors, valves, piping, instrumentation etc.

Automatic medium velocity water spray system for cable vaults and cable galleries of the main plant, switchyard control room, CHP control room and ESP control room consisting of smoke detectors, linear heat sensing cable detectors, deluge valves, isolation valves, piping, instrumentation, etc.

Automatic medium velocity water spray system for conveyors, galleries, transfer points and crusher house consisting of linear heat sensing cables, IR detector, heat detectors deluge valves, nozzles, piping, instrumentation, etc.

Automatic medium velocity water spray system for un-insulated fuel oil tanks storing fuel oil having flash point 65 deg C and below consisting of QB detectors, deluge valves, nozzles, piping, instrumentation, etc.

Automatic fixed foam system for fuel oil storage tank

Foam injection system for fuel oil storage tanks consisting of foam concentrate tanks, foam pumps, in-line inductors, foam monitor, foam hydrant, valves, piping & instrumentation etc.

Automatic inert gas system

For protection of control room, equipment room, computer room and other electrical and electronic equipment rooms, suitable “Halon substitutes” such as “INERGEN” or “AGRONITE” system would be provided.

Potable and mobile fire extinguishers

Portable and mobile fire extinguishers, such as pressurized water type, carbon-dioxide type, foam type, dry chemical powder type, will be located at strategic locations throughout the plant.

Fire tender

Two no. fire tender of multipurpose type shall be provided in the fire station.

Fire detection and Alarm system – A computerized analogue, addressable type early warning system will be provided to cover the complete power plant with compatible detection systems.

An over ground fire water pump house will be constructed near these firewater storage tanks.

The Fire water supply system shall consist of the following major equipment:

- Two (2x100%) main electric motor driven hydrant pump
- One (1x100%) Diesel engine driven hydrant pump
- One (1x100%) electric motor driven spray water pump
- One (1x100%) diesel engine driven spray pump
- Two (2X100%) jockey pump electric motor driven & one number of hydro pneumatic tank with two (2X100%) reciprocating compressor shall be provided to maintain the constant pressure in complete system.
- One number (two compartment) aboveground RCC fire water storage tank shall be provided.

Firewater pumps will be installed in the pump house for hydrant and spray system and the same will be driven by electric motor and diesel engines as per TAC guidelines. The water for foam system will be tapped off from the hydrant system pumps.

The Fire Protection Water supply system shall be maintained at a static pressure of 10.5 Kg/cm^2 (g) by the pressure maintenance pump which shall start automatically when the pressure falls below a pre-set level.

For boiler area, Depending on the height of boiler & restriction in main pump static head, booster pumping station shall be provided to maintain the pressure of hydrant valve at boiler tope area,

One (1x100%) Diesel engine driven hydrant pump

One (1x100%) electric motor driven spray water pump

All necessary instrumentation & controls for the entire fire detection, alarm and protection system will be provided for safe operation of the system

Piping, Valves, Fittings & Specialties

The scheme of various systems such as, steam of sub-critical and supercritical parameters, condensate, water, oil, air etc. have been explained above. Piping, valves, fittings, hangers, anchors, supports, guides etc. would be provided as required. All high pressure, medium pressure and low pressure lines will be of proven quality and suitable for conditions of operation encountered at the specific points. Pipelines running outside the powerhouse will be routed over trestles as far as practicable in order to avoid maintenance and other problems encountered with trench piping and buried piping. However, for rail culvert crossing piping inside trenches and for large diameter water lines buried pipes with proper coating and waterproofing would be adopted.

Miscellaneous Auxiliaries

Turbine Oil Purification System:

A suitable centrifuge or other type of turbine oil purification plant will be provided as an auxiliary of the turbo-generator to condition the turbine oil continuously, in order to remove the water and other impurities from the system to maintain the turbine oil at the optimum condition. In addition to the above unit system, a central turbine oil storage unit comprising one clean oil tank, one dirty oil tank, one purifier unit and necessary pumps, vent fans etc. will be kept. This would also receive the refill of turbine oil from outside. The purification plant to be provided with the unit system will be complete with oil purifiers, storage tanks, filters, necessary pumping sets, vent fans etc.

Condensate Polishing System:

The proposed 2 x 800 MW Power Project will be provided with 100% capacity condensate polishing system per unit. Condensate polisher will comprise four (4) demineralisers per unit each operating in parallel. Any three (3) of these

units will be capable of treating the full condensate flow at boiler MCR condition. Condensate polishing will ensure elimination of ammonia, silica, sodium or potassium from the condensate before being recycled to the feed water system. Condensate polishers will operate at 100% capacity during normal operation to maintain boiler water chemistry as required by OEM. Three (3) of the exchanger vessels will be working in parallel and the fourth one will remain isolated from the system. The fourth vessel will act as standby and will be brought into operation when regeneration is required or during any emergency period. The polishing unit would be located at the powerhouse building. The operation of the condensate polishing system will be semi-automatic, remote/manual.

The regeneration system will be external. For regeneration, the resins from the exhausted exchanger vessel will be transferred hydraulically to this facility located at DM plant and regenerated resin sent back in the same way.

Chemical Feed System:

For maintaining ultra-supercritical steam parameters water chemistry assumes greatest importance. Oxygenated treatment (OT) program is adopted with 100% condensate polishing plant which has proven essential for once-through system. During start up and low load operation all volatile treatment (AVT) is followed with an oxygen scavenging chemical. Chemical feed system will be provided for feeding neutralizing amine for pH control and oxygen injection during OT (normal conditions) and neutralizing amine and hydrazine for AVT (startup condition). The chemicals are injected in the condensate pump discharge with additional provision in the boiler feed suction line to maintain the chemical concentration in the feed water circuit within permissible limits for trouble-free operation of the plant.

Oxygenation system will consist of high pressure cylinder banks with standby, regulating station and mass flow control valve for injection.

The Low Pressure chemical dosing system (amine and hydrazine) of each unit will consist of:-

i) A mixing tank provided with stirrer and a metering tank

ii) Two (2) full capacity, variable volume metering pumps, complete with suction filters and other accessories and fittings as necessary. These LP pumps will inject hydrazine or other chemicals into the condensate pump discharge/boiler feed suction. Normally one pump will be running and the other will be standby.

iii) Necessary piping, valves, fittings and instruments.

In circulating cooling water system shock chlorination would be done to contain algae growth. Continuous chlorination will be required for the potable water system.

Hydrogen Generation Plant:

A hydrogen generation plant is being provided in the proposed Project to meet the requirement of hydrogen gas required for cooling the generator. Hydrogen generation plant capacity of 2 x 8 m^3/hr has been proposed. The plant would be located at a safe distance from other installation as per statutory requirements of the explosive act. Provision shall also be made to collect the by- product oxygen produced in compressed gas cylinders for medical use within the plant medical unit.

Plant Elevators:

One (1) goods-cum-passenger elevator will be installed for each boiler. In addition, one (1) passenger elevators will be installed in powerhouse building & one (1) passenger elevator will be installed in new service building. Besides, an elevator would be provided for the each FGD stack.

Cranes & Hoisting Equipment:

Two EOT cranes of suitable capacity is proposed to be provided in the turbine hall and will be used for maintenance of the TG hall equipment. Temporary gantry crane is proposed for lifting generator stator and heavy equipment.

Conventional and special type of cranes required for maintenance of certain SG and TG equipment such as FD/PA/ID fans, condenser water box, ESP, FGD, transformer rectifier sets etc. will be supplied by the respective equipment

supplier. For clarified water pump house a crane of suitable capacity (pendant operated) and for circulating water pump house a pendant operated of suitable capacity electric travelling crane have been considered. Two pendant-operated of suitable capacity of SG/DG EOT cranes are proposed for ash slurry pump house and store building.

Maintenance cranes/handling devices of suitable capacities have been considered for all other pump houses and other places such as coal handling plant transfer points, DM plant, etc. Monorails for lifting heavy motors and other equipment within the powerhouse not covered by EOT crane such as miscellaneous pumps, heat exchangers etc. will also be provided. Suitable rails will be provided, if necessary, on floor for bringing the horizontal feed water heaters under the approach of EOT crane.

Associated Facilities

Repair Workshop:

For achieving higher availability of the plant, the plant maintenance would be done following a concept of unit exchange system for repair and maintenance. Under this system, the defective components would be replaced immediately by sound ones from the stores. The defective components would thereafter be repaired in the workshop and sent back to the stores. Following this system, two types of activities namely maintenance and reconditioning would be physically separated thereby speeding up maintenance activity.

In order to carry out the repair activities, it is envisaged to provide the following shops:-

A. Main workshop near the main powerhouse building.
B. Electrical and Instrument repair shop housed within the powerhouse building or in the workshop.
C. A repair shop for mobile equipment would be located near the coal storage yard.
D. Motor vehicle repair shop.

Necessary machinery, tools and tackle required for the nature of repair involved would be provided at all the above shops.

Workshop shall be provided for repair & maintenance purpose & shall be decided during detailed engineering.

General Stores:

Both covered and open space will be required for storage of various materials required for construction as well as operation and maintenance of the plant. While the construction stores will be temporary, the other stores will be permanent. Consumables, tools and tackle and other relevant items required for the 800 MW Unit size will also be kept in the stores.

The stores will broadly have the following divisions to house material of different categories:

1. Heavy materials store will house boiler tubes of various sizes, boiler and auxiliary parts, turbine heavy parts, stainless steel plates, conveyor belt and other coal handling equipment spares, dumper and dozer spares, motors, transformer windings, firefighting equipment, insulators and hardware connectors, copper and aluminium conductors and similar heavy items.
2. Mechanical, electrical and instrument stores will accommodate small spare parts for mechanical and electrical equipment and instruments respectively.
3. Fast moving spares store will house electrodes and welding materials, blow lamps, bulbs and light fittings, grease, soap, battery, cotton waste and cloth, brooms, motor vehicle spares, gas cylinders, gloves, aprons, safety belts, goggles, ropes, refill for the firefighting equipment etc.
4. Chemical stores will house alum, lime, morpholine/hydrazine resin, spirit and other chemicals required for steam, feed water and condensate system and chemical laboratory.
5. Civil engineering store will accommodate cement, sanitary materials, filtering sand and filters, pipe and pipe fittings etc. for water supply.
6. Refractories and lubricants will be stored under separate covered sheds.

Open storage-yard will be provided to store structural steel, rail, sleeper, heavy castings, cable reels etc.

Suitable enclosures will be provided for storing the insurance spares. Arrangements will be made for storing items like relays, motors, and instruments under controlled atmospheric conditions.

Chemical Laboratory & Testing Facilities:

A central chemical laboratory in the service building is envisaged for the Project. This will have necessary equipment and facilities to test and analyse steam, water, oil, fuel etc. required to ensure satisfactory operation and maintenance of the Power Plant. The testing and calibration laboratories for C&I and relay-metering will also be housed in the same building, with necessary equipment and standard instruments for chemical analysis of various items, testing of electrical items and testing/calibration of instruments.

For all practical purposes, the chemical laboratory and testing facilities shall be provided.

Thermal Insulation:

Adequate insulation will be provided to reduce heat losses from the equipment, piping and ducts and to ensure adequate personnel protection in critical areas. Insulation would be so selected that the covering jacket surface temperature does not exceed the surroundings ambient temperature by more than 15 °C.

Pollution Monitoring System:

Monitoring of various environmental aspects is of prime relevance in setting-up the proposed unit. The following aspects would be critically monitored:-

- To keep watch on the state of pollution
- To generate data for predictive and corrective measures

- To quantify environmental impacts

The important area requiring periodic/conditions monitoring are:-

- Stack emission
- Ambient air quality
- Disposed water quality (if any)

Electronic smoke density analyser and gas analyser equipment is proposed to be provided for continuous monitoring of particulate matters at the outlet of ESP. Sample analysis of NOx, ammonia slip, SO_2 and other pollutants from chimney would be carried out. Wastewater would be checked for any harmful pollutants before discharging to outfall (if applicable).

An oil/water separation unit has been envisaged near fuel oil day tank/pump house area in order to keep plant drains free of oil and to reclaim waste oil as far as practicable. Oil thus separated would be returned to the fuel oil tank and used or disposed of by incineration.

Coal Handling and Ash Handling Plants will be equipped with dust extraction/suppression system to combat fugitive dust.

ELECTRICAL SYSTEM & EQUIPMENT

Introduction

The proposed Thermal Power Station at Dadri Khurd, Mirzapur district, Uttar Pradesh will be of two (2) generating units of 800 MW each.

Power from the proposed power station will be available at 400kV level at the bus bars of the EHV switchyard of the power plant. Power from this switchyard would be evacuated through one 400 kV double circuit line to the nearest UPPTCL/UPPCL grid sub-station.

The 400 kV switchyard of the generating station will be located in front of the transformer yard.

Design Parameters

Following criteria/data will be used in engineering the electrical system and equipment for 2x800 MW power plant.

System Configuration

The system configuration is based on the concept of single contingency of operation i.e. failure of any auxiliary transformer or supply feeder pertaining to any subsystem will not affect the full load operation or start- up/shut down operation of any unit.

400 kV System Data:

a. Maximum short circuit level : 63 kA for 1 sec.
b. Maximum system voltage : 420 kV

Voltage at Load Terminal

a. At full unit load, the voltage will not drop below 90% of the rated voltage.
b. At light unit load, the voltage will not exceed 110% of the rated voltage.
c. During starting of large motor, the voltage will not drop below 80% of the rated voltage.

System Parameters & Variations

System parameters for utility systems are detailed below: -

Sl.No.	System Voltage & Frequency	Fault level	Grounding
a.	11000 V ± 10%, 3Ph, 3-wire, 50 Hz - 5% to +3%	50 KA (1 sec)	Non effectively earthed
b.	6600 V ± 10%, 3Ph, 3-wire, 50 Hz - 5% to +3%	50 KA (1 sec.)	Non effectively earthed
c.	415 V ± 10%, 3Ph, 4-wire, 50 Hz - 5% to +3%	50 KA (1 sec)	Effectively earthed
d.	240 V ± 10%, 1Ph, 2-wire, 50 Hz - 5% to +3%	25 KA (1 sec)	Effectively earthed
Combined voltage and frequency variation 10% (Absolute sum)			
e.	220 V DC (–) 15% to (+) 10%, 2-wire	25 kA (1 sec)	Unearthed

Environmental Condition

Electrical equipment will be installed in a hot, humid, and tropical atmosphere, heavily polluted at places with coal dust and/or fly ash and will be designed accordingly.

The equipment will be capable of continuous full load operation under the following site conditions :-

- Finished Grade Level : 181.0 M above MSL
- Annual Ambient
  Air Temperature : (+) 44.8°C (Max.)
  (+) 4.0°C (Min.)
- Relative Humidity : 85% (Max.)
  18% (Min.)
- Wind Velocity : 27 km/hr. in accordance with I.S.: 875
- Seismic Zone Zone-III in accordance with I.S. : 1893, Part-3

Sensitive electrical and electronic devices will be placed in controlled environment such as control room, electronic equipment room, etc. as required.

All electrical equipment are to be designed for ambient temperature of 50ºC and relative humidity of 95%. Sensitive electrical and electronic devices will be placed in controlled environment such as control room, electronic equipment room, etc. as required.

Codes and Standards

Electrical equipment will be designed in accordance with the latest applicable Indian Standards (IS), International Electro-Technical Commission (IEC) standards, CEA guidelines and publications of Central Board of Irrigation & Power (CBIP).

Electrical installation work will conform to the provisions of Indian Electricity Act/Rules, CEA guidelines relevant I.S. Codes of practice and also comply with other statutory rules and regulations, as applicable.

Electrical System

Generation System & Power Evacuation

Proposed power station will have 2x800 MW STG units generating power at 22 kV or as per manufacturer standard. These units will be connected to 400 kV GIS switchyard in the plant for evacuation of generated power. The switchyard will be contained in a fenced area separated from the generation building. The bus bar configuration will be suitable for one and half circuit breaker arrangement for better reliability, comprising four (4) I-section bays.

- Two (02) – 400 kV circuits for generator transformers bay
- One (01) – 400 kV circuits for station maintenance transformers bay
- Two (02) – 400 kV circuits for outgoing lines with switchable line reactor
- Two (01) – 400 kV circuit for Bus Reactor

A control room will be located in the switchyard premises to house switchyard control, metering and protective equipment. For reliable communication and carrier aided distance protection of 400 kV remote end breakers, power line carrier communication equipment (PLCC) and Fibre Optic Telecommunication Equipment (FOTE) will be installed in the switchyard in consultation with Utility.

In the Power House, each generator will be directly coupled to the respective steam turbine and will have a nominal rating of 800 MW at 0.85 p.f. (lag). Generation voltage will be 3-phase, 27 kV with variation of ±5%, at frequency 50 Hz with variation of + 3% to - 5%. The excitation system will be brushless or static type as per manufacturer's standard and will be selected for an ideal rate of response, accuracy and sensitivity during normal as well as transient state of operation. The generating unit will be connected to 400 kV switchyard through the Generator Circuit Breaker (GCB) and three-phase bank of three (3) single phase, 22/(420/√3) kV step-up generator transformers (GT) of 315 MVA each, having the total capacity of GT as 945MVA. Connection between generator, GCB and generator transformer low voltage terminals will be through isolated phase generator bus duct and that between the high voltage terminals and the switchyard by outdoor overhead ACSR conductors.

Power Distribution System

Three voltage levels viz. 11KV, 6.6KV and 415V have been envisaged to supply power to the unit and station auxiliaries in the power plant. According to the kW rating of motor, its rated voltage will be as follows:

kW rating of AC Motor	Rated Voltage
Motor kW <0.2 kW	230V , 1 phase
0.2 kW < Motor kW < 200kW	415V, 3 phase
200 kW < Motor kW < 2000 kW	6.6KV, 3 phase
Motor kW > 2000 kW	11KV, 3 phase

During starting of the unit the start-up power will be drawn from 400 kV bus through 400/27 kV Generator transformer. The generator will then be synchronized through GCB at 27 kV system. In the event of unit trip, power will be drawn from the 400 kV bus through Generator transformer for coasting down of the unit. As the system is a GCB scheme 2X50% unit transformer per unit and 1X100% Station transformer will be provided to feed the station auxiliaries and unit start-up / shutdown facilities. The station maintenance transformer shall be used as back up to station/unit transformer and also used to take unit maintenance power in case of GT shutdown. During complete blackout, emergency DG set will be automatically started and will provide power to essential loads for carrying out safe shutdown of the unit.

11 kV System

11 kV station power will be derived from the 11.5 kV windings of 27/11.5 kV unit/station transformers and 400/11.5 KV station maintenance transformer. The 11.5 kV terminals of the transformers will be connected to 11 kV station/unit/maintenance switchgears through 11 kV segregated phase bus ducts. 11kV Unit switchgears will feed power to motor driven boiler feed pumps.

The dam-side Intake Pump House located within 2 km away will get two feeders from the 11 kV station switchgears. Those feeders will be upgraded to a higher voltage level if required to maintain allowable minimum voltage for the pump motors at starting. This aspect will be examined at the detail development stage.

In addition 11 kV Unit and Station switchgears will act as power source to 11/6.9 kV auxiliary power transformers. Two such transformers will be in the transformer yard of Power House for feeding the station/Unit loads of Power House area. A set of another two 11/6.9 kV auxiliary power transformers will be at CHP/AHP/FGD area to feed the loads of CHP/AHP/FGD. 11 kV switchgears will also act as power source to 11.5/0.433KV LV service transformers, which will feed the station loads for auxiliaries of Switchyard, auxiliaries of compressed air system, A/C & ventilation system, Plant Illumination System, welding boards and other station service loads through a number of 415V switchgears. 11 kV station switchgears/Unit Switchgear/Station maintenance will be interconnected by full capacity tie by means of 11 kV segregated phase bus ducts.

During normal running of the Unit, its auxiliaries like ID fan, PA Fan, FD Fans etc. will be fed from unit transformers. Two nos 27/11.5 kV transformers and 1(ONE) 27/11.5 kV station transformer fed by each generator will cater the unit /Station auxiliaries of each 800 MW Unit through two (2) nos. unit 11 kV switchgears and one (1) station switchgear. Each 11 kV unit/station switchgear will be interconnected to 11 kV station maintenance switchgear by separate circuit breakers and segregated phase bus duct. During normal operation of the unit each 11 kV unit/station switchgear receives power through 27/11.5 kV unit transformer and 27/11.5 kV station transformer.

Construction power:

The peak demand of construction power is estimated as 7500 kVA, assuming certain quantity of site fabrication of steel structures and piping. The required construction power supply will be obtained either from the grid, depending upon feasibility.

6.6 kV System

6.6 kV power system will be derived from 11 kV system through 11/6.9 kV auxiliary power transformers and will be used mainly for feeding 6.6 kV motor loads and 6.6/0.433 kV auxiliary transformers. To cater the 6.6 kV motor loads/transformer load Unit/AHP/CHP/FGD, there will be separate set of transformers and switchgears. There will be one (1) 6.6 kV switchgear for each unit and AHP/CHP/FGD loads. This unit switchgear will be in the Power House and will be fed from transformers located in Transformer Yard adjacent to Power House. 6.6

KV switchgears being located at respective load centre, will also be used to cater the 415V loads of respective area through 6.6/0.433kV transformers and 415V switchgears.

In order to cater 6.6 kV loads of CHP/AHP/FGD, 11/6.9 kV transformers and 6.6 kV switchgear will be installed in CHP/AHP/FGD area and 6.6/0.433kV transformers and 415V switchgears will be also there to cater 415V loads of AHP/CHP/FGD.

415 V System

a. 415 V distribution system will supply power to 415 V loads during normal operation and under emergency condition of the plant. Unit and station loads will be powered from 6.6/0.433kV & 11/0.433kV service transformers connected to their respective 415V unit and station switchgears (MCCs/PMCCs). Connection between auxiliary transformer and 6.6kV & 11kV switchgear will be through cable and that between the transformer and 415V PCC/PMCC will be through non-segregated phase bus ducts. 415V PCC/PMCC will feed power to breaker-operated motors, lighting transformers and 415V MCCs.

b. Local Starter Panels/Local Panels and other auxiliary loads will be powered from respective 415V MCCs/DBs.

415 V Emergency System

Emergency AC power will be required to permit a safe shut down of the units as well as safety to personnel and plant (e.g. aviation obstruction lighting of the chimney) in the event of a plant blackout. Suitably rated Diesel Generator sets will provide the emergency power to the 415V emergency switchboard that will have normal supply from unit auxiliary system. This switchboard will feed important AC motors like AC turbine auxiliary oil pump, AC jacking oil pump, etc. It will feed power to Turbine as well as Boiler valve MCC etc. It will also meet the AC power requirement of loads such as battery chargers, UPS, AC emergency lighting loads etc. There will be three (03) DG Sets of identical rating - one per unit plus a common standby – to cater to the AC emergency loads.

220 V DC System

a. Battery backed DC supplies will be provided for critical loads such as emergency oil pump, seal oil pump, jacking oil pump, scanner air fan, etc. and for protection, control, indication and annunciation supply of switchgear and control panels including emergency lighting. Battery will supply these loads during complete black out condition and will be sized for 1 hour back up time subsequent to tripping of the generating units.

b. Four sets of batteries will be provided in Power House for the two generating units, each rated to carry the DC loads of one unit as well as common station loads. Each set of battery will be accompanied with a float-cum-boost charger. Further distribution of DC power will be through DC distribution boards/fuse boards.

c. Switchyard, Plant Water System, coal handling plant etc. which are away from Power House will have its own independent DC source derived from battery bank located in respective areas. Each set of battery will be connected to float charger and float cum boost charger. DC power will be further distributed to various locations through DC distribution boards/fuse boards.

UPS System

UPS will be provided for regulated, filtered and uninterrupted 240 V, 50 Hz, single-phase power to critical AC loads during normal as well as emergency conditions. The system will comprise 2X100% parallel redundant chargers and inverters, 2x100% battery bank for main plant, FGD and power evacuation switchyard 1X100% battery bank for offsite area, bypass line transformers and voltage stabiliser, static switch, manual bypass switch, distribution board, etc.

System Control

The Generator will be controlled from Power House unit control room through DCS. The DCS will be utilized to perform control, interlock, indication, metering and annunciation related to the above equipment including equipment pertaining to Generator auxiliary system. All controls as supplementary to the proprietary system of boiler, turbine and generator package (BTG) including auto synchronization of generator with 400kV bus will also be performed from DCS.

Control, interlock, metering of Generator Transformer (GT)/Generator circuit breaker (GCB) breakers including its alarm/indication will be provided in DCS. Control of GT breaker will be possible from switchyard control room but limited to maintenance operation only, however GCB shall be controlled from central control room DCS only. Important status indication will be duplicated in switchyard control room. The switchyard control room will also be the control point for all other 400 kV breakers and will house control, metering and protective relay panels, SAS/SCADA, 415 V AC and 220 V DC system equipment pertaining to the switchyard.

Control, indication, metering, monitoring of electrical power distribution system in the power block will be performed from DCS in unit control room. Electrical system of various sub systems (e.g. coal handling system, ash handling system, Plant water system, etc.) will be controlled from DCS/PLC, located in respective control room.

Control of diesel generator will be from AMF panel in DG room. Remote control provision will also be provided in DCS through CRT operator interface in unit control room.

Metering

Plant electrical parameters will be metered to the extent required for proper operation and monitoring of plant conditions. The same will be provided as per requirement.

For import and export of power, tariff meters shall be provided separately and the same shall be as per latest CEA regulations.

Protection System

For protection of equipment against abnormal system conditions, adequate protective devices will be installed in respective switchgears and/or control and relay panels located in switchgear room/control room. A group of such protective devices will be utilised to protect the equipment under different abnormal conditions arising out in the electrical system. Multifunction, numerical protective devices will be used for protection of electrical system equipment.

2x100% protection will be provided for each of the generators. For transformer, separate protection relays will be used for main & back-up protection. For line protection and bus bar protection having duplicated redundant protection, relays with different algorithm will be provided as main-1 & main-2 protection. Following protections will generally be provided for various electrical equipment in the electrical system:

Generator

a. Differential (87G)

b. Stator inter turn fault (95)

c. 100% Stator earth fault (64S)

d. 95% Stator earth fault (59N)

e. Over fluxing (24)

f. Inverse time over current (51) for alarm

g. Negative phase sequence (46)

h. Loss of excitation (40)

i. Reverse power (32)

j. Rotor earth fault (64R) (2 stage)

k. Back-up Impedance (21)

l. Pole slipping (78)

m. Thermal overload (49)

n. Low forward Power (37)

o. Over voltage (59)

p. Under voltage (27)

q. Over frequency (81O)

r. Under frequency (81U)

s. Voltage balance (60)

t. Check Synchronisation V.T. supervision (25)

u. Dead Machine (51,27)

The generator will also be provided with surge protection equipment comprising surge capacitor and lightning arrestor.

Generator Transformer

a. Overall differential (87GT)

b. Generator transformer differential (87T)

c. Buchholtz/Winding/Oil temperature/PRV operated (63)

d. HV restricted earth fault (64)

e. Volts/Hz. over fluxing (24)

f. Inverse time HV back-up over current (51)

g. Inverse time HV back-up earth fault (51N)

h. Breaker failure (50Z)

Unit / Station Transformer / Aux. Power Transformer / Station Maintenance Transformer

a. Transformer differential (87T)

b. Buchholtz/Winding/Oil temperature/PRV operated (63)

c. Restricted earth fault except for HV winding of Unit Transformer (64)

d. HV Back-up over current with high set instantaneous unit (50/51)

e. Directional earth fault for Aux. Power Transformer (67N)

f. HV back-up inverse time earth fault for Station Transformer (51N)

g. HV standby inverse time earth fault for Aux. Power and Station Transformer (51N)

h. LV standby earth fault (51N)

i. Breaker failure (50Z) for station transformer feeder

400 kV Line Feeder (main1 and Main2 shall be from different manufacturer)

a. Non-switched Distance Main – 1 with inbuilt directional earth fault (21,67N)

b. Non-switched Distance Main – 2 with inbuilt directional earth fault (21,67N)

c. Breaker failure (50Z)

d. Check synchronization (25)

e. Auto re-closing (79)

f. Overvoltage protection

Duplicated Bus bar differential protection (87BB) shall be provided for 400 kV bus in the switchyard.

LT Auxiliary Transformers

a. LV over current / earth fault (51/51N)

b. HV over current with high set instantaneous unit (50/51)

c. Buchholtz/Winding/Oil temperature/PRV operated (63)

11 kV Switchgear

Incomer/Bus-coupler-

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

c. Check synchronization (25)

d. Under voltage (27) (wherever applicable)

Outgoing Line Feeders

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

c. Under voltage (27) (wherever applicable)

Motor Feeders-

a. Integrated motor protection relay comprising of following functions:-

- Ø Thermal overload
- Ø Phase fault (short circuit)
- Ø Unbalance (Negative Sequence)
- Ø Locked rotor
- ➢ Earth fault through core balance CT
- ➢ Prolonged start

b. Differential protection for motor rated above 1000 KW (87)

c. Winding/Bearing temperature (49)

d. Under voltage (27) (wherever applicable)

6.6 kV Switchgear

Incomer/Bus-coupler-

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

c. Check synchronization (25)

d. Under voltage (27) (wherever applicable)

Outgoing Line Feeders

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

Motor Feeders

a. Integrated motor protection relay comprising of following functions:-

- Ø Thermal overload
- Ø Phase fault (short circuit)
- Ø Unbalance (Negative Sequence)
- Ø Locked rotor
- ➢ Earth fault through core balance CT
- ➢ Prolonged start

b. Differential protection for motor rated above 1000 KW (87)

c. Winding/Bearing temperature (49)

d. Under voltage (27) (wherever applicable)

415V Switchgear/PMCC

Incomer / Bus-coupler

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

c. Check synchronization (25)

d. Under voltage (27) (wherever applicable)

Outgoing Feeders

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

415V Breaker Controlled Motor Feeders (above110kW)-

a. Integrated motor protection relay (99) for the following functions :

- Ø Thermal overload
- Ø Phase fault (short circuit)
- Ø Unbalance (Negative Sequence)
- Ø Locked rotor

- Ø Earth fault
- Ø Prolonged Start

415V MCC

Incoming/Outgoing Feeders

a. Short circuit protection through fuse/MCCB

415V Contactor controlled Motor Feeders (upto and incl. 110kW)

a. Thermal overload with in-built single phasing protection.

b. Short circuit protection through fuse/MCCB

DC System

a. Short circuit protection with earth fault alarm.

Diesel Generator

a. Voltage restrained over-current (51VR)

b. Reverse power (32)

c. Negative phase sequence (46)

d. Under frequency (81)

e. Over voltage (59)

f. Under voltage (27)

In all cases, proper discrimination would be achieved so as to isolate the faulty **elements only, keeping the healthy part of the system in service.**

Plant Illumination

Suitable illumination is necessary for general visibility in the plant as well as for operation and maintenance ensuring safe movement of working personnel. Power supply for the illumination system will be derived from the following sources:

Normal AC System

Normal AC system would provide about 70 - 80% lighting in the power island and adjoining areas and 100% lighting in offsite areas, roads, other open areas including the switchyard. The power supply will be derived from station service switchgear through dry type lighting transformers, distribution boards and lighting panels distributed all over the plant.

Emergency AC System:

This system provides 20 – 30% lighting in selected areas only in the power island. The supply will be derived from emergency switchgear through dry type lighting

transformers, lighting distribution board and lighting panel. Lighting fixtures connected to this system will be normally ON along with normal AC system lighting. They will go off for few seconds in case of normal supply failure and will automatically be restored upon restoration of emergency AC supply through Diesel generator.

Emergency DC System

At strategic locations, few lighting fixtures fed from 220 V DC supply will be provided to enable safe movement of operating personnel and access to important control points during an emergency when the complete station AC supply has failed. These lighting fixtures will be fed from DC lighting panels which in turn will be connected to DC distribution boards. The supply to DC lighting panels will be automatically switched ON in case of loss of AC supply at service switchgear as well as at emergency switchgear. The DC supply will be automatically switched off after few minutes following the restoration of supply to normal AC or emergency AC lighting system.

In auxiliary/off site buildings emergency DC lighting will be ensured through self contained DC emergency fixtures. The fixtures will be switched ON automatically in case of failure of AC supply.

EXIT sign fixtures with built-in battery will be provided in strategic location.

Type of light source will be guided by the lumen out put, operating life, colour appearance and area of application. Lighting fixtures recommended for different areas are given below.

Turbine Building -

a. General	:	LED
b. Turbine Hall	:	LED High bay .
c. Unit Control Room	:	LED Recessed Decorative type
d. Battery Room	:	LED Corrosion Proof.
e. Office Area	:	LED Decorative type

Boiler Area

a.	Mill Bay	:	LED well glass/high bay fittings
b.	Boiler Platform	:	LED highbay/well glass.
c.	General Area	:	LED Flood lighting .

d.	Stack	:	As per IOCA Aviation Warning Lights

Emergency Lighting

a.	General Area	:	LED Bulkhead
b.	Control Room	:	LED Decorative type

Other Areas

a.	Fuel Oil	:	LED Flame-proof
b.	Street Lights	:	LED Street
c.	Miscellaneous	:	LED - depending upon area of application.

Street/Area Lighting

Lighting towers (lattice structure) will be employed for switchyard/stockpile/ outdoor area lighting. Street light poles (SWAGE type) will be used for approach road lighting. Photocell will be used for controlling chimney lighting/streetlights/yard lighting with provision for manual over ride.

Grounding & Lightning Protection

Grounding System:

The main objectives of grounding system are:-

a. To provide safety to personnel from contact of dangerous potential caused by ground fault.
b. To ensure sufficient grounding current for effective relaying.
c. To stabilize circuit potential with respect to ground.

In order to meet the above requirement, a ground mat/mesh will be provided for the main plant and switchyard complex. All electrical equipment, non current carrying metal parts, structures, building steel, lightning protection system, generator/transformer neutrals will be connected to the station ground mat. For grounding of electronic equipment such as DCS/PLC, separate arrangement will be provided for connection to electronic ground mat.

Equipment under different sub systems will be connected to the earth grid to be created for respective systems. The earth grid conductor under different systems will be finally connected to main plant ground mat.

Lightning Protection System

The main purpose of lightning protection system are :

a. Provide protection to structures from lightning strokes.

b. Provide a low resistance conducting path to lightning discharge.

Lightning protection is recommended for main plant building, chimney, cooling tower and other structures. Lightning protection will also be provided for building/structures as per latest IEC standard 63205. For metal structures, which are electrically continuous down to the ground level, no lightning protection is required except adequate grounding connections. Lightning arrestors (LA) will be installed in the HV side of generator transformers & station transformers for protection against lightning surges.

In –Plant Cabling

Cables provide means of carrying electrical power and also conveying signals for various control, protection and monitoring functions.

Type of Cables

All power cables in the distribution system will be of Cross linked Polythene (XLPE) insulated and control cables will be PVC insulated. All cables will be armoured. Armour of twine and multi-core cables will be of galvanized steel wire /tape and for single core cable it will be of non-magnetic material. Outer sheath of all cables will be of improved fire performance category C2 of FRLSH (Fire Retardant Low Smoke and Halogen evolution) Type.

Cable Routing

Cables will generally be laid on ladder type prefabricated GI cable trays either in trenches or overhead steel/structures supported from building. For inter plant connections, cables may be directly buried or routed through overhead cable bridge. Separate trays will be used for HV, LV, control and instrumentation cables. AC and DC circuit will not run in the same cable tray. For underground crossing of railways, roads, etc. protection will be provided in the form of hume pipe or concrete encased rigid steel conduits, depending on application.

CONTROL & INSTRUMENTATION

Design Objective

The objective of this section of the detailed project report is to outline design philosophy to be adopted for Instrumentation and Control (I&C) systems for 2 x 800 MW Ultra Supercritical Thermal Power Plant, which will cover BTG (boiler, turbine, generator and their auxiliary systems and power cycle system) and BOP (balance of the plant) systems. The implementation of I&C system will be based on a state-of-the-art Distributed Digital Control, Monitoring & Information System (DDCMIS). The objectives are as given below.

i) To allow safe start-up, synchronizing, loading & load runback, shut-down, emergency tripping, control and monitoring of all major plant areas.

ii) To maximize the availability and reliability of plant taking into consideration of proper redundancies at critical levels as applicable.

iii) Failsafe design of I&C system considering the safety of personnel, process and equipment under the failure of Instrument air and / or Electric power.

iv) To incorporate a maximum level of automatic control, thereby minimizing operating manpower levels.

v) To provide facilities for comprehensive monitoring, storage and presentation of information concerning plant conditions.

vi) To provide facilities for comprehensive testing, presentation of information concerns to the systems and plant performance.

vii) To centralize plant monitoring and control facilities within the Central Control Room for BTG and local area control rooms for BOP.

viii) Achieve maximum life span of major equipment by condition monitoring systems.

ix) Optimization of the plant with high output and minimal consumption of fuel.

x) Maximum efficiency.

The I&C system would be of the type which normally relieves the operator of continuous duties and would take pre-planned corrective actions in case of process drift or if unsafe trends / condition develop in any regime of operation during start up, shutdown, normal and emergency conditions.

Plant Control Philosophy

A safe, efficient and reliable operation of the Plant Instrumentation & Control System is envisaged for Control and Monitoring of all equipment of the Main Plant & Auxiliaries from the Central Control Room (CCR), which will be common for two units. The proposed I&C System would provide Control and Monitoring of all major systems and equipment and related subsystems so that the status of all process parameters of the entire plant is made available at operator stations of the CCR.

The implementation of I&C system for the BTG unit would be based on a state-of-the-art Microprocessor based Distributed Digital Control, Monitoring & Information System (DDCMIS) with functional & geographical distribution of various function groups. Wherever required, Remote Inputs and Outputs (RIO) will be considered for the system & sub-system of the plant at different locations for optimization of the scope of cabling. The DDCMIS will be of Open Architecture type having high system availability and reliability with redundancies at various levels.

It is envisaged to have a unified DDCMIS system for Steam Generator Controls, Steam Turbine & Generator Control, Power cycle equipment, FGD, SCR, Plant Electrical Distribution System and BOP system controls through same family of hardware and software. All critical protection signals related to safety tripping shall be hardwired to DDCMIS.

Plant operation and control will be through the Operator Interface Units located on the Unit Control Desk (UCD) in the Central Control Room which will consist of colour graphic LED (TFT) monitor, keyboard / Mouse and also through Large Video Screen (LVS) driven by its driving server computer.

Offsite plants (BOP) will be DDCMIS / PLC based control system in hot redundant configuration. Major parameters of Offsite Plants like Raw Water facilities, DM Water facilities, Coal handling plant, Fuel Oil unloading & storage system, Ash Handling Plant etc. has also been considered in the CCR for remote operation / monitoring of the respective off-sites facilities in addition to their local operation and control from their respective local control rooms. PLC based proprietary control will be considered based on OEM recommendation.

PC based Operator Interface Units with LED (TFT) / KBD / Mouse will be provided for these offsite systems, which will be kept in the respective Local Control Areas. Some of the auxiliaries will have optional facility of operation from central control room as well as from local panels. 2 nos. 72"LVS in each local control room of WTP, AHP, CHP & FGD will be provided.

Steam Generating Unit and Auxiliaries

I&C shall include major Boiler controls like Burner Management System (BMS) including Master fuel Trip (MFT), Secondary Air Damper (SADC), Soot Blower Control and other open/close loop controls like coal mills and coal mill feeders, seal Air fans, scanner air fans, Boiler circulation water pumps, Pressure reducing & de-super heating stations, ID / FD / PA fans, HP Bypass system, SCR etc. and other integral auxiliaries control. HP/LP Chemical Dosing System control shall be done directly from DDCMIS.

Turbine Generator and Auxiliaries

I&C shall include controls and protective trips functions like Electro Hydraulic Governor (EHG) control, Automatic Turbine Run up System, Turbine Testing, Turbine Stress Evaluator, Turbine Protective Trip System, Turbine supervisory Instrumentation (TSI), LP Bypass system and other open loop & closed loop controls of TG system and auxiliaries like Feed water system, Condensate system, Heater drain system etc. related to the integral performance and safety.

Common Station C & I System

This will Include the control & monitoring of all other balance controls in Power cycle such as, Service water pumps, CW & ACW system & Cooling Tower Fans, DMCW system, Fuel oil pressurizing, heating and forwarding system, Ammonia Unloading & Forwarding etc. along with all integral instruments.

CW/ACW & CT fan systems and Fuel oil pressurizing & heating system, Ammonia Unloading & Forwarding shall be controlled and operated from DDCMIS operator's station as well as from Local operator's station. Remote Terminal Units (RTUs) shall be provided for this purpose.

Offsite Plant Controls

DDCMIS / PLC based System

DDCMIS / PLC based controls with operator interface units will be provided for major offsite plant controls as mentioned below. DDCMIS / PLC & operator interfaces will be located at the respective area control rooms. DDCMIS / PLC systems for these offsite plants shall have interface with the Main Plant DDCMIS (either through soft-link communication or through hardwired link) for operation / monitoring and status indication of selected parameters in CCR. Considering the presence of electromagnetic interference prevailing in

the plant, fiber optic cable would be provided for the above digital communication.

- In Plant Water Transportation & Pre-treatment Plant
- Demineralization Plant
- Coal Handling plant
- Ash Handling Plant
- Compressed Air Plant
- Mill Reject Handling System
- Condensate Polishing Unit
- Hydrogen Generation Plant
- Fuel Oil Unloading, Storage & Heating
- Condenser On-load tube cleaning system,
- Centralized Turbine Oil Purification system (PLC based as per OEM)
- Emergency Diesel Generator (Microprocessor based as per OEM)
- Raw water pumping system
- Effluent treatment system
- Fire Detection & Protection System (Microprocessor based as per OEM)
- Compressed Air Plant Compressors Integral Control (Microprocessor based as per OEM)
- Chlorination and CW Treatment plant
- Ammonia Unloading & Forwarding

Design Basis Requirements

The design of the control and monitoring system envisaged would be based on the following basic requirements:

- Complete control and monitoring of the Main Plant BTG unit & its Auxiliary systems and Electrical Systems will be performed from Central Control Room (CCR) through the PC based Operator stations of DDCMIS with Display Monitor and keyboard / mouse.
- Necessary soft-link integration of third party controls of the plant.
- Display, alarm and report generation of all relevant parameters in operator's guidance mode.
- DDCMIS connectivity with the switchyard SCADA has been envisaged for power distribution monitoring.
- Supervisory control for the electrical sub system will be realized in the DDCMIS. Monitoring of electrical parameters and status in the DDCMIS with graphic screen display has been envisaged.
- The system design will be aimed for safe, efficient and trouble-free functioning of the plant under start-up, synchronization, loading, unloading, shut down & emergency operation etc. The system will ensure high safety for man & machine.
- Sequence of Event Recording (SER) system has been envisaged as integral part of DDCMIS. SER shall be provided to record and print trip and causes of trip for quick diagnostic of fault and remedial action.
- 80'' Large Video Screens display units has been envisaged for monitoring salient plant parameters, plant status, alarms, graphics etc.
- Adequate number of operator stations will be provided to achieve flexibility in operation and it will also be ensured that any operational task can be carried out from any operator station. Printers shall be supported in the network and are common for log and report printing, graphic print, alarm and event printing from any operator station.
- Engineering stations shall be envisaged to perform programming/configuration of the system, and to perform system diagnostics. Engineering stations shall be password protected.

- Operation/Control and monitoring of plant shall be achieved from HMI Stations through interactive graphic displays which shall include complete plant mimic displays, control displays, bar graph displays, alarm displays and messages, operator guidance displays, system status displays etc. Logs, summaries and reports will be displayed and will be printed on the printers.

Drives shall have start / stop, open / close facilities from the operator stations, at CCR. All drive shall have Emergency stop facilities through the **Local Push Button stations.**

Major Instrumentation & Control Systems

The following Control and Instrumentation Systems have been envisaged: -

- Distributed Digital Control & Management Information System (DDCMIS)
- Programmable Logic Control system (PLC)
- Field instruments
- Final Control Elements
- Vibration Monitoring & Analysis System
- Master and Slave Clock (GPS) system
- Alarm Annunciation System
- Steam and Water Analysis System (SWAS)
- Continuous Emission Monitoring System (CEMS)
- Boiler Tube Leak Detection System
- Hart Management System
- Plant Performance Analysis, Diagnosis & Optimization (PADO)
- Continuous Ambient Air Quality Monitoring stations (CAAQMS)

Distributed Digital Control, Monitoring & Information System (DDCMIS)

An integrated and functionally distributed hierarchical control (both binary and modulating) and data acquisition system synthesized from one common family of hardware and software has been envisaged for the plant.

The DDCMIS hardware like Controllers, modules / cards etc. shall be housed in cabinets located in Control Equipment Room (CER). HMI stations/operator interfaces shall be located in Unit Control Desk in Central Control Room (CCR) common for two units.

The DDCMIS shall be configured to perform the following basic functions:

Automatic sequencing of start-up and shutdown of equipment and auxiliaries including group/plant level start-up to minimize Operator's intervention under normal operating conditions ensuring safety of man and machine as well as to ensure high plant availability.

Automatic regulation of various valves and dampers to achieve guaranteed performance of various controlled variables and to achieve most fuel-efficient operating regime.

Acquisition, display, report generation and archiving of plant data and maintain historical data.

Performance calculations based on plant real time data and operator input data.

Electrical Distribution Management System (EDMS) to provide control and monitoring of the unit in-plant electrical distribution system.

Energy management of the plant and equipment by measuring consumption of power of all equipment in the plant, measurement of fuel, steam and all other relevant parameters.

On-line self-surveillance, monitoring and diagnostic facility

System programming & documentation facility

Data communication system

The DCS shall broadly comprise the following sub-systems:

Input / Output Signal Processing

Input/Output process interface sub-system shall directly acquire process data from transmitters, thermocouples, resistance temperature detectors and other sensors.

Input/Output (I/O) modules shall be intelligent having the following features as minimum.

Every channel shall be addressable during routine periodic diagnostic check.

Any failure in the module, loss of signal (both analog & digital) or any signal input crossing the permissible range shall be immediately detected and displayed.

Such failures shall lead to failsafe situations.

Closed Loop & Open Loop Control Subsystems (CLCS/OLCS)

Multi-loop Multi-function controllers shall be dual hot redundant and shall be capable of handling both Close and Open Loop Controls. Controllers shall connect to dual redundant network with a minimum bus speed of 100 MBPS.

The CLCS will perform modulating controls with optional auto-tuning facility that will act on valves, dampers or other regulating devices to achieve stable control with permissible variation in parameters.

The OLCS shall include sequence control, interlock & protection for various plant auxiliaries, valves, dampers, drives etc. The sequence control shall provide safe and automatic startup and shutdown of plant / associated plant items. The interlock and protection system shall ensure safe operation of plant / plant items at all times and shall automatically shut down plant / plant items when unsafe conditions arise.

Redundant multi-loop controllers logically grouped for optimum, effective and safe Performance will be provided.

It is envisaged that the controllers are uniformly loaded and have sufficient CPU spare capacity under worst data loading.

Redundant sensors ("2 out of 3" or "1 out of 2" philosophy) have been envisaged for critical measurements and control.

Boiler and Turbine protection will be conceived in either 2 or 3 channel configuration with adequate diagnostic.

Electro-pneumatic type final control elements are considered for the regulating duty. However, for critical applications where first response is required such as HP / LP Bypass etc., Electro-hydraulic actuators have been envisaged.

All actuators with fail-safe condition mode under abnormal conditions have been envisaged.

Data Acquisition System (DAS)

Bulk non-control-related data shall be acquired in similar Multi-loop Controllers and shall be processed and stored for monitoring purpose.

The data collected will be used for display, alarm, graphics, trends, logging, historical storage and performance calculation.

Historical Storage & Retrieval Subsystem

The Historical Storage Unit (HSU) will augment the Global Memory database in the system and will archive data and parameters for logs and historical records including trends, alarms and events. These will be used for analysis and performance calculation.

Historical Storage Facility shall be redundant so that any single failure of the storage medium or electronics will not lead to loss of historical data.

Performance Calculation

Plant performance calculations and other complex computations will be achieved by automatically retrieving plant data from highways. All these data will be displayed on Operator's station. Performance calculation would be based on ASME PTC performance test code for the SG, TG and other equipment in the plant.

Engineering & Configuration Station

PC based Engineering and Configuration Stations per unit shall be provided for engineering, program development, customizing, configuring & modification jobs related to entire DDCMIS. Engineering station shall be located in the computer room.

HMI Subsystems

Adequate number of Operator's stations configured with latest version of Pentium based PC, 32" industrial grade LED TFT colour monitors, keyboard, mouse etc. will be provided for Human-machine interface. Any system / equipment of the unit can be operated and monitored from any Operator's Stations. In addition, engineering station, performance calculation &

optimization package and shift supervisor station have been envisaged with PC based HMI.

Adequate number of color & B/W laser and dot matrix printers will also be provided as part of HMI systems for alarm, SOE, reports, logs, graphic print. Over and above the Operator's consoles one terminal each shall be provided for, the Shift Charge Engineer, maintenance Management and Plant Performance Calculation.

For each 800 MW unit, four (4) high resolution 80'' Large Video Screen (LVS) from the state-of-the-art technology will be installed in the CCR to facilitate monitoring of the entire plant. The system will be interfaced with DDCMIS for Plant graphic & critical alarms.

Alarm Facility

Plant abnormal conditions will be alarmed and displayed in the Operator Stations with different levels of priority and colours to facilitate the type of action to be taken by the operator.

Data Highway & Gateway for interfacing with other Systems

The DCS shall be based on Open System Architecture system having globally distributed database and connectivity with third party systems following standard protocol. Redundant Fast Ethernet switches shall be utilised for connecting and routing of data. All active items on the network shall be identified by unique address as their location in the network.

All Controllers and HMI units shall be resident on a common redundant high-speed data highway for global distribution and access of data. Any data will be available at any point of the network as and when required unless protected or masked.

The network shall be modular, expandable and flexible so that expansion is possible by adding extra stations on the data highway modularly and assigning the required network address, without disrupting the operation of rest of the system.

Communication gateway link between DDCMIS and other PLC based plant control system will be redundant.

Comprehensive self-diagnostic features have been envisaged to facilitate easy fault location and detection of hardware and software while the unit is in operation.

The data communication systems with following minimum features have been envisaged:

- Redundant communication controllers have been envisaged to handle the communication between each functional group of controllers of Control System with the Main data highway. The design shall be such as to minimize interruption of signals. It shall ensure that a single failure anywhere in the media shall cause no more than a single message to be disrupted and that message shall automatically be retransmitted. Any failure or physical removal of any station/module connected to the Data highway / control network shall not result in loss of any communication function to and from any other station / module.
- Built-in diagnostics shall be provided for easy fault detection. Communication error detection and correction facility (ECC) shall be provided at all levels of communication. Failure of one network and changeover to the standby network shall be automatic and completely bump less and the same shall be suitably alarmed / logged.
- Sufficient Data transmitting speed has been envisaged to meet the responses of the system in terms of displays, control etc. Spare capacity has been also considered.

Sequence of Event Recording System (SER)

A high resolution Sequence of Event Monitoring System shall be an integral part of Distributed Control System.

All SOE inputs shall be sourced directly from the primary switches and primary relay/contactors for "real time-stamping" based on GPS master clock following any tripping of major equipment, sub-systems and the plant as a whole.

The system shall be capable to discriminate inputs with a resolution of one millisecond.

Scan Time & Response Time

As a guideline, the maximum permissible response time of DDCMIS for various functions are as follows:

- CLCS function - 200 – 250 msec.
- Critical loops - 100 msec.
- OLCS function – 100 msec

DAS function - 500 msec or more.

Displays

Following displays on the monitor have been envisaged:

- Plant Graphics
- Control Faceplate Display
- Individual and Group Display
- Real Time and Historical Trend Display
- Alarms Display
- SOE display

- Diagnostic Display of the Process and Control System

Logs and Reports

The following logs and reports have been envisaged:

- Hourly, daily & monthly logs with freely assignable option of any parameter.
- Trip logs related to the unit and electrical system including pre-trip and post-trip.
- Alarm and SOE logs

System Software

The latest user-friendly version of all necessary software will be provided for the system. The software platform will permit interface with third party systems.

Programmable Logic Control System

PLC based control system shall consist of measurement system, interlock, protection and sequential logic control system, integrated annunciation system and data bus system for control and communication with the process. The microprocessor based PLC system shall consist of redundant power supply modules, redundant (hot standby) processor modules and redundant communication modules for communicating with operator station, Engineering station, DDCMIS (at CCR) and remote I/O panels with I/O card.

The system shall provide for sequencing of automatic start-up / shutdown of equipment/drives into operation as well as start/stop of standby equipment on failure of main equipment and manual intervention facility for all the equipment.

The PLC shall have all the standard facilities like dynamic graphics, alarm / event recording, real time and historical trending, control groups, overview

pages, logging (hourly, shift, daily, weekly, monthly), Pre-trip, post trip reports etc.,

Field Instruments & Systems

The transmitters and switch devices will be grouped together and will be placed in different local instrument enclosures in open and dust prone areas and in open type local instrument racks in covered areas at suitable locations. All field instrumentation items shall have IP 65 protection class as minimum. Instruments located in hazardous area shall have intrinsic safe circuit / Ex-proof enclosure.

The equipment shall be designed and constructed to withstand ambient temperature extremes and relative humidity conditions of the plant. The equipments shall meet all functional requirements and perform accurately and safely under the environmental and operating conditions without undue heating, vibration, wear, corrosion and aging.

Instruments will be of proven reliability, high accuracy & repeatability. They will comply with the acceptable international standards with following type and features:

- All field transmitters are envisaged with 4-20 mA DC signal output with high turndown ratio and with superimposed digital signal conforming to HART protocol.
- Instrument scale will be calibrated in engineering units and range will be selected in such a way that normal process parameter will lie in between 50-80% (approx.) of full scale.
- Instrument will have over pressure limit of about 150%.
- Accuracy of process transmitters is envisaged as +/- 0.075%. Accuracy of local gauges (PG, TG etc.) is envisaged as +/- 1% (approx.).
- All temperature elements (RTD / Thermocouple) will be duplex type. Thermocouples will be mineral insulated & ungrounded type.

- Flow nozzles will be considered for auxiliary steam and feed water flow. For other water flow measurement orifice plates are proposed.
- Coriolis Type Mass Flow Meter will be used for oil flow measurement.
- Magnetic Flowmeter / Ultrasonic Flowmeter will be used for CW flow to each unit
- Radar or Ultrasonic type level transmitter will be used for measurement of level of underground large sump and over ground large tanks
- Guide wave Radar type levels Transmitters will be used for vacuum services such as for Condenser hot well & LP heaters under vacuum. DP type level transmitters will be used for all other level measurement.
- Conductivity types Electronic Water level for boiler water separator.
- Discriminating type Flame Scanners will be considered for flame monitoring & failure trip. Flame intensity display will be available in monitor.
- Local gauges will be provided wherever any local adjustment and maintenance is required.
- Process switches for temperature, pressure and level as per requirements shall be provided for alarms / Trips.

Pressure indicators, Pressure switches, Pressure transmitters, Level transmitters etc. will be connected with process piping through root valves having proper size instrument piping. The necessary root valves, impulse piping, drain valves, gauge-zeroing valve, valve manifolds and all the other accessories required for mounting/ erection of field instruments (i.e. PI, PS, PT, LT, etc) will be provided.

Final Control Elements

Control valves, dampers and other final control elements will in generally provided with pneumatic type actuators. Hydraulic actuators have been envisaged for HP / LP bypass valves.

Regulating duty valve shall have smart electro pneumatic positioner, position transmitter and air lock relay. On off duty valve will have solenoid valve and end position limit switch. All control valves shall be provided with handwheel.

All severe service control valves shall conform to leakage class V with metal-to-metal seating. Other will have leakage Class –IV.

The sizing procedure will be as per latest edition of ANSI/ISA or equivalent standard.

Vibration Monitoring & Analysis System

Microprocessors based stand alone vibration monitoring and analysis system have been envisaged for rotating machine condition monitoring, analysis & diagnostic. Uniform make of On-line Vibration Monitoring System will be provided for all BTG & BOP HT drives like ID fans, FD fans, PA fans, BFP, CEP, CW pump, Mills, FGD Drives etc. including Turbine Generator Supervisory Instrumentation (TSI). The Vibration measurement shall be carried out in X and Y direction for the equipment and also for motor bearing. Vibration monitoring system will consist of Vibration transducers, Key phasor probes, Vibration monitors, Power supplies. Vibration monitoring system will have interface with DDCMIS for centralized monitoring.

Master and Slave Clock (GPS) System

A common redundant master and slave clock system is envisaged and this would be time synchronized with the Global Positioning Satellite (GPS) system. The master clock will synchronize the entire BTG controls and other associated controls as required for uniform time stamping.

Alarm Annunciation System

All the alarm points of DDCMIS / PLC will be annunciated on the HMI.

Steam and Water Analysis System

Considering the criticality of the water chemistry of the Ultra Super critical unit, a centralized Steam and Water Analysis System (SWAS) has been envisaged for measurement of pH, Conductivity, Dissolved Oxygen, Sodium, Silica etc. contents in feed water, steam and condensate at various sections of the process. Measured values and health of the Analysers will also be monitored in plant DCS through hardwiring and will interface with the dozing system to control the dozing pumps. SWAS will consist of a Wet Section and a Dry Section. Wet Section shall condition the sample to bring the sample to reference temperature by cooling at the primary cooler/s with DMCW and at the secondary cooler by cooling with chilled water and also bring the sample to a pressure level acceptable to the analysers. Dry Section shall house the analysers and the sensors. All samples shall be conditioned at 20 °C temperature before entering any sensor assembly of the Analyzer under worst ambient condition.

Provisionally, the following measurements points are foreseen: -

1. Superheated Steam (Degasser Cation Conductivity, pH, Silica, Specific Conductivity)
2. Feed Water at Economizer Inlet (Cation Conductivity, pH, Silica, Specific Conductivity, hydrazine, Dissolved Oxygen)
3. Condensate after Polisher (Cation Conductivity, pH, Silica, Specific Conductivity)
4. Demineralized Make-up Water (pH, Silica, Specific Conductivity)
5. Condensate Extraction Pumps Discharge (Cation Conductivity, pH, Specific Conductivity, Dissolved Oxygen, Sodium)
6. Deaerator Outlet (pH, Dissolved Oxygen)
7. Condenser Hotwell (right and left) (Specific Conductivity)

8. Reheater Steam (Specific Conductivity)

Continuous Emission Monitoring System (CEMS)

In conformity with the local and state pollution control norm, Continuous Emission Monitoring System shall be installed in the chimney to analyze the constituents of the combustion products. Link shall be established between CEMS and SPCB / CPCB for data reporting and central monitoring.
The system will consist of the following measurements:

- SOx, NOx, analyser at stack.
- Oxygen analyzer at stack
- Opacity monitors at stack.
- Flue gas velocity measurement at stack

Boiler Tube Leak Detection System

Acoustic type Steam leakage system to detect steam leaks from boiler tubes at different zones shall be provided. Whenever steam leaks from a tube, large amount of sound shall be produced. This shall be analysed and used for detection of tube leakage. The system shall be complete with acoustic signal generator, signal receiver, signal processing unit and controller, operator interface etc.

Hart Management System (HMS)

HMS has been envisaged for centralized configuration, calibration, maintenance, diagnostic and record keeping of electronic smart transmitters from remote location. Smart electronic transmitter signals will be wired to DDCMIS termination cabinet. The 4-20 mA signal shall be used for control and monitoring in DDCMIS whereas digital signal will be used by HMS.

Plant Performance Analysis, Diagnosis & Optimization (PADO) Software

PC based on-line plant performance analysis, diagnosis & optimization (PADO) system for the station has been envisaged. The PADO system shall incorporate the complete thermal design model of each unit. The model of each unit shall work together from the same PC for the complete plant.

The system shall use the measured data from the DDCMIS through appropriate interface. Instruments, which are specifically required for implementation of PADO shall also be provided.

Control Room / Equipment Room Desk & Panel

One Central Control Room (CCR) common for two units of the plant, located adjacent to the turbine hall at the operating floor level of powerhouse building has been envisaged.

Centralized control of the plant has been envisaged from LED (TFT) based Operator's station located in the common Central Control Room. DDCMIS Electronic Cabinets, VMS cabinets, Master clock panel, Relay Cabinets and other system cabinets will be housed in the Electronic Equipment Rooms. Computer Room in general will house the Engineering Consoles, Video copiers, historical storage units, network cabinets etc. All necessary computer furniture will be provided.

Operator Stations and Emergency shutdown push buttons will be installed on the Unit Control Desk (UCD). Control desk will be having aesthetically & ergonomically designed.

Emergency Push button stations as recommended by the manufacturer for safe shutdown of plant will be provided on unit control desk.

Separate Operator work station with monitor, Keyboard and Printer will be provided in Shift In charge engineer's Room.

Power Supply System

A dual redundant single phase Uninterrupted Power Supply System (UPS) with 240V ± 1% AC supply having redundant 2 x 100% inverters and separate chargers with battery banks is envisaged for powering of the AC consumers in the C&I System, fire detection system, relevant C&I laboratory instruments and plant communication system etc. UPS system shall be designed for 60 minutes back up.
Batteries shall be sealed lead acid type or Ni-Cd type.
DC power distribution for DDCMIS and loop-powered field instruments shall be derived from the UPS supply and the required DC distribution boards shall be located within DDCMIS cabinets. Any other DC power supply required for the plant shall also be suitably derived and distributed.

Power supply to all other DDCMIS / PLC based control systems in the major offsite plants has been envisaged from their own packaged UPS system.

Instrument Air Supply

I&C Systems will be supplied with adequate Instrument air supply from compressor, Air dryer Assembly. Moisture and oil free Instrument air at 6 Kg/cm² and minus (-) 40°C dew point will be used.

Instrumentation & Control Cables & Accessories

Instrumentation cables shall be stranded, electrolytic grade tinned copper conductor, screened, armoured, FRLS outer sheath type. Junction boxes shall be provided within transmitter racks and other locations to group sensor and transmitter signal cables. Signal cables from Individual Instruments/sensors to field junction box, wherever applicable, shall be with conductor size of 1.5 mm^2. From the junction boxes multi-core overall screened signal cables shall be used for extending binary signals, multi-pair twisted cable shall be used for analog signals and multi-triads shall be used

for extending RTDs to the control room area. Multi-core/ multi-pair/multi-triad cables from field junction box or transmitter rack to control room shall be of conductor size of 0.5 mm^2.

Extension cables shall be used to connect thermocouples. Similarly, thermocouples shall also be brought to junction boxes to facilitate the use of multi-pair cables. Single or Multi Pair, solid conductor, 20 AWG, overall screened & armoured extension cables will be provided for carrying millivolt signals.

For low voltage power cables stranded annealed plain copper conductors of cross-section 2.5 mm^2 with PVC insulation, armoured and with FRLS PVC outer sheath will be used.

All interconnecting cables between cabinets will preferably be prefabricated with connectors at both ends.

Cables shall be glanded at each point of entry with watertight glands. Screens shall be grounded at Control Room end only. For long parallel runs, separation of 300 mm will be maintained between low level signal cables and LT power/control cables. The separation of 600 mm shall be maintained with HT cable. Junction boxes shall be IP-65 enclosures with knock-out holes.

Erection Hardware

Erection hardware including all process connection and piping materials like impulse pipe, manifolds, fittings, condensate pots, siphons, isolation valves, pneumatic line tubes and pipes along with necessary fittings, instrument racks and enclosures, junction boxes, pull boxes, cable accessories like glands, flexible/rigid conduits, lugs, trays, supports etc. are envisaged. All erection hardware shall be of proper rating (in line with process piping class) and sizes.

Tools & Tackle and I&C Laboratory Instruments

Special tools and tackle shall be provided for the maintenance of the plant and machineries. A set of laboratory instruments consisting of standard measuring & calibrating instruments has been envisaged. Electronic test bench and pneumatic test bench equipped with all necessary meters, portable vibration monitoring equipment, etc. have been envisaged.

Spares & Consumable

All electronic cabinets shall have installed spares to allow expansion and modifications. Spare capacity shall be envisaged in the form of rack space for augmentation and spares channels would be judiciously distributed.

All mandatory spares, commissioning spares and consumable shall be included.

Fire Detection & Protection System

a) A fire detection system as per National Fire Protection Association (NFPA) standards / Tariff Advisory Committee (TAC) guideline would be provided. A Main fire alarm control panel located in the central control room will provide the alarm annunciation for the plant in case of fire.

b) Manifestation of fire shall be sensed by the following methods:

i) Multi criteria type / photoelectric type detectors.

ii) Thermal / heat detectors. Both the type of detectors shall be addressable from the panel and operator interface.

Plant Communication System

A Plant Communication System will be provided to facilitate plant operations by establishing quick communication among operating personnel at various

locations of the plant. The Plant Communication System will consist of the following:

- Telephone System
- Public Address (PA) system

Electronic Private Automatic Exchange, with paging and intercom facility will be located in the administrative area and will have number of outgoing trunk lines. Wall mounted, rugged type field phones with paging button will be provided in various plant areas at strategic locations to make plant-wide announcements to draw attention of roaming operators to important developments in the plant. There will be provision for audio volume adjustment in the sets to circumvent ambient noise in plant areas. Intercom & Paging facilities will be provided at the Operator's desk as well as in the Engineer's table.

Speaking in 'Paging' mode will be heard all over the plant while the 'Private' mode will facilitate conversation between two or more stations through close talk channel.

Closed Circuit Television System (CCTV)

IP based Closed Circuit Television System (CCTV) with all cameras, CCTV components and accessories shall be provided for the purpose of surveillance of major Electrical Drives & equipment e.g. Boiler Feed Pumps, ID Fans, FD and PA Fans, Mills, Condensate Extraction Pumps and critical areas like Turbine hall, CW pump house, CHP, Ash Plant areas etc. so that, by and large, all important areas and equipment can be brought under surveillance. Also, cameras for security surveillance shall be installed at the Main Gate, Material Gate, fencing, admin building, service building, store and other common auxiliary plants.
Industrial TV for furnace flame monitoring system (Furnace Flame TV) shall be envisaged.

4 SITE ANALYSIS

4.1 Connectivity

Selected Location	:	The plant is located between 24°58'41.6" to 25°0'16.8" North Latitudes and 82°39'50.4" E to 82°41'03.7" E longitudes. It is located at Dadri Khurd village in Mirzapur Sadar tehsil, Mirzapur district in Uttar Pradesh.
Nearest Major Town	:	Mirzapur District Headquarters is about 25 km
Seismic Zone	:	Zone-III as per IS 1893.
Access by Road	:	State Highway (SH-5) located about 1.7 km away from the site & it is also about 23 kms from NH-17.
Access by Rail	:	Nearest railhead, Lusa Railway Station on BG railway line of Northern Railway is at a distance of 24 kms from the site.
Access by Air	:	Nearest Airport is at Varanasi at a distance of 72 kms from site.
Access by Sea	:	Nearest Seaport is at Haldia West Bengal.

4.2 Site Data

The proposed 2x800 MW Thermal Power Plant will be located on an identified plot of virgin land in village Dadri Khurd of Mirzapur district near Mirzapur-Renukut State Highway no.-5 (SH-5). The plant will be located within the latitudinal extent from 24°58'41.6" to 25°0'16.8" North and longitudinal extent of 82°39'50.4" to 82°41'03.7" East and spread over an area of approximately 365.19 Ha. Toposheet map is enclosed.

Land:

The land of 365.19 Ha envisaged above for the Power Plant considers installation of 2 x 800 MW capacity supercritical coal based thermal power plant including its water pre-treatment facility, induced draft cooling towers, fuel oil system, 400 kV switchyard, ash handling facility, coal handling system, mandatory space provision for desulphurisation plant, green verge to satisfy UPPCB/MoE&F norms, raw water reservoir, fabrication yard, coal storage area, in-plant roads, etc.

The layout of the plant and facilities for the proposed 2x800 MW Greenfield Coal based Thermal Power Plant (TPP) at Dadri Khurd village, Mirzapur Sadar tehsil, Mirzapur district, Uttar Pradesh, has been largely dictated by its location, contour, shape, rail and road access, water source, windrose pattern, land use pattern of adjoining areas and the direction of power evacuation.

Fuel and Transportation Logistics:

The coal for the project will be transported by railway wagon from Commercial Coal Mines.

Primary crushing of coal will be carried out at mine end. However, the secondary crushing and screening plant will be installed at power plant. Coal will be transported from the mine to the plant site by railway wagons. Besides, sufficient days storage of crushed coal will be provided inside the plant to take care of any exigency situation.

Assuming an annual plant load factor (PLF) of 85%, the coal requirement for the 1600 MW station works out as 6.4 MMTPA with design coal at TMCR and 7.4 MMTPA with worst coal at TMCR.

As mentioned earlier, the site is well connected by broad-gauge railway line of Northern Railways (NR) and state/national road highways. The site is located within 24 km from the nearest railhead - Lusa Railway Station. Main rail line

which will facilitate transportation of coal from Commercial Coal Mines /nearby coal mines of NCL/SECL/CCL as well as transportation of equipment & material to site from different places of the country. The road access to the site is on State Highway SH-5 about 1.7 km away and National Highway NH-7 about 23 km away. This will facilitate movement of LDO/HSD which are planned to be transported by road.

Auxiliary liquid fuel, viz. LDO/HSD will be required for start-up, load carrying and flame stabilization at low load operation. The requirement of fuel oil @ 1 ml per unit (kWh) generation has been estimated to be about 15000 KL per annum considering 85% PLF. Transportation of fuel oils has been considered by road to the plant site in tankers from nearby source.

Water:

The raw water requirement for the proposed TPP shall be around 3200 m3/hr and about 28 MCM of raw water shall be required annually for the Project.

While selecting the intake location on the water body, the prime features needing attention are adequate water availability on sustained basis, history of stability of river course, possibility of any construction on upstream or downstream sides of the river and proper design of intake so that year-round availability is ensured. The water requirement for the Project will be met from Ganga River. Water from Ganga River shall be pumped to the Upper Khajuri dam and from Upper Khajuri Dam water will be further pumped to plant raw water reservoir by means of Intake Water Pumps. River Ganga is located approx. 23 km upstream of Upper Khajuri Dam and the Upper Khajuri Dam is located approx. 7 km from the plant.

Maximum Raw water requirement for the power station is estimated as 76,800 M3 per day. Raw water will be received in an in plant, twin chamber, reservoir from which the station will draw its raw water requirement.

As may be noted, the cooling system is the largest consumer of water for a thermal power station. Semi-open recirculating cooling water circuit with wet type cooling tower will be adopted for condenser and auxiliary equipment cooling. Induced draft cooling towers for the circulating cooling circuit has been considered on the basis of lower initial investment and shorter gestation period required as compared to the natural draft cooling towers.

Other requirements of consumptive water are estimated on the basis of:

- Heat cycle make up to steam generator @ 1%.
- Cooling tower make up @ 1.5% of circulating cooling water flow.
- Plant Potable water requirement @ 135 litre/personnel/day.
- Service water requirement for floor washing etc. @ 10 M3/hr.

On the basis of raw water quality available, clariflocculation, filtration and demineralisation plants will be required, and the water treatment plant will be designed accordingly permitting adequate redundancy as well as storage capacities for different qualities of treated water.

Power Evacuation:

Net power generated from the station will be evacuated at 400 KV level to 400 KV grid at nearest UPPTC/UPPCL substation. A 400KV switchyard will be built within the Power-station which will be connected to 400 KV substation.

Infrastructure:

Among the infrastructural facilities, the state highway (SH-5) is passing near to the proposed power station site. A kancha road from SH-5 is crossing the project site. This kancha road will be developed/constructed as the main approach road for the plant to ensure movement of heavy equipment/over dimensioned consignment for the plant. The tentative route of the approach road is shown in the Plot Plan.

Nearest airport is at Varanasi at a distance of about 95 km. The port facility at Haldia in West Bengal may be utilised for sea transportation of heavy equipment. Communication facilities viz. telephone, internet, etc. are to be developed for timely implementation of the project.

Infrastructural facilities in terms of availability of market, bus stand, hospital, schools, college, small scale industries to support construction of the new plant are available at Mirzapur town and Varanasi. The local villages can also be of assistance for deployment of workforce at the initial stage. To accommodate a large workforce during construction of the project, it is envisaged that some housing facilities viz. temporary labour hutments, guest houses, bachelor's hostel, residential quarters may be developed along with necessary civic amenities.

4.3 Discussion on Selected Site

The Project location was found to be the most suitable on the following grounds:

Availability of adequate land which has already been procured.

- Plot is sparsely inhabited
- Near-by Broad-gauge rail route
- Close to National/State highways
- Availability of water from Ganga River, which is perennial, located near the site.
- Less possibility of air traffic movement at lower level as airport is quite far off

4.4 Environmental Setting

There are no areas protected under international conventions, Wildlife sanctuaries, National Parks.
Reserved forests, water bodies, temples and BHU (South Campus) are existing within 15 km from project site.

Sl. No.	Feature	Distance in km	Direction
1	Mirzapur RF	Adjacent to plant boundary	SE
2	Danti RF	Adjacent to plant boundary	N
3	Bahuti RF	8.0	SW
4	Patehra RF	5.6	SW
5	Gohlanpur RF	8.0	E
6	Barkachha RF	6.4	NW
7	Chandlewa Khurd RF	6.0	NE
8	Nanauti RF	8.6	ESE
9	Malua RF	9.3	SW
10	Newaria RF	9.4	SW
11	Kakrad RF	11.5	SW
12	Saktesgarh RF	11.5	ESE
13	Piori RF	13.0	SW
14	Parts of Semra RF	14.0	SW
15	Dadra Rampur RF	13.0	SE
16	Bhiskuri RF	14.0	NW
17	Gorthara RF	14.5	SE
18	Patharkhura RF	14.5	SE
19	Machharmara RF	12.3	NE
Water Bodies: Rivers/Nalas/Canals Flowing Within 15 Km			
1	Jamtlhwa Nadi (~1.6 km N to W side of the plant boundary)		
2	Jogiadri Nadi (2 km NE to E side of the plant boundary)		
3	Jogidari Nala (1.8 km E to SE side of the plant boundary)		
4	Pahiti Nadi (4 km NE)		
5	Paintidari Nadi (5.7 km ESE)		
6	Charar Nadi (4.5 km N)		
7	Right Upper Khajuri Canal (3.7 km WNW)		
8	Belwan Nadi (6.6 km NNE)		
9	Barhaiya Nala (9.5 km NE)		
10	Marihan Branch (Ghaghar Canal) (6.4 km S)		
11	Hinauta Distributary (7.6 km S)		
12	Bharpura Distributary of R. Ganga (10.6 km NNE)		
13	Kanauraghat Pump Canal (13.8 km NNE)		
14	Right Lower Khajuri Canal (10.8 km NNW)		
15	Madho Nala (11.3 km NW)		
16	Left Lower Khajuri Canal (12 km NW)		
17	Ojhala Nala (11.9 km NW)		
18	Khajuri Nala (15 km NNW)		
19	Gurkhauli Nala (13.3 km NE)		
20	Kaalyawa Nala (14 km NE)		
21	Usrabawa Nala (15 km NE)		

22	Nanauti Left Canal (10.5 km E)
23	Jirgo Nadi (15 km ESE)
24	Magardaha Nala (14.5 km SE)
25	Banki distributary (11.4 km SE)
26	Karaunbia Nala (11.5 km SE)
27	Patbar Nala (13 km SE)
28	Gotutwa Nala (12.9 km SE)
29	Bidaula Nala (11.8 km SSE)
30	Gopalpur Distributary (13.8 km SSE)
31	River Ganga (17 km N side of plant boundary)
RESERVOIR/DAMS (WITHIN 15 KM)	
1	Upper Khajuri Dam (6 km W)
2	Dhenkwan Dam (6.2 km E)
3	Imiliya Bandhwa (9.82 km E)
4	Lower Khajuri Dam (10.6 km W)
5	Bhonka Dam (12.0 km NW)
6	Barkachha Dam (10.4 km NW)
7	Hinauti Dam (12.3 km ENE)

4.5 Soil Classification

Detailed soil investigation works of the plot have been carried out and the reports in seven parts are available. It was noticed from the available soil data, the top cover is composed of rock formation. This rock classified as Quartzitic Sandstone (Kaimur Sandstone). It consists of three zones as mentioned below:

- Moderately weak, highly fractured, moderately weathered sandstone
- Moderately strong, highly fractured, moderately weathered sandstone
- Strong, slightly fractured, slightly weathered sandstone

The thicknesses of first and second zones varied from 1.50m to 6.0m and the third zone varied from 1.50m to 4.50m.

The recommended bearing capacity of the soil may be considered as 45-50 T/M^2 at a depth of 0.5M to 5.0M below existing grade level, depending on location of the facilities.

4.6 Climatic Data from secondary sources

Environmental Condition

Electrical equipment will be installed in a hot, humid, and tropical atmosphere, heavily polluted at places with coal dust and/or fly ash and will be designed accordingly.

The equipment will be capable of continuous full load operation under the following site conditions :-

- Finished Grade Level : 181.0 M above MSL
- Annual Ambient

  Air Temperature : (+) 44.8°C (Max.)

  (+) 4.0°C (Min.)
- Relative Humidity : 85% (Max.)

  18% (Min.)
- Wind Velocity : 27 km/hr. in accordance with I.S.: 875
- Seismic Zone Zone-III in accordance with I.S. : 1893, Part-3

Sensitive electrical and electronic devices will be placed in controlled environment such as control room, electronic equipment room, etc. as required.

All electrical equipment are to be designed for ambient temperature of 50ºC and relative humidity of 95%. Sensitive electrical and electronic devices will be placed in controlled environment such as control room, electronic equipment room, etc. as required.

Seismic Consideration:

The power station area is located in Zone-III as per the demarcation of IS:1893-2005 of Indian Code of Practice. Analysis and design of structures will be carried out accordingly taking into consideration the factors related

to soil characteristics and importance factors of the structure together with the basic seismic co-efficient as per provision of Indian Code (IS 1893 Parts I and IV).

Wind Conditions :

The maximum wind pressure including winds of short duration as specified in Indian Standard Code of Practice IS:875-1987 (Part-3) will be adopted for the zone where the proposed power station is located. The site is located in the zone as per above standard having basic wind speed of 47 m/sec. The provision of Indian Standard Code of Practice IS:875 with appropriate co-efficient for variation of heights and shape will be considered for detail design.

4.7 Social Infrastructure available

The sensitive facilities that exist within 15 km radius of the project site:

- South Campus of BHU is situated at approximately 7 km from the project site in NW.
- A primary health centre is also present in Marihan.
- Lurki Mahadev temple (~ 6 km NW) is present near the project site.
- Wyndham Fall is present ~ 18.6 km away from the project site in the NW direction.

5 Planning brief

5.1 Landuse Planning

Land area requirement for the proposed power station of 1600 MW capacity is about 365.19 Ha subject to shape and configuration of the plot.

- Forest Land (inside the plant boundary): 0.62 Ha
- Non-Forest Land is 364.57 Ha out of which is:
    - Private Land: 333.19 Ha (presently in the name of WEUPPL in revenue records including 1.01 Ha bearing plot no.180 (Jhari) allotted to WEUPPL in exchange for private land)
    - Government Land: 31.38 Ha (29.30 Ha of Govt. of U.P, land already

applied on 22.03.24 and 2.08 Ha Gram samaj land to be applied for exchange)

Proposed Facilities outside Power Plant Premises are:

- Approach Road (ROW/ROU) - Forest Land outside plant boundary :3.39 Ha
- Water Pipeline (ROW/ROU) – under survey
- Railway line (ROW/ROU) – under survey

Forest approval/Clearance for Outside facilities of Power Plant will be obtained after details survey & engineering.

This estimate considers:

- Main plant building with TG hall, steam generators, electro-static precipitators, chimney, transformer yard, 400 kV switchyard and power evacuation corridor.
- Recirculating cooling water circuit with wet type induced draft cooling towers.
- Flue gas desulphurization.
- Water treatment facilities.
- Waste water treatment and disposal system.
- Space for green verge to meet the requirement of State Pollution Control Board/Central Pollution Control Board.
- Land requirement for raw water reservoir and coal storage and handling area.
- Land requirement for ash pond.
- Land for fabrication yard and other facilities.
- Marshalling yard, administrative building, Site Office, Erector's hostel, Power evacuation corridor, etc.

(Land Area in Ha)

SN	Details	2x800MW
1	Plant Area (Considering Future Expansion)	85.80
2	Reservoir	33.18
3	Coal Stock Yard	64.75
4	Ash Dyke	49.37
5	Township	11.57
6	Green Belt	120.51

	Total	**365.19**
7	Forest Patch (Inside Plant Boundary) *	0.62
Others (Outside Plant Boundary) **		
8	Approach road *	3.39
9	Pipeline#	Under Survey
10	Railway line#	Under Survey

*****Forest Land inside plant boundary 0.62 Ha and approach road 3.39 Ha is part of forest proposal for pipeline & approach road.

#Forest approval/Clearance for Outside facilities of Power Plant will be obtained after details survey & engineering.

5.2 Other Infrastructural facilities

Miscellaneous infrastructural requirements for setting up a power Project are:-

- Access road
- Availability of housing for construction staff and finally operating personnel.
- Availability of market, health care, education facility, entertainment centre etc.
- Availability of skilled and unskilled manpower.
- Telecommunication facility.
- Other facilities like workshop, bank, post office, police station etc.

Heavy-duty class National Highway NH-7 and State Highway SH-5 runs in close proximity of the proposed plant area. Access road will have to be suitably constructed up to the plant for movement of men and materials. The station will also be connected by rail route. The station will be equipped with workshop, stores, training centre, safety and security sections, fire station, well-planned township with civic amenities, etc. All associated facilities like market complex, schools, hospital, post office, police station, communication facilities, temple, community center, playground etc. will be developed to attract skilled manpower for the plant. During construction stage, basic infrastructural facilities will be developed for skilled/unskilled manpower

with civic amenities as nearest major town, Varanasi is located quite far off from the site, around 95 KM.

5.3 Employee and Township facilities

Approx. 450 employees (250 Nos Direct and 200 Nos Indirect) during the construction phase (60 Months) and 300 employees (275 Nos. Direct and 25 Nos. Indirect) during operational phase (25 years) are expected excluding Labour.

In addition to the plants & equipment for generation of power the following facilities shall be provided in this station:

- Construction offices and stores
- Time and security offices
- First Aid and firefighting station
- Canteen and welfare centre
- Toilets and change rooms
- Car parks and cycle/ scooter stands
- Training centre

Office space shall be provided as per good practice and canteens, toilets and restrooms according to norms laid down in relevant factories act. The above facilities shall also be adequately furnished and equipped.
Township to provide accommodation for the O&M staff shall be built.

6 Proposed Infrastructure

6.1 Drinking Water Management

Necessary water distribution network for drinking and service water with pumps, piping, tanks, valves, etc. will be provided for distributing water at all transfer points, control rooms etc.

6.2 Sewerage and Sewage Treatment Plant

The sewerage system shall be designed to provide cleansing conduit for speedy and efficient conveyance of foul water, such as wastewater from closets, urinals, bathrooms and pantries. An independent network of lines to carry the storm water drainage and sewerage shall be provided. Sewers shall be designed for desired minimum and maximum velocities.

The plant area shall be divided into different parts based on layout consideration. The sewerage flow shall be made by gravity. Routing of these shall ensure no interference with underground facilities. Manholes shall be provided at every 30 meter along the length of any pipe, at connection points and at every change of alignment, gradient or diameter of sewer pipeline.

A permanent sewage treatment plant (anaerobic treatment) shall be provided to ensure adequate cleaning of the sewerage discharge of the plant. The treated effluent shall be utilized for the irrigation of the landscaped areas. The treatment plant shall be designed to meet all requirements of applicable local bylaws/pollution standards, as well as the conditions stipulated by the State/Central agencies during the environmental clearance to the Project.

Sanitary Sewerage System:

For sewage treatment, adequate numbers of septic tanks will be installed & the effluent shall be discharged in surface drains after suitable treatment in chlorination chamber / up-flow filter.

6.3 Electrical System

Generation System & Power Evacuation

Proposed power station will have 2x800 MW STG units generating power at 22 kV or as per manufacturer standard. These units will be connected to 400 kV GIS switchyard in the plant for evacuation of generated power. The switchyard will be contained in a fenced area separated from the generation building. The bus bar configuration will be suitable for one and half circuit breaker arrangement for better reliability, comprising four (4) I-section bays.

- Two (02) – 400 kV circuits for generator transformers bay
- One (01) – 400 kV circuits for station maintenance transformers bay
- Two (02) – 400 kV circuits for outgoing lines with switchable linereactor
- Two (01) – 400 kV circuit for Bus Reactor

A control room will be located in the switchyard premises to house switchyard control, metering and protective equipment. For reliable communication and carrier aided distance protection of 400 kV remote end breakers, power line carrier communication equipment (PLCC) and Fibre Optic Telecommunication Equipment (FOTE) will be installed in the switchyard in consultation with Utility.

In the Power House, each generator will be directly coupled to the respective steam turbine and will have a nominal rating of 800 MW at 0.85 p.f. (lag). Generation voltage will be 3-phase, 27 kV with variation of ±5%, at frequency 50 Hz with variation of + 3% to - 5%. The excitation system will be brushless or static type as per manufacturer's standard and will be selected for an ideal rate of response, accuracy and sensitivity during normal as well as transient state of operation. The generating unit will be connected to 400 kV switchyard through the Generator Circuit Breaker (GCB) and three-phase bank of three (3) single phase, 22/(420/√3) kV step-up generator transformers (GT) of 315 MVA each, having the total capacity of GT as 945MVA. Connection between generator, GCB and generator transformer low voltage terminals will be through isolated phase generator bus duct and that between the high voltage terminals and the switchyard by outdoor overhead ACSR conductors.

Power Distribution System

Three voltage levels viz. 11KV, 6.6KV and 415V have been envisaged to supply power to the unit and station auxiliaries in the power plant. According to the kW rating of motor, its rated voltage will be as follows:

kW rating of AC Motor	Rated Voltage
Motor kW <0.2 kW	230V , 1 phase

0.2 kW < Motor kW < 200kW	415V, 3 phase
200 kW < Motor kW < 2000 kW	6.6KV, 3 phase
Motor kW > 2000 kW	11KV, 3 phase

During starting of the unit the start-up power will be drawn from 400 kV bus through 400/27 kV Generator transformer. The generator will then be synchronized through GCB at 27 kV system. In the event of unit trip, power will be drawn from the 400 kV bus through Generator transformer for coasting down of the unit. As the system is a GCB scheme 2X50% unit transformer per unit and 1X100% Station transformer will be provided to feed the station auxiliaries and unit start-up / shutdown facilities. The station maintenance transformer shall be used as back up to station/unit transformer and also used to take unit maintenance power in case of GT shutdown. During complete blackout, emergency DG set will be automatically started and will provide power to essential loads for carrying out safe shutdown of the unit.

11 kV System

11 kV station power will be derived from the 11.5 kV windings of 27/11.5 kV unit/station transformers and 400/11.5 KV station maintenance transformer. The 11.5 kV terminals of the transformers will be connected to 11 kV station/unit/maintenance switchgears through 11 kV segregated phase bus ducts. 11kV Unit switchgears will feed power to motor driven boiler feed pumps.

The dam-side Intake Pump House located within 2 km away will get two feeders from the 11 kV station switchgears. Those feeders will be upgraded to a higher voltage level if required to maintain allowable minimum voltage for the pump motors at starting. This aspect will be examined at the detail development stage.

In addition 11 kV Unit and Station switchgears will act as power source to 11/6.9 kV auxiliary power transformers. Two such transformers will be in the transformer yard of Power House for feeding the station/Unit loads of Power House area. A set of another two 11/6.9 kV auxiliary power transformers will be at CHP/AHP/FGD

area to feed the loads of CHP/AHP/FGD. 11 kV switchgears will also act as power source to 11.5/0.433KV LV service transformers, which will feed the station loads for auxiliaries of Switchyard, auxiliaries of compressed air system, A/C & ventilation system, Plant Illumination System, welding boards and other station service loads through a number of 415V switchgears. 11 kV station switchgears/Unit Switchgear/Station maintenance will be interconnected by full capacity tie by means of 11 kV segregated phase bus ducts.

During normal running of the Unit, its auxiliaries like ID fan, PA Fan, FD Fans etc. will be fed from unit transformers. Two nos 27/11.5 kV transformers and 1(ONE) 27/11.5 kV station transformer fed by each generator will cater the unit /Station auxiliaries of each 800 MW Unit through two (2) nos. unit 11 kV switchgears and one (1) station switchgear. Each 11 kV unit/station switchgear will be interconnected to 11 kV station maintenance switchgear by separate circuit breakers and segregated phase bus duct. During normal operation of the unit each 11 kV unit/station switchgear receives power through 27/11.5 kV unit transformer and 27/11.5 kV station transformer.

Construction power:

The peak demand of construction power is estimated as 7500 kVA, assuming certain quantity of site fabrication of steel structures and piping. The required construction power supply will be obtained either from the grid, depending upon feasibility.

6.7 kV System

6.6 kV power system will be derived from 11 kV system through 11/6.9 kV auxiliary power transformers and will be used mainly for feeding 6.6 kV motor loads and 6.6/0.433 kV auxiliary transformers. To cater the 6.6 kV motor loads/transformer load Unit/AHP/CHP/FGD, there will be separate set of transformers and switchgears. There will be one (1) 6.6 kV switchgear for each unit and AHP/CHP/FGD loads. This unit switchgear will be in the Power House and will be fed from transformers located in Transformer Yard adjacent to Power House. 6.6

KV switchgears being located at respective load centre, will also be used to cater the 415V loads of respective area through 6.6/0.433kV transformers and 415V switchgears.

In order to cater 6.6 kV loads of CHP/AHP/FGD, 11/6.9 kV transformers and 6.6 kV switchgear will be installed in CHP/AHP/FGD area and 6.6/0.433kV transformers and 415V switchgears will be also there to cater 415V loads of AHP/CHP/FGD.

415 V System

a. 415 V distribution system will supply power to 415 V loads during normal operation and under emergency condition of the plant. Unit and station loads will be powered from 6.6/0.433kV & 11/0.433kV service transformers connected to their respective 415V unit and station switchgears (MCCs/PMCCs). Connection between auxiliary transformer and 6.6kV & 11kV switchgear will be through cable and that between the transformer and 415V PCC/PMCC will be through non-segregated phase bus ducts. 415V PCC/PMCC will feed power to breaker-operated motors, lighting transformers and 415V MCCs.

b. Local Starter Panels/Local Panels and other auxiliary loads will be powered from respective 415V MCCs/DBs.

415 V Emergency System

Emergency AC power will be required to permit a safe shut down of the units as well as safety to personnel and plant (e.g. aviation obstruction lighting of the chimney) in the event of a plant blackout. Suitably rated Diesel Generator sets will provide the emergency power to the 415V emergency switchboard that will have normal supply from unit auxiliary system. This switchboard will feed important AC motors like AC turbine auxiliary oil pump, AC jacking oil pump, etc. It will feed power to Turbine as well as Boiler valve MCC etc. It will also meet the AC power requirement of loads such as battery chargers, UPS, AC emergency lighting loads etc. There will be three (03) DG Sets of identical rating - one per unit plus a common standby – to cater to the AC emergency loads.

220 V DC System

a. Battery backed DC supplies will be provided for critical loads such as emergency oil pump, seal oil pump, jacking oil pump, scanner air fan, etc. and for protection, control, indication and annunciation supply of switchgear and control panels including emergency lighting. Battery will supply these loads during complete black out condition and will be sized for 1 hour back up time subsequent to tripping of the generating units.

c. Four sets of batteries will be provided in Power House for the two generating units, each rated to carry the DC loads of one unit as well as common station loads. Each set of battery will be accompanied with a float-cum-boost charger. Further distribution of DC power will be through DC distribution boards/fuse boards.

c. Switchyard, Plant Water System, coal handling plant etc. which are away from Power House will have its own independent DC source derived from battery bank located in respective areas. Each set of battery will be connected to float charger and float cum boost charger. DC power will be further distributed to various locations through DC distribution boards/fuse boards.

UPS System

UPS will be provided for regulated, filtered and uninterrupted 240 V, 50 Hz, single-phase power to critical AC loads during normal as well as emergency conditions. The system will comprise 2X100% parallel redundant chargers and inverters, 2x100% battery bank for main plant, FGD and power evacuation switchyard 1X100% battery bank for offsite area, bypass line transformers and voltage stabiliser, static switch, manual bypass switch, distribution board, etc.

6.4 System Control

The Generator will be controlled from Power House unit control room through DCS. The DCS will be utilized to perform control, interlock, indication, metering and annunciation related to the above equipment including equipment

pertaining to Generator auxiliary system. All controls as supplementary to the proprietary system of boiler, turbine and generator package (BTG) including auto synchronization of generator with 400kV bus will also be performed from DCS.

Control, interlock, metering of Generator Transformer (GT)/Generator circuit breaker (GCB) breakers including its alarm/indication will be provided in DCS. Control of GT breaker will be possible from switchyard control room but limited to maintenance operation only, however GCB shall be controlled from central control room DCS only. Important status indication will be duplicated in switchyard control room. The switchyard control room will also be the control point for all other 400 kV breakers and will house control, metering and protective relay panels, SAS/SCADA, 415 V AC and 220 V DC system equipment pertaining to the switchyard.

Control, indication, metering, monitoring of electrical power distribution system in the power block will be performed from DCS in unit control room. Electrical system of various sub systems (e.g. coal handling system, ash handling system, Plant water system, etc.) will be controlled from DCS/PLC, located in respective control room.

Control of diesel generator will be from AMF panel in DG room. Remote control provision will also be provided in DCS through CRT operator interface in unit control room.

6.5 Metering

Plant electrical parameters will be metered to the extent required for proper operation and monitoring of plant conditions. The same will be provided as per requirement.

For import and export of power, tariff meters shall be provided separately and the same shall be as per latest CEA regulations.

6.6 Protection System

For protection of equipment against abnormal system conditions, adequate protective devices will be installed in respective switchgears and/or control and relay panels located in switchgear room/control room. A group of such protective devices will be utilised to protect the equipment under different abnormal conditions arising out in the electrical system. Multifunction, numerical protective devices will be used for protection of electrical system equipment.

2x100% protection will be provided for each of the generators. For transformer, separate protection relays will be used for main & back-up protection. For line protection and bus bar protection having duplicated redundant protection, relays with different algorithm will be provided as main-1 & main-2 protection. Following protections will generally be provided for various electrical equipment in the electrical system:

Generator

v. Differential (87G)

w. Stator inter turn fault (95)

x. 100% Stator earth fault (64S)

y. 95% Stator earth fault (59N)

z. Over fluxing (24)

aa. Inverse time over current (51) for alarm

bb. Negative phase sequence (46)

cc. Loss of excitation (40)

dd. Reverse power (32)

ee. Rotor earth fault (64R) (2 stage)

ff. Back-up Impedance (21)

gg. Pole slipping (78)

hh. Thermal overload (49)

ii. Low forward Power (37)

jj. Over voltage (59)

kk. Under voltage (27)

ll. Over frequency (81O)

mm. Under frequency (81U)

nn. Voltage balance (60)

oo. Check Synchronisation V.T. supervision (25)

pp. Dead Machine (51,27)

The generator will also be provided with surge protection equipment comprising surge capacitor and lightning arrestor.

Generator Transformer

a. Overall differential (87GT)

b. Generator transformer differential (87T)

c. Buchholtz/Winding/Oil temperature/PRV operated (63)

d. HV restricted earth fault (64)

e. Volts/Hz. over fluxing (24)

f. Inverse time HV back-up over current (51)

g. Inverse time HV back-up earth fault (51N)

h. Breaker failure (50Z)

Unit / Station Transformer / Aux. Power Transformer / Station Maintenance Transformer

a. Transformer differential (87T)

b. Buchholtz/Winding/Oil temperature/PRV operated (63)

c. Restricted earth fault except for HV winding of Unit Transformer (64)

d. HV Back-up over current with high set instantaneous unit (50/51)

e. Directional earth fault for Aux. Power Transformer (67N)

f. HV back-up inverse time earth fault for Station Transformer (51N)

g. HV standby inverse time earth fault for Aux. Power and Station Transformer (51N)

h. LV standby earth fault (51N)

i. Breaker failure (50Z) for station transformer feeder

400 kV Line Feeder (main1 and Main2 shall be from different manufacturer)

a. Non-switched Distance Main – 1 with inbuilt directional earth fault (21,67N)

b. Non-switched Distance Main – 2 with inbuilt directional earth fault (21,67N)

c. Breaker failure (50Z)

d. Check synchronization (25)

e. Auto re-closing (79)

f. Overvoltage protection

Duplicated Bus bar differential protection (87BB) shall be provided for 400 kV bus in the switchyard.

LT Auxiliary Transformers

a. LV over current / earth fault (51/51N)

b. HV over current with high set instantaneous unit (50/51)

c. Buchholtz/Winding/Oil temperature/PRV operated (63)

11 kV Switchgear

Incomer/Bus-coupler-

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

c. Check synchronization (25)

d. Under voltage (27) (wherever applicable)

Outgoing Line Feeders

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

c. Under voltage (27) (wherever applicable)

Motor Feeders-

a. Integrated motor protection relay comprising of following functions:-

- Ø Thermal overload
- Ø Phase fault (short circuit)
- Ø Unbalance (Negative Sequence)
- Ø Locked rotor
- ➢ Earth fault through core balance CT
- ➢ Prolonged start

d. Differential protection for motor rated above 1000 KW (87)

e. Winding/Bearing temperature (49)

d. Under voltage (27) (wherever applicable)

6.6 kV Switchgear

Incomer/Bus-coupler-

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

c. Check synchronization (25)

d. Under voltage (27) (wherever applicable)

Outgoing Line Feeders

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

Motor Feeders

a. Integrated motor protection relay comprising of following functions:-

- Ø Thermal overload
- Ø Phase fault (short circuit)
- Ø Unbalance (Negative Sequence)

- Ø Locked rotor
- ➢ Earth fault through core balance CT
- ➢ Prolonged start

e. Differential protection for motor rated above 1000 KW (87)

f. Winding/Bearing temperature (49)

g. Under voltage (27) (wherever applicable)

415V Switchgear/PMCC

Incomer / Bus-coupler

c. Inverse time over current for phase fault (51)

d. Inverse time over current for earth fault (51N)

c. Check synchronization (25)

d. Under voltage (27) (wherever applicable)

Outgoing Feeders

a. Inverse time over current for phase fault (51)

b. Inverse time over current for earth fault (51N)

415V Breaker Controlled Motor Feeders (above110kW)-

a. Integrated motor protection relay (99) for the following functions :

- Ø Thermal overload
- Ø Phase fault (short circuit)
- Ø Unbalance (Negative Sequence)
- Ø Locked rotor
- Ø Earth fault
- Ø Prolonged Start

415V MCC

Incoming/Outgoing Feeders

a. Short circuit protection through fuse/MCCB

415V Contactor controlled Motor Feeders (upto and incl. 110kW)

c. Thermal overload with in-built single phasing protection.

d. Short circuit protection through fuse/MCCB

DC System

a. Short circuit protection with earth fault alarm.

Diesel Generator

g. Voltage restrained over-current (51VR)

h. Reverse power (32)

i. Negative phase sequence (46)

j. Under frequency (81)

k. Over voltage (59)

l. Under voltage (27)

In all cases, proper discrimination would be achieved so as to isolate the faulty elements only, keeping the healthy part of the system in service.

7 PLANT LAYOUT & CIVIL ENGINEERING ASPECTS

7.1 Introduction

The layout of the plant and facilities for the proposed 2 X 800 MW Coal based Thermal Power Plant (TPP) at Dadri Khurd village, Mirzapur Sadar tehsil, Mirzapur district, Uttar Pradesh, has been largely dictated by its location, contour, shape, rail and road access, water source, windrose pattern, land use pattern of adjoining areas and the direction of power evacuation. The project will utilise coal from NCL/SECL/CCL as primary fuel.

7.2 Plant Layout

It is a virgin plot of land located at Dadri Khurd village in Mirzapur Sadar tehsil, Mirzapur district in Uttar Pradesh. Varanashi town is located at a distance of 50 km from the proposed plant site. The district head-quarter of Mirzapur is located at a distance of 25 km and Mirzapur town is 35 km from the proposed plant site respectively.

A conventional layout for the boiler and the turbine has been suggested for the power plant with TG set axis transverse to the boiler. The turbine bay is followed by the electrical bay, the mill bay, the boiler proper, electrostatic

precipitators, FGD and lastly the chimney. The main plant area houses the turbine building, steam generator, 400 kV switchyard, circulating water system, water treatment and DM plant, Flue Gas De-sulphurisation (FGD) system, coal crushers and coal conveyors and stack and the ash disposal system. The dispositions of different elements have been decided on the basis of their functional inter-relations and the direction of incoming or outgoing materials.

Unitised concept has been followed in the plant design as far as practicable. The unloading-cum-erection bay is considered at the centre of two units and coal conveyor entry is kept along the rear of Steam Generator block of the station. Side mill arrangement is considered and accordingly coal conveyor entry shall be provided.

The main power block is located more or less in the centre of the plot. The switchyard is located on the east of the power block. The raw water reservoir is located on the west of plot .The reservoir will be having an overall capacity of around seven (7) days consumption for both the units. On the south-east of the power block are CW pump house and water treatment facility which will receive raw water from the raw water reservoir. The entry of raw water pipeline from Upper Khajuri Dam to the site is from the south-west corner of the plot. It is proposed to deploy wet type induced draft cooling towers in the recirculating cooling water circuit. The cooling towers are located along the wind direction on the south-east of the power block as close as possible to the CW pump house to optimise on length of C.W. channels.

The coal yard along with other auxiliaries are located on the southern end of the plot. This location ideally suits the wind direction and conventional layout of locating the coal facility at the south-west of the main plant. Four stacks of coal storage and handling facility have been planned for the Power Station. This will cater to approx. 20 days' requirement of coal for

the station. The layout considers bunker feeding both from the coal yard and directly from the unloading facilities with wagon tipplers.

The Power Plant along with the area earmarked for auxiliaries and accessories has been located within the security wall of the complex. The access road enters the plant from south western end, which is connected to the State Highway (SH-5). Another material entry gate has been provided on the south western side of the plant also which will be used for receiving fuel oil and stores items required for the station. A peripheral road on western side of the boundary will be used for despatching of fly ash by trucks.

The Administrative Building for the complex is located at south-west side of the plant and has a boundary wall around with suitable entry. This area also accommodated Fire Station and First Aid Centre. Site Office is located near to the Administrative Building. All the senior executives of the power station are located in the Administrative Building. The entry to the Power Plant is flanked by security gate and time office.

7.3 Civil Engineering Aspects

Plant Grading:

The contour survey of the site had been conducted and on the basis of the report, the highest ground levels observed at south/south-east sides of the plot and the lowest ground levels are observed is at the north/north-west sides of the plot. The ground level is highly undulating with substantial level variations. Ground levels across the site range from RL 165.00m to RL 228.00m indicating a level variation about 60~63m. The higher ground level is found in southern part of the site, gently sloping down towards the north/north-west, which will be predominant direction of area drainage. Based on the survey carried out, the following grade levels have been considered as marked in Plot Plan::

- SWITCHYARD RL 182.00 M
- COOLING TOWER AREA RL 178.00M
- POWER HOUSE AREA RL 181.00M
- ASH RELATED BUILDINGS RL 174.00M
- COAL STOCKYARD RL 191.00M

The entire site shall be protected with boundary wall along site boundary and gates with guard houses at suitable locations. Fencing shall be provided around transformer yard, warehouse/store, etc.

All Buildings will be provided with peripheral drains. All storm water drainage will generally be through open drains. However all plant effluent drainage will be through separate buried concrete pipes.

Open storm water drains will be provided on both sides of the roads. Open RCC rectangular section will be provided for all drains and will be covered with perforated precast RCC slabs.

RCC box/pre cast RCC pipe culverts will be provided for road crossings. Invert of drains will be designed to match with the overall Plant drainage system.

7.4 Description of Building & Superstructure

Powerhouse Building Superstructure:

The superstructure of the powerhouse building will be in fabricated structural steelwork. All components will be of welded fabrication and the field connections will be with high-tensile bolts. The transverse frames will be of rigid type. In the longitudinal direction these rigid transverse frames will be braced to resist horizontal forces. Roof slab will be cast in-situ concrete slab using metal deck sheets, as permanent shuttering.—The turbine hall roof will be made of cast in situ RCC slab on metal decking in order to reduce the period of construction. Side cladding will be brickwork upto about 3-5 meters from ground and beyond that with coloured sheeting.

Auxiliary Building:

All other buildings namely, store, workshop, switchyard control room building, cooling water pump house, service buildings, & pre-engineered buildings etc. would be of structural steel framed with insulated metal roof or cast-in-situ RCC roof and Metal wall cladding. Administrative building, Canteen buildings will be of reinforced concrete frame structure with masonry walls. In DM Plant building, provision of special anti-corrosive treatment would be made. In case of long span roof, however, steel truss with RCC slab/sheeting would be adopted. Foundations in all cases would be of RCC.

FGD system civil works:

Absorber foundation shall be of RCC circular raft type construction.

FGD system buildings comprising of Limestone and Gypsum storage and dewatering buildings shall be of steel structures with roofing and cladding of colour coated troughed galvalume sheeting as necessary.

Similarly, ball mill building, electrical control building shall be steel structures with RCC floor slab and roof over metal deck sheeting. The side cladding shall be colour coated troughed galvalume sheeting.

Limestone silos shall be of steel and would be supported on steel structure and RCC foundations.

Other miscellaneous structures such as truck unloading hopper and shed, Limestone conveying system, Gypsum conveying system shall be of steel construction.

Foundations for all the structures shall be RCC isolated / raft type shallow foundations based on the soil bearing capacity.

Foundations for process water tanks shall be RCC circular / rectangular raft construction. RCC neutralization pit suitably lined with acid alkali resistant glass flake lining shall be provided to cater to the wet FGD discharge liquid.

Cable & Pipe Rack:

The cable and pipe rack supports would be of fabricated tubular steel work. All steel components will be of welded fabrication with bolted/ welded joints for erection and assembly in the field. Grating supported on structural steel framing would be placed for walkway portion. Foundation for supports would be of RCC.

Civil Works for Plant Water System:

Circulating cooling water system using Induced Draft Cooling Tower is considered for condenser and auxiliary cooling by a separate set of ACW pumps. Two chambers for each cooling tower basin will be planned to ensure periodic cleaning. The cooling tower will be of RCC structure.

The raw water reservoir shall have trapezoidal cross-sections with sufficient estimated capacity. Reservoir shall be properly lined by impervious membrane to resist any water seepage/leakage. Necessary piping and pipe supports shall be provided as required.

Civil Works for Coal Handling Plant:

Underground tunnels would be of R.C. construction. Coal conveyors, Crusher house, wagon tippler shed, conveyor galleries, supporting trestles, superstructures of transfer houses would be of fabricated structural steel work. All components will be of welded fabrication with bolted/welded joints for erection and assembly in the field. Roofing will be of corrugated sheets and necessary windows/louvres will be provided for natural lighting and ventilation. Foundation for supports would be of RCC.

Civil Works for Chimney:

Two wet flue stacks (one per unit) as per EPRI norms catering to the FGD system shall be provided. Each wet steel flue stack shall be suitably lined with Anti corrosive lining material. The flue cans shall be supported on steel framed structure supported. The external surface of the steel flues shall be suitably cladded with aluminium sheeting over sandwich insulation layer (minimum 50mm thick bonded mineral wool insulation). The height of the stack would be decided as per MOEF norms for plants comprising of FGD systems. Intermediate platforms for supporting the flue cans as well as for access and maintenance of monitoring probes and aviation lights shall be provided as necessary.

Elevator shall be provided up to highest platform level. The elevator shall be supported from the same steel framed construction as that of stack.

Civil Works for Ash Handling Plant:

Silos, ash water sump, slurry sump, pipe pedestals etc. would be of RCC construction. Super structure of slurry pump house, water pump house, ash handling control room, compressor house, recovery pump house, bottom ash hopper etc., would be of structural steel, whereas foundations should be of RCC. Necessary windows / louvers will be provided for natural lighting & ventilation of control room, compressor house. Earthen ash dyke with LDPE Lining has been envisaged.

Ash Pond:-

Ash pond is proposed to be developed in a separate plot connected by a road towards South side of the main plot. HCSD as detailed elsewhere is envisaged for the Project, A small height of initial Ash Dyke will be constructed to channelize storm water from the slopes of Ash mount of HCSD.

Roads, Drains & Culverts:

All plant roads shall be, double lane roads with 10.0 m / 7.0 m wide except building / structure access road & patrol road which are single lane 3.75 m

wide. All the roads are bituminous road over WBM sub-base with 2500mm wide shoulders for roads greater than 7.50 and 1500m wide shoulder for 3.75m road wide shoulder on each side of road. All drains are considered as open type RCC rectangular section. The invert of drain shall be kept such that water can be discharged by gravity. Effluent drains shall completely be separated from storm water drain. RCC pipe culverts / box culverts will carry drainage under intercepting roads & railway tracks.

8 ENVIRONMENTAL ASPECTS

8.1 Introduction

Adani Power Limited proposes to set up a 1600 (2 x 800) MW coal-based Thermal Power Project near the village Dadri Khurd, Mirzapur Sadar Tehsil, Mirzapur district of Uttar Pradesh will be equipped with state-of-the-art technology with pollution control devices to reduce the emission and discharge of pollutants within the acceptable limits of MOEF & UP and CPCB/SPCB.

The proposed project is based on Ultra supercritical technology, installation of High efficient Electrostatic precipitators (ESP), Flue Gas Desulphurization (FGD) and Low NOx burners (SCR) will achieve the emission norms prescribed by MOEF & CC. Water requirement will be met from Ganga River

.

8.2 Type & Source of Pollution

The various types of pollutions likely to be created by the construction & operation of proposed power plant, which is classified into the following categories:

Type & Source of Pollution

Sr. No.	Type of Pollution	Source of Pollution
1.	Air Pollution	• Dust particulates in flue gas stack • Sulphur dioxide & Nitrogen oxides in flue gas • Coal dust particles during storage/ handling of coal • Fugitive emission of Dust in the ash disposal area and along road sides
2.	Water & Sewage Pollution	• Wastewater from water treatment (WT) plant like - Sewage Treatment Plant - Effluent Treatment Plant • Steam generator blow down • Cooling tower blow down • Plant drains • Wastewater from coal pile area run off
3.	Noise Pollution	• Steam turbine generator • Other rotating equipment • Combustion induced noises • Flow induced noises • Steam valve

The proposed plant will be provided with necessary equipment and systems to meet all applicable environmental regulations. The plant has been envisaged to have the following features, which will help in reducing emissions and wastewater.

- Low NOx burners have been envisaged to reduce the NOx generation. Suitable post combustion De-NOx control system will be provided if required to meet the emission limit as per MoEF & CC..
- Flue gas desulphurization plant (Wet limestone based) will be installed to control the SO2 levels below 100 mg/Nm3.
- High efficiency Electrostatic Precipitators has been envisaged to

limit the particulate emissions to <30 mg/Nm3.

- Independent steel wet flue for each unit, down- stream of FGD of suitable height as per MoEF & CC guidelines and an adequately designed electrostatic precipitator with more than 99.99% efficiency are envisaged, which will help in dispersion of air borne emissions over lager area and thus reducing the impact of the power plant on ground level concentrations.
- Closed cooling water system with cooling towers envisaged, thus significantly reducing the makeup water requirement for the plant.
- The Plant will be designed to treat all wastewater that generated from plant. The wastewater will be met as per the prevailing environment norms.
- Dust extraction and dust suppression systems have been envisaged in the coal handling plant.

8.3 Pollution Monitoring and Control Measures

There are no ecologically sensitive or archaeologically important monuments in the area of 10 km buffer zone. Ministry of Environment and Forest (MoEF) have laid down procedures for obtaining environmental clearance for industrial projects vide Environment Impact Assessment Notification, 2006. Under Schedule I of EIA, 2006 all the thermal power stations of capacity 500 MW & higher (coal/lignite/naphta & gas based) are Categorized as 'A' category Projects. Thus the notification requires industry to carry out EIA study, in accordance with MoEF guidelines to determine the impact of new projects or activities or the expansion or modernization of existing industry on the existing environment in respect of atmospheric and liquid pollutants and resultant air and water quality in the area to ensure their quality well within the prescribed limits.

Environmental Management Plant (EMP) is proposed to be established for the plant to detail out the environmental quality measures to be undertaken during the construction and operational phases. EMP will also discuss the post project monitoring measures to be adopted by the plant authorities in

order to maintain the Ambient Air and water quality within the acceptable limits specified by the State Pollution Control Board and the Ministry of Environmental, Forests & Climate Change (MoEF&CC) and Control Pollution Control Board (CPCB).

The environmental monitoring programme will be provided with trained and qualified staff who will monitor the ambient air as well as stack flue gas quality to ensure that the quality of discharge gases is maintained within the permissible limit. Each flue will be provided with Continuous Emission Monitoring System (CEMS) to monitor the PM, NOx and SO_2 constituents in the flue gas on continuous basis.

The plant wastewater will be periodically analysed so that the wastewater quality is maintained within the permissible levels of the pollution control board regulations.

The pollution control measures proposed to be adopted for the project are summarized as follows:

v) <u>Air Pollution</u>

High efficiency Electrostatic Precipitators (ESP) will be installed to control the emission of ash particles. The precipitators would be designed to limit the particulate emission to less than <30 mg/Nm3.

Independent steel wet flue for each unit, down- stream of FGD of suitable height as per MoEF & CC guidelines and an adequately designed electrostatic precipitator with more than 99.99% efficiency are envisaged to meet the emission standards as prescribed by MoEF&CC. The chimney would be provided with personal access for regular monitoring of stack emissions.

For the control of fugitive dust emission within and around the Coal handling plant, dust extraction and suppression systems will be

provided. Dust suppression system will be installed at all the transfer points in Coal Handling Plant and at Coal stockyard. Further in order to arrest the coal dust generation, all conveyers will be provided with enclosed galleries. The bottom portion of all the conveyors will be provided with seal plates within the power plant area and above roads.

During the construction phase, no significant impact on air quality is expected. However, fugitive dust emissions and NOx levels may temporarily increase in the immediate vicinity of construction site due to soil excavation and vehicular movement. Such impacts will be confined to the construction site. These will be minimized by sprinkling water and proper maintenance of vehicles. Green belt will be developed all around the plant periphery as per the norm laid down by MoEF to minimize dust nuisance outside the plant boundary.

Dust collection system with ventilation system having bag filters will be provided to evacuate dust and hazardous gases like Methane from the coalbunkers. Collected dust will be returned to coal bunker. The dust collector outlet emission will be restricted to trap the dust in the bunkers.

Ambient Air quality for Ground level concentration of PM10, PM2.5, SO2 & NOx will be monitored for compliance with NAAQS, 2009 and in accordance with prescribed ambient air quality norms of State Pollution Control Board (SPCB) and Central Pollution Control Board (CPCB).

To control NOx emissions from the DG Set, adequate technical measures will be adopted during the design & engineering stage. The latest available technology will be used to control these emissions.

vi) Ash Disposal

Fly ash has high pozzolanic properties and form cementaceous material when mixed with lime and water and it is suitable for the following commercial uses:

- Cement Industry
- Brick Industry
- Light Weight Aggregates
- Road Sub-base
- Grouting material
- Roads / paving - used as filler in asphalt mix for roads.
- Road enlargement
- Land filling material

Ash Management Plan will be developed and implemented for achieving 100 % utilisation of fly ash within the time period prescribed by MoEF from time to time

- Disposal of fly ash from silos to nearby small-scale industries like cement manufacturing, Construction work (RMC plant, Roads, Highways), Brick Manufacturing, etc.

- Bottom ash generated shall be supplied to the Road Mix Concrete (RMC) / brick producers / filling of low lying area / filling of mine voids as per the statutory guidelines thereby eliminating the need for separate area shall be explored.

In case of any exigencies, unutilized ash will be transported to the ash dyke as high concentrate slurry using high concentrate slurry pumps.

Ash evacuated from ESP/Economiser/Air Preheater collecting hoppers is transported in closed pipelines by pneumatic means. At the time of unloading fly ash into the silos, some ash laden air would get vented out. In order to restrict the fugitive emission of ash dust particles to the limits

of <30 mg/Nm3, a vent filter will be installed on top of each of the fly ash silos.

The following pollution control measures will be installed for ash disposal:

- It is proposed to use closed trucks for fly ash transportation in order to avoid dust nuisance. To reduce the dust nuisance while loading the ash into the trucks from fly ash silos, the fly ash is conditioned with water spray.
- Water sprinkling system has been commissioned in the ash disposal area to restrain flying of fine ash to wind.
- It is also proposed to dispose un-utilised fly ash to ash dyke.

The dust nuisance in the ash disposal area will be contained by ensuring that the ash is always kept wet.

vii) Noise Pollution

Several noise suppression and attenuation features shall be designed into the plant for the protection of personnel at all normally accessible locations within the plant boundary, both inside and outside the different buildings, and for the protection of the inhabitants living in the vicinity of the power plant.

The plant is expected to have the noise level in and around the operation area of plant and its machinery. Necessary noise control and abatement measures will be adopted to minimize the noise level from the plant during construction and operation phase to a maximum of 85 dBA at 1 metre distance as per the requirement of OSHA (Occupational Safety and Health Administration) Standards.

The major sources of noise during the construction phase are vehicular traffic, construction equipment like dozers, scrapers, concrete mixers, cranes, generators, pumps, compressors, rock drills, pneumatic tools,

saws, vibrators, etc. Also, all measures will be taken to limit the noise levels at the plant boundary within the stipulated limits.

To achieve the noise limitations around the equipment, the main measures taken shall be as follows:

- Each feed water pump sets shall be covered by a separate enclosure,
- Each coal crusher shall be covered by a separate hood,
- Small units like condensate and vacuum pumps, shall be designed to limit noise emission,
- Bypass valve, the de-super heater and the relevant piping shall be covered with acoustic insulation.
- To achieve the noise limitations in the control room, the control equipment such as computers and its accessories (such as printers) and the air conditioning system shall be designed so as to limit noise emission.
- During maintenance/inspection works, the personnel will wear ear protections.
- To achieve the far field noise limitations, the following main measures shall be taken, as appropriate for that purpose:
- Steam vent pipes shall be fitted with silencers,
- The steam generator thermal insulation shall be designed to limit noise emission,
- The steam generator draught fans, the electrostatic precipitators and the air heaters shall be designed to limit noise emission,
- The main transformers shall be designed to limit noise emission.

An Environmental Impact Assessment Study shall be carried out to access the noise level limits to be kept at the proposed plant boundary considering the background noise level.

viii) Water Pollution

Water source from the Ganga River for makeup to the closed cycle re-circulation system of condenser cooling. It is proposed to utilise the power plant waste water for plant reuse to achieve minimum discharge concept. It is envisaged to utilize cooling water blow down for ash handling purposes and treated waste water will be used for Plantation and gardening activities.

Streams of wastewater emanating from the power station sources during operational phase will be treated individually based on the wastewater quality. The treated wastewater will be recycled for plant use and for green belt development. Therefore, there will be no impact on the ground water resources.

The major wastewater generated from the plant like DM Plant discharge will be treated in a waste water treatment plant and recycled. No discharge of liquid waste to the other public boundaries is foreseen for the proposed power station. The coal pile area run off water during monsoon season will be led to a pond. Coal particles will settle down in the pond and clear water will be allowed to overflow to the central monitoring basin for treatment.

In the power plant, some specific locations in Steam /Turbine Generator area require washing, to maintain good plant housekeeping and prevent build-up of dirt and waste material, which generates wastewater. This wastewater along with process drain will be led to an oil water separator for separation of oil. The clear water will be led to the central monitoring basin. The dirty oil will be recovered separately in a drum.

The rain (storm) water removed from the building roofs, non-process area and grade level surfaces will be directed through the open ditches and culverts to the storm drainage piping. The storm water from the storm

water drainage piping shall be discharged outside the plant boundary. All ditches will be concrete lined and located along the roads. All drainage ditches will be located to provide the shortest practical drainage path while providing efficient drainage for the yard. Grade level will be contoured such that storm water run-off is directed on the ground by sheet flow, to well defined drainage paths leading to the ditches.

9 Environment Impact Assessment (EIA) Studies

Environment Impact Assessment (EIA) study will be carried out through a NABET accredited & MoEF recognized consultant. Detail base line data will be collected & EIA Report will be prepared to identify the impact of the proposed power plant on the surrounding flora, fauna, human inhabitations, etc. in the surrounding area and prescribe mitigation measures.

Environmental Impact Assessment (EIA) report will elaborate the assessment of the impact on the environmental scenario around the proposed Power plant, with regard to the main environmental attributes viz., air, water, soil, noise, ground level concentration (GLC) and socio-economic conditions. The success of any EIA study will primarily depend on the accuracy of assessing the baseline environmental situation prior to superimposing the predicted result on the ambient situation to arrive at the post project scenario.

The baseline environmental situation will be assessed with respect to land use, soil, demography and socioeconomics, meteorology, hydrology, water quality, terrestrial ecology and aquatic ecology. Suitable remedial / mitigation measures will be incorporated in the plant, to comply with pollution control authorities norms.

10 Post Project Environnemental Management Plan

Air Environment:

The major source of air pollution is from combustion of coal, which results in release of SO_2, NOx and PM.

Prediction for PM is made taking into consideration the design efficiency of the ESP. It is observed that the emissions from the power plant, on implementation of the control measures, will be negligible. Increase in Ground Level Concentrations (GLC) of dust after installation of the power plant will be estimated by EIA Consultant to verify compliance with the GLCs within prescribed levels.

The predicted ground level concentrations of PM, SO_2, NOx will also be verified within the limits of the National Ambient Air Quality standards prescribed for rural use.

Coal handling areas are potential sources of causing occupational health hazards such as asthma, tuberculosis and bronchitis. To control dust generation, dust suppression and dust extraction system will be provided at appropriate locations. In addition, frequent wash downs of these areas, with plant service water, will be undertaken.

Noise Environment:

The major sources identified as contributing towards noise pollution from the power plant are Compressors, Steam turbines, other rotating equipment, inlet & exhaust systems etc. However, the impact of such noise on the neighbourhood is predicted to be negligible.

The turbine & generators will be provided with acoustic enclosures and housed in buildings that would considerably reduce the transmission of noise to the outside environment.

Noise levels will be periodically monitored and any corrective action will be undertaken.

Water Environment:

The waste water treatment plant, which receives discharges from neutralization pit of DM Plant, clarified waste water from Oil Water Separator, etc will be designed to enable maximum re-use/recycling. The treated waste water will be utilised for plant consumptive requirements and for green belt development.

Green Belt Development:

A green belt development program in line with the MoEF guidelines will be prepared for the project. The objective of the green belt development around the plant site is to capture the emissions, attenuate the noise generated, improve the aesthetics in general and maintain a balanced environment. The green belt of the project site will form an effective barrier between the plant and surroundings.

Tree plantation will be undertaken in a large scale on land vacated after cessation of construction activities. Open spaces, where tree plantation is not possible will be planted with shrubs and grass to prevent erosion of topsoil. Appropriate type of trees and plants suitable for this region would be planted in compliance of conditions of environmental clearance.

As per the stipulations of MoEF, green belt will be provided all around the power plant boundary by planting trees and the total green area including landscaping area will be 1/3rd of the plant area.

10.1 Risk Assessment & Disaster Management Plan

Risk Assessment:

Environmental risks are inherent in design and operation of any power plant. Risk involves the occurrence or potential occurrence of an accident consisting of an event or sequence of events.

The main objectives of risk assessment are as follows:

- Identification of hazard prone area and estimation of damage distance for the maximum credible accident scenario visualized for storage.

- Computation of frequency of occurrence of hazards and evaluation of risks

- Recommendation of risk mitigation measures and arriving at a Disaster Management and Emergency Preparedness Plan.

Identification of hazards in a power plant is of primary significance in the analysis, quantification and cost-effective control of accidents involving chemicals and process. Hence, all the components of a process/system/plant 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.

As coal is subject to spontaneous combustion it may catch fire given the slightest opportunity. This fire hazard is greatly influenced by the amount of airflow through the mass of coal.

Thus, 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.

Fuel oils (LDO/HFO/HSD) will be used in small quantity for initial start-up. Chlorine and other chemicals are used in the makeup water treatment & DM Plant. The hazards associated with the use of these materials would be taken careful consideration and due precaution would be taken for its safe handling at various stages of usage.

Disaster Management Plan:

A major emergency in a plant is one that has the potential to cause serious injury or loss of life. It may cause damage to property and serious disruption, both inside and outside of the plant. The disasters identified as most likely to occur in the power plant are:

- Fire at oil storage area
- Fire at coal storage area
- Toxic release of chemical

Hazard analysis has revealed that the damage distance is mainly confined to plant boundary only.

The main objective of the disaster management plan is to prevent or at least reduce the risk of accidents through design, operation, maintenance and inspection. An important element of accident mitigation is emergency planning, which would consist of:

- Recognising the possibilities and probabilities of each kind of accident
- Assessing the on-site and off-site implications of such incidents and

deciding the emergency procedures that would need to be carried out.

A number of elements makeup a good and workable disaster management plan. They are briefly discussed below:

Identification and assessment of hazards:

Experience has shown that for every occasion that the full potential of an accident is realized, there are many other occasions when some lesser event occurs or when a developing incident is made safe before reaching full damage potential.

Procedure for Personnel and Equipment:

This involves setting up of an emergency communication system, formation of an emergency response team and setting up of an emergency control centre.

It is essential that the emergency plans to be regularly monitoring so that any defect may be corrected. The plan should be reviewed and updated, and any changes made should be disseminated to all concerned.

Emergency plan needs to consider emergency shutdown procedure so that phased and orderly shutdown of the plant & systems can take place when necessary.

Depending upon the methodology adopted for the co-ordination of various aspects of disaster management, specific responsibilities should be fixed for civil and government agencies. Outside agencies support is required for the emergency responses such as:

- Augmenting the firefighting service and firewater
- Emergency medical help for the injured personnel of the plant
- Evacuation of personnel
- Law enforcement, traffic control and crime prevention
- Co-ordination with other nearby industrial establishments
- Communication facilities

- Procuring fire-fighting consumables such as foam compound, fire hose, etc.

10.2 Maintenance and Monitoring

The safety of a plant and function of safety related systems could only be as good as the maintenance and monitoring of these systems. It is of great importance to establish plant maintenance & monitoring schedule, which includes the following tasks

- Checking of safety related operating conditions both in the control room and at site / on the field.
- Checking of safety related parts of the plant on site by visual inspection or by remote monitoring.
- Monitoring of safety related utilities such as electricity, steam, coolant and compressed air.
- Preparation of maintenance plan and documentation of maintenance work specifying the different interval and type of works to be performed.

In addition, the maintenance and monitoring schedule will specify the qualifications and experience required by the personnel to perform their tasks.

Reporting to Authorities:

In the management of a major hazard, in an installation, it is likely that the incident is to be reported to the concerned authorities. Reporting will be carried out in three steps.

- Identification/notification of a major hazard installation
- Preparation of a safety report
- Immediate reporting of the accident

The safety report gives the authorities the following opportunities:

- To carry out specific inspection in order to learn about hazards arising from these installations.
- To establish contingency plans.

Emergency planning rehearsals and exercises will be monitored by senior officers from the emergency services. After each exercise, the plan will be thoroughly reviewed to take account of omissions or shortcomings.

Increase in concern of disaster management plans has prompted the Ministry of Environment and Forests, Govt. of India to make risk assessment and disaster management a mandatory requirement for the power industry.

Statutory Permits and Clearances

Sr. No.	Description	Authority	Status
1	Water availability	Water Resource Dept. /WRD	WRD permission will be obtained for Water required for expansion 2X800 MW.
2	TOR	Ministry of Environment & Forests (MOEF), GoI	MTEUPPL will apply for ToR in Form 1 for the proposed project as per EIA Notification, 2006 & amendments.
3	EIA	Ministry of Environment & Forests (MOEF), GoI	MTEUPPL will conduct EIA study for the proposed project as per EIA Notification, 2006 & amendments.
4	Public Hearing	State Pollution Control Board	After completion of EIA studies, Public Hearing shall be conducted as per EIA Notification, 2006 & amendments.
5	Apply for Appraisal and Environmental Clearance	Ministry of Environment & Forests (MOEF), GoI	On completion of scrutiny by EAC based on final EIA report and proceedings of Public Hearing.
6	Apply for Consent to Establish	State Pollution Control Board	MTEUPPL will Apply for consent from state Pollution Control board

Sr. No.	Description	Authority	Status
			after obtaining EC & before starting construction activities for the proposed project.
7	Apply for Consent to Operate (Water & Air & HW)	State Pollution Control Board	MTEUPPL will apply for consent from state Pollution Control board before commissioning of proposed project.
8	Forest clearance	State Forest Dept. / MOEF, GoI.	The total land requirement for plant is 365.19 Ha, out of this 0.62 Ha is forest Land, and 364.57 Ha is non forest land. Proposed Facilities outside Power Plant Premises are: A) Approach Road (ROW/ROU) B) Water Pipeline (ROW/ROU) C) Railway line (ROW/ROU) Forest approval/Clearance for Outside facilities of Power Plant will be obtained after details survey & engineering.
9	Civil aviation/ MoD clearance for Chimney height	Airport authority of India and Ministry of Defence	MTEUPPL will obtain all the necessary & required chimney height clearance from concerned authorities before commissioning of project.
10	Coastal Regulatory Zone clearance	Coastal Zone Management Authority	Not Applicable
11	Authorizations under Hazardous Waste Rule, Bio Medical waste Rules	State Pollution Control Board	MTEUPPL will obtain required necessary authorization from state Pollution control Board before commissioning of proposed project.

11 CONSTRUCTION FACILITIES

11.1 Introduction

The Project shall be executed based on Front End Loading (FEL) strategy with proper project planning and implementation including development of

adequate infrastructure, Risk Management, Construction Management, Contract Management, Monitoring, Engineering Co-ordination, Quality Assurance, Procurement and Material Management, Human resources and Administration. MTEUPPL has well established Project Management group to ensure project delivery in integrated manner within Time & Cost with assured quality.

Contracting Strategy for the project is finalized and accordingly Master Net Work (MNW) for the project is prepared covering interfaces of various packages and package-wise overall durations of Engineering, Procurement & Manufacturing, Delivery & Construction phases. The first Unit of the Project will be scheduled to be commissioned in 54 months from "Zero date" and subsequent units at an interval of 6 months. Zero date is considered as the date of obtaining Financial Closure.

EPC package shall be ordered as per contracting strategy with stiff completion dates incorporating interim milestones linked to liquidated damage/incentive clause. Procurement risk management plan are prepared in alignment with Project requirements.

A consistent methodology for Site Execution is arrived upon before the start of construction activities on site. Cross functional agreement on construction philosophy is achieved necessary pre-requisites for constructions are identified Key infrastructure facilities are developed at site before start of the construction.

11.2 Construction Features

Construction of Road:

The proposed site is located at approx. 10 km from Singori Bypass at NH – 26B. Approach Road to site from Singori Bypass shall be a 15 m wide two-lane road suitable for movement of all plant and equipment including the construction materials. Suitable slopes shall be provided in the roads, as there may be some minor variations in the levels enroute. The highway would be augmented through state Public Works Department (PWD) to carry heavy loads wherever required. The in-plant roads would be suitably developed by the contractors of the auxiliary units with suitable access from the main road

coming to the identified plot. Since the rail network is unlikely to be ready during construction, the road network would be depended upon for movement of material including over dimension consignment (ODC).

Construction Building:

Sufficient space for construction office and covered storage shall be provided in plot area for construction of offices, stores etc. Space shall be earmarked for batching plant and storage yard during plant construction. A lay down area shall be provided for fabrication and pre-assembly works.

Construction Water:

Construction water shall be made available from water reservoir.

Construction Power:

Construction power shall be made available from nearest sub-station.

Construction Equipment:

The contractors will bring their own construction equipment. To facilitate site work the Project Authority will also provide a few useful construction equipment, viz. crawler mounted heavy-duty crane, tractor-trailer, road roller, some transport equipment, measuring instruments, etc. In view of the fact that the project is envisaged to be executed on island concept, any further addition to construction plant and machinery by the owner is deemed unnecessary. In addition, a few transport vehicles like cars, jeeps, trucks, ambulance, cash van, etc. will be procured by the Project Authority during construction stage.

Construction Materials:

Stone Aggregate:

Quarries for stone aggregate are available in the region from locally and the aggregate will have to be transported by road/rail suitably. A batching plant shall be set-up to cater to aggregate requirement.

Sand:

Coarse to medium sand is available locally and will be transported by trucks.

Bricks :

Brick plants are also available in nearby localities. Ash bricks will be used depending on the availability in the proximity of the Project.

Cement :

There are a number of cement distributors in nearby locations who are capable of meeting the project requirement.

11.3 Organisational Set-up for Plant Construction

The Project is proposed to be implemented under the overall direction of a Project Director. He shall be assisted by a team of senior executives of different disciplines of Engineering, Construction, Sourcing and Procurement, Project Management & Control Group. Total staff strength of 199 personnel from Owner is envisaged during construction stage.

All legal matters arising out of land disputes, etc. will be tackled by the Legal Department. All Design & Engineering related activities shall be taken care by Engineering Department. The Techno Commercial Group shall be responsible for selection of Contractors for the project. Quality Department shall ensure the quality of equipment purchased and work done at site. Safety & Security Department's personnel shall be deployed in the Project area from the date of receipt of the building materials at site. Finance Department will take care of smooth flow of funds as per project requirement. Members from Project Management team shall also be deployed at Construction site for smooth coordination, monitoring, planning & controlling. Consultant's engineers may be engaged to supervise and monitor different technical activities including compliance of codes, standards, safety requirements, quality, progress etc.

Commissioning and Operation Teams shall be deployed at the appropriate time during construction and pre-commissioning stages of various plant and equipment.

11.4 Safety & Health Hazard Monitoring

MTEUPPL would be primarily responsible for safety and health hazard aspects during project construction. In view of this, MTEUPPL jointly with contractors

shall constantly monitor safety and health aspects on periodic basis. The responsible personnel identified for this task would be empowered to identify unsafe construction practices, non-use of safety gears, source of potential health and safety hazards viz, gas leakage, faulty electrical connections, unsafe excavations, unsanitary conditions, fire hazards etc. in the work sites. They would suggest ways and means to prevent occurrence of accidents arising out of the aforesaid situations as well as bringing to task the erring personnel.

Apart from prevention measures, as detailed above, there should be an infrastructure to deal with potential accident situations. The infrastructure shall consist of, but not limited to, first-aid centre, ambulance, fire-fighting system etc. and trained personnel to take care of these emergency services.

11.5 Security

An elaborate security system shall be arranged by MTEUPPL to secure the proposed project site from theft, pilferage, obstruction to work etc. The security shall be established for the whole perimeter, in general, and storage spaces, in particular, by installation of fencing/boundary walls, security gates and surveillance cameras and manned by trained security personnel.

11.6 Labour Welfare & Statutory Regulations

MTEUPPL, being the principal employer for the project construction, shall have the primary responsibility in this regard. A dedicated group would be formed to take care of these functions. The licenses required for project construction are, but not limited to, license /clearance to engage labour under Contract Labour Regulation and Abolition Act, Workmen's Compensation Act, clearance from State Electricity Inspectorate for construction power installations, license for use of explosives under Indian Explosives Act clearance, from State Boiler Inspectorate, Factory Directorate, etc. The group shall also monitor the compliance of all the statutory regulations by the Contractors and their sub-contractors.

12 PROJECT COST ESTIMATE, ASSUMPTIONS & EVALUATION

12.1 Basis of Project Cost

The project cost estimate has been worked out on the basis of following assumptions:

12.2 Assumptions for Hard Cost Input

The followings are the key assumptions made while estimating the project cost.

- Total two (2) Units of 800 MW gross capacity each with Ultra super critical steam condition has been considered.
- The project costs is inclusive of BTG package with auxiliaries, De NOx and mandatory spares; FGD, BOP with auxiliaries, 400 kV Switchyard and related civil and architectural works.
- The completion schedule is considered as 54 months as the commissioning date of Unit #1, and 60 months for Unit #2 from ''Zero date''.

12.3 Assumptions for Soft Cost Input

The major assumptions made to compute the soft cost are as follows:

- **Capital Structure** – Debt Equity ratio is considered as 70:30
- Rate of interest for Debt is considered as 11%.
- **Interest During Construction (IDC)** – IDC has been included in the Project Cost based on the phasing of the expenditure up to COD of Unit-2.
- **Working Capital** - The rate of interest on working capital loan is assumed to be 11% p.a.
- **Taxes and Duties-** All prevailing applicable taxes and duties have been considered.

12.4 Project Cost

Based on the assumption and consideration as mentioned above, the estimated cost of the proposed Project, out to be Rs.18,300 Cr.

Rs. in Cr

Particulars	Mirzapur (2x800 MW)
Land development/ Others	75
Corporate Environment Responsibility (CER)	50
Plant & Machinery (incl. BTG, BOP, OSBL, Civil works)	12,300
Pre – operative Expenses	850
Total Hard Cost	**13,275**
Project Management Consultancy	1,675
Finance, Insurance, BG Upfront charges and Other Consultancy Charges	175
Margin Money on WC	425
IDC	1,875
Debt Service Reserve (DSRA)	525
Contingency	350
Total Soft Cost	**5,025**
Total Project Cost	**18,300**
Total Project Cost (Rs. Cr / MW)	**11.44**

EMP Cost

SN	Item Description for 2x800 MW Mirzapur TPP	Cost (Rs. In Cr)
1	Electrostatic Precipitator	542.80
2	Chimney	59.00
3	Cooling Tower including civil works	189.15
4	Ash Handling including ash water recirculation	225.38
5	Ash disposal civil work	29.50
6	Dust extraction & suppression system	8.26
7	DM Plant Waste Treatment System	60.00
8	Sewerage collection, treatment & disposal	1.77
10	Green Belt & land scaping	11.80
11	FGD and SCR	1,848.98
12	Rainwater harvesting	7.19
13	Solar power harnessing	3.19
14	Environmental Laboratory & Environmental Monitoring (Capital + Recurring)	10.03
15	CEMS, CAAQMS, EQMS monitoring system & Main gate display board	11.80
16	Wind Breaking Wall, Dry Fog System & RCC Flooring in Coal Storage Area.	3.54
	Total	**3,012.39**

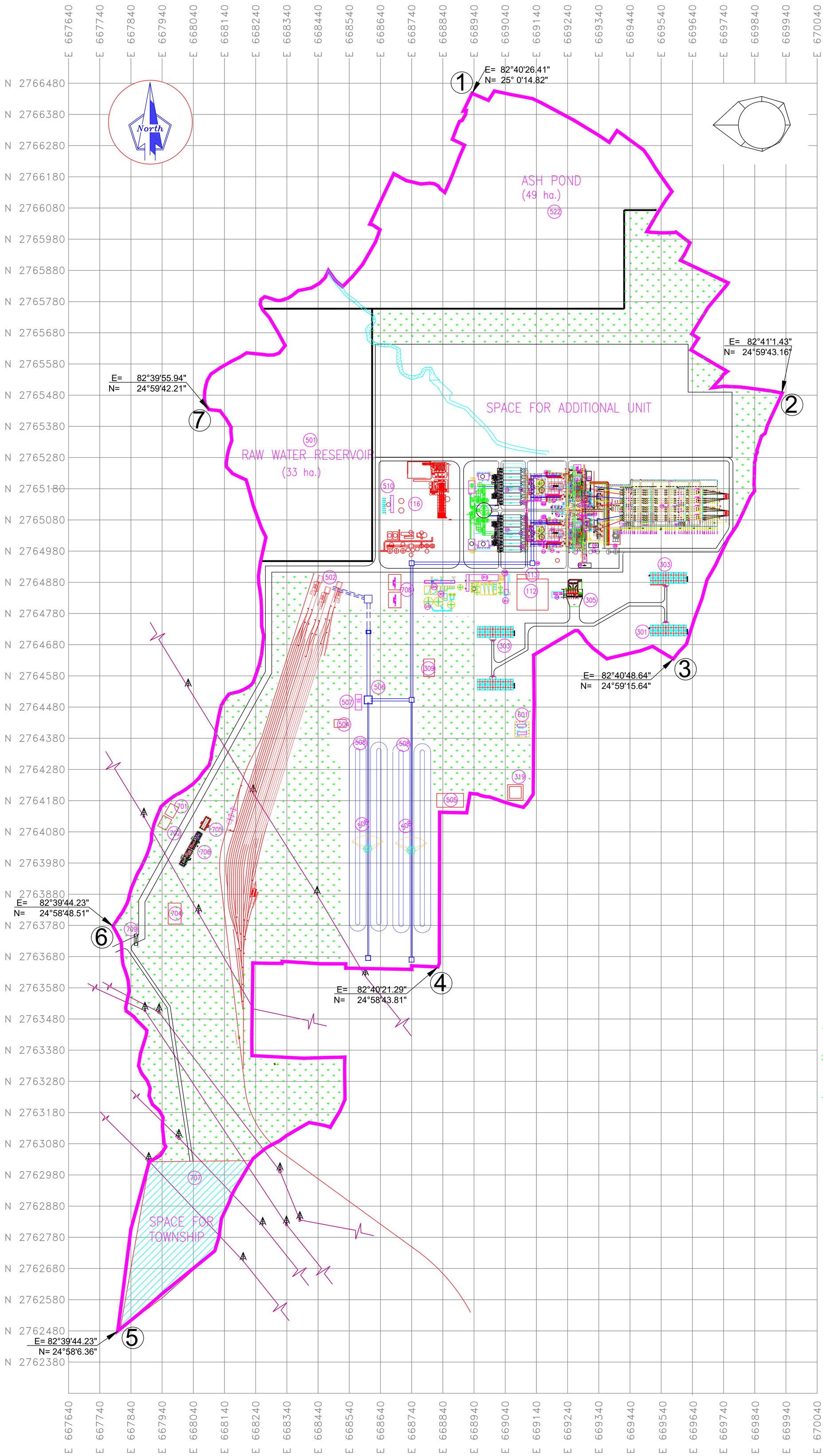


TABLE OF BUILDINGS AND STRUCTURES

ITEM NO.	DESCRIPTION
101	TG BUILDING
102	BOILER UNITS
103	ELECTROSTATIC PRECIPITATOR
104	INDUCED DRAFT FAN
105	FLUE GAS DUCT AND CHIMNEY
106	CENTRAL CONTROL ROOM
107	ESP/FGD SWITCHGEAR& CONTROL ROOM– 40Mx50M (COMMON FOR BOTH UNITS)
108	CONDENSATE TANK
109	MILL BAY
110	EMERGENCY DG BUILDING
111	PLANT AIR/ ASH/ MRHS COMPRESSOR HOUSE & ELECTRICAL CUM CONTROL ROOM– AHP ER1
112	ANHYDROUS AMMONIA UNLOADING/PUMPING/STORAGE AREA
113	MCC AND CONTROL ROOM OF ANHYDROUS AMMONIA AREA
114	AIR WASHER UNIT
115	PA FAN & FD FAN AREA
116	FUEL OIL TANK FARM AREA
117	NOT USED
118	NOT USED
201	TRANSFORMER YARD
202	765kV AIS
203	SWITCH YARD CONTROL ROOM
204	NOT USED
301	SWITCH GEAR ROOM
302	RAW WATER PUMP HOUSE MCC CUM RIO ROOM
303	COOLING TOWER
304	CLARIFIED & DM WATER STORAGE TANK & PH
305	C.W. PUMP HOUSE
306	C.W. SIDE STREAM FILTRATION
307	RAW WATER PRE–TREATMENT PLANT
308	ACID AND ALKALI STORAGE AREA
309	S.T.P.(HOLD)
310	C.T. ELECTRICAL ROOM & DCS RIO ROOM
311	E.T.P./CMB
312	C.W. CHLORINATION
313	DM WATER TREATMENT, WWTP & CW BLOWDOWN
314	UNIT DRAIN TANK
315	WTP ELECTRICAL CUM CONTROL ROOM (COMMON FOR PT/RO/DM/CWT/ETP)
316	HRSCC
317	C.W. DOSING ROOM
318	C.W. ELECTRICAL CUM CONTROL ROOM (INCL. DCS PANEL ROOM FOR CW/ACW SYSTEM, CW CHLORINATION & CWSSF SYSTEM.)
319	RAIN WATER HARVESTING POND (HOLD)
401	LIMESTONE UNLOADING AND STORAGE
402	LIMESTONE SILO/MILL/SLURRY TANK AREA
403	GYPSUM PROCESSING BUILDING
404	GYPSUM STORAGE YARD
405	ABSORBER
406	CEMS
407	SLURRY CIRCULATION PUMP ROOM
408	LIME STONE/GYPSUM/FGD BOP SWITCHGEAR CUM DCS RIO/PLC ROOM
501	RAW WATER RESERVOIR
502	WAGON TIPPLER
503	TRANSFER TOWER
504	BULLDOZER SHED
505	COAL SETTLING POND
506	CRUSHER HOUSE
507	CHP CONTROL/MCC ROOM (CHP–ER1,CHP–ER2,CHP–ER3)
508	COAL STOCK PILE
509	HCSD FLY ASH SILO
510	F.O.P.H.
511	MILL REJECT SILO
512	BA SLURRY PUMP HOUSE
513	BA HYDROBINS
514	MAIN FLY ASH SILOS
515	HCSD MIXING TANKS
516	HCSD PUMP HOUSE
517	ASH WATER PUMP HOUSE
518	BA SETTLING TANK & SURGE TANK
519	ASH WATER & HCSD ELECTRICAL MCC & CONTROL ROOM (AHP ER2)
520	ASH WATER RECOVERY/TREATMENT FACILITY
521	MAIN FLY ASH SILOS
522	ASH POND
601	HYDROGEN GENERATION PLANT INCLUDING CYLINDER STORAGE
701	FIRST AID CENTER
702	FIRE STATION
703	LOCO SHEED
704	ADMIN. BUILDING
705	CANTEEN (PEB)
706	SITE OFFICE CONSTRUCTION (PEB)
707	TOWNSHIP
708	PEB STORE AND LAYDOWN AREA DEVELOPMENT
709	MAIN GATE

NOTES:–

1. ALL RLs SHOWN IN THE PLOT PLAN ARE FINISHED GRADE LEVELS. ALL FINISHED GRADE LEVELS ARE IN METRES ABOVE MEAN SEA LEVEL.
2. FINISHED FLOOR LEVELS OF DIFFERENT AREAS/BUILDINGS ARE AS FOLLOWS
   A. BOILER AREA:RL.....M
   B. TRANSFORMER YARD:RL.....M
   C. ALL OTHER BUILDINGS: 500mm ABOVE ADJACENT FINISHED GRADE LEVEL
3. GREEN FIELD DEVELOPEMENT IN PLANT AREA IS INDICATIVE.

SR.NO	EASTING	NORTHING
1	E = 82°40'26.41"	N = 25° 0'14.82"
2	E = 82°41'1.43"	N = 24°59'43.16"
3	E = 82°40'48.64"	N = 24°59'15.64"
4	E = 82°40'21.29"	N = 24°58'43.81"
5	E= 82°39'44.23"	N= 24°58'6.36"
6	E = 82°39'44.23"	N = 24°58'48.51"
7	E = 82°39'55.94"	N = 24°59'42.21"

SR.NO	DETAILS	AREA IN HA. 2X800MW MIRZAPUR
1	PLANT AREA (CONSIDERING FUTURE EXPANSION	86
2	RESERVOIR	33
3	COAL STOCK YARD	65
4	ASH DYKE	49
5	TOWNSHIP	12
6	GREEN BELT	121
7	TOTAL	365

OWNER: adani

MIRZAPUR THERMAL ENERGY (UP) PVT LTD
2x800MW

TITLE: PLOT PLAN

DRAWN : AM	CHECKED : RR	SCALE NTS
REVIEWED : RR		DATE –
APPROVED : RR		JOB NO. –

OWNER'S DRG. NO.: –

OPEN SERIES MAP

No. 644W9

Scale 1:50,000

644O8 (63K/8)	644O12 (63K/12)	644O16 (63K/16)
644W5 (63E/5)	Mirzapur UTTAR PRADESH 644W9 (63E/9)	644W13 (63E/13)
644W6 (63E/6)	644W10 (63E/10)	Sonbhadra UTTAR PRADESH 644W14 (63E/14)

Sidhi MADHYA PRADESH

1 Sant Kabir Nagar, UTTAR PRADESH.
2 Pratapgarh, UTTAR PRADESH.
3 Rewa, MADHYA PRADESH.
4 Allahabad, UTTAR PRADESH.

भारतीय सर्वेक्षण विभाग | SURVEY OF INDIA

1st Edition 2011. Price : Rs. 70/-

CONVENTIONAL SYMBOLS

Express highway: with toll; with bridge; with distance stone
Roads, metalled: according to importance
Roads, double carriageway: according to importance
Unmetalled road. Cart-track. Pack-track with pass. Foot-path
Streams: with track in bed; undefined. Canal
Dams: masonry or rock-filled; earthwork. Weir
River: dry with water channel; with island & rocks. Tidal river
Submerged rocks. Shoal. Swamp. Reeds
Wells: lined; unlined. Tube-well. Spring. Tanks: perennial; dry
Embankments: road or rail; tank. Broken ground
Railways, broad gauge, double, single with station, under constrn
Railways, other gauges: double; single with distance stone; do.
Mineral line or tramway. Kiln. Cutting with tunnel
Contours with sub-features. Rocky slopes. Cliffs
Sand features:(1)flat. (2)sand-hills(permanent). (3)dunes(shifting)
Towns or Villages: inhabited; deserted. Fort
Huts: permanent; temporary. Tower. Antiquities
Temple. Chhatri. Church. Mosque. Idgah. Tomb. Graves
Lighthouse. Lightship. Buoys: lighted; unlighted. Anchorage
Mine. Vine on trellis. Grass. Scrub
Palms: palmyra; other. Plantain. Conifer. Bamboo. Other trees
Areas: cultivated; wooded. Surveyed tree
Boundary, international
" state: demarcated; undemarcated
" district; subdivision; tahsil or taluk; forest
Boundary pillars: surveyed; unlocated
Heights, triangulated: station; point; approximate
Bench-mark: geodetic; tertiary; canal
Post office. Telegraph office. Overhead tank
Rest house or Inspection bungalow. Circuit house. Police station
Camping ground. Forest: reserved; protected
Spaced names: administrative; locality or tribal
Hospital. Dispensary. Veterinary; Hospital / Dispensary
Aerodrome. Helipad. Tourist site
Power line: with pylons surveyed; with poles unsurveyed

NOTES :-

Heights are in metres and above Indian mean sea level.
Contours are approximate.
A relative heights, e.g...$_{25}$ represents the approximate height, in metres, between the top and bottom of a steep slope.
All Unmetalled roads and cart-tracks in this sheet are generally motorable in dry season.Permission to use the cart-tracks along canals is required from the Irrigation authorities
The kilometre stone numbers along roads are shown in slant type, e.g., '3' whereas milestone numbers are shown in upright type, e.g., '3'.
Tanks, shown dry in this area, usually contain water from July to January.
The common boundaries between Reserved Forests have not been shown for want of reliable information.

COMPILATION INDEX

A. Modern Survey 1970-71. Updated for major details during 2006-07.

A

Projection -UTM Datum -WGS84

Magnetic Variation from True North about 0°1/2 West in 2005.
(Decreasing by about 1' annually).

500 m to 1 cm 1:50,000 2 cm to 1 km

Metres 1000 500 0 1 2 3 Kilometres

CONTOUR INTERVAL 20 METRES

For further details about this map, please contact
Director
East Uttar Pradesh Geo-Spatial Data Centre
Survey of India
B-2 Block, 2nd Floor, PWD Bhawan, Gomti Nagar, Lucknow.

WEBSITE -www.surveyofindia.gov.in

E= 82°40'26.41" N= 25° 0'44.82"
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REG. No. -WPG D'11 (East Uttar Pradesh GDC-1:50,000)-

भारत के महासर्वेक्षक, स्वर्ण सुब्बा राव, बी.ई., के निदेशन में प्रकाशित,
Published under the direction of Swarna Subba Rao, B.E., Surveyor General of India,
Survey of India, Kalidharkala Estate, Post Box No.37, Dehra Dun-248001 (Uttarakhand)
Department of Science & Technology, Government of India.

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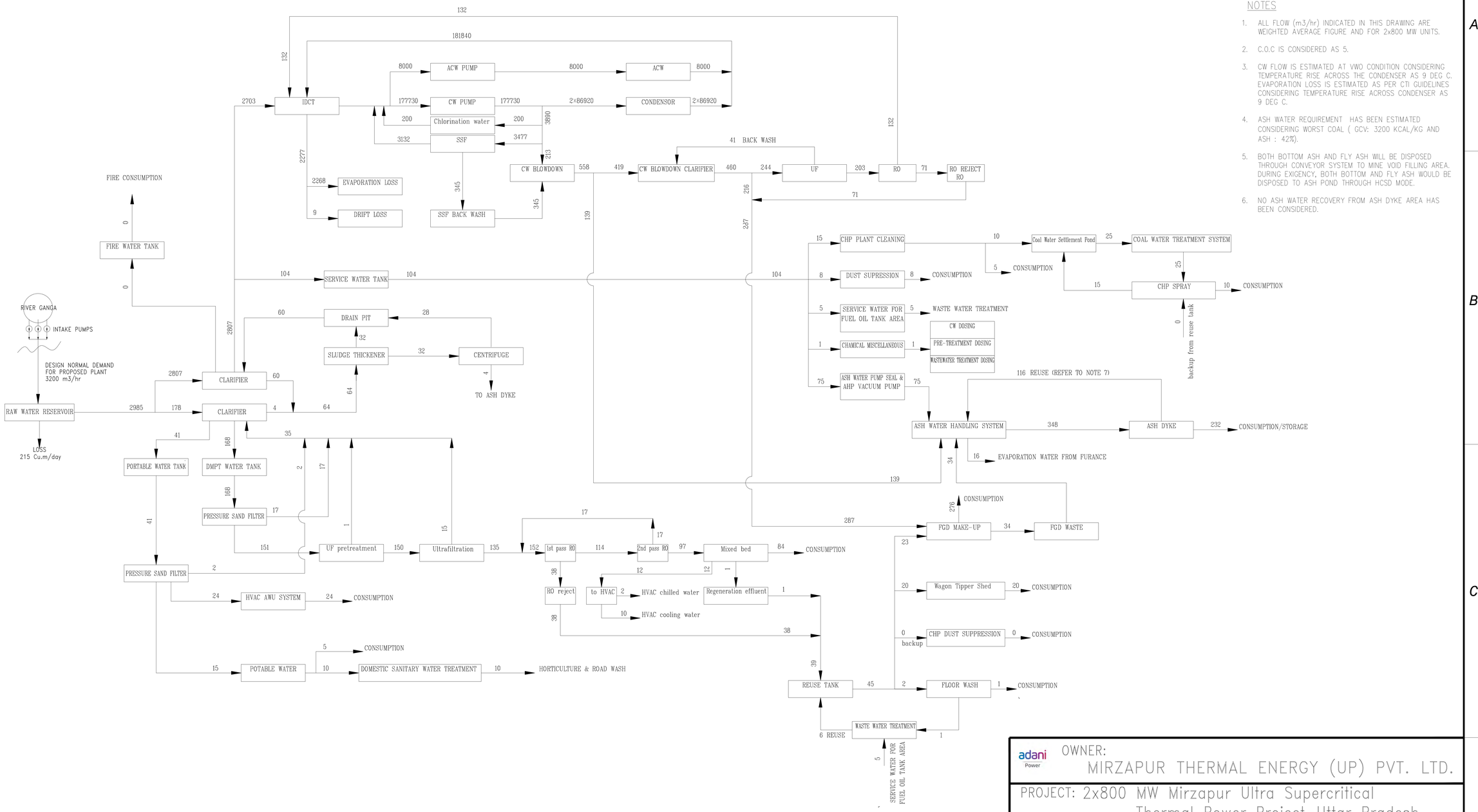

OWNER:	MIRZAPUR THERMAL ENERGY (UP) PVT. LTD.
PROJECT:	2x800 MW Mirzapur Ultra Supercritical Thermal Power Project–Uttar Pradesh
TITLE:	WATER BALANCE DIAGRAM
PREPARED	JOB NO.
CHECKED	SCALE
APPROVED	DATE
DWG. NO.	MIR1-E-EPC-SPE-TM-T-I-002
REV	
SHEET	1 OF 1

DWG. NO.
REV
FILE LOCATION:
PLOT DATE:
A3 [420x297]

श्रीमान्

तहसीलदार महोदय,
तहसील सदर, मीरजापुर।

महोदय,

निवेदन है कि ग्राम बदरीखुर्द, तप्पा 84, परगना कतित, तहसील सदर, जिला मीरजापुर स्थित भूमि पर प्रार्थी कम्पनी वेलस्पन एनर्जी यूपी प्राइवेट लिमिटेड के अब तक के पंजीकृत बैनामा के आधार पर प्राप्त कब्जा प्रमाण पत्र की आवश्यकता है।

अतः निवेदन है कि ग्राम बदरीखुर्द, तप्पा 84, परगना कतित, तहसील सदर, जिला मीरजापुर से प्रार्थी के पंजीकृत बैनामा के आधार पर प्राप्त कब्जा का प्रमाण पत्र जारी करने की कृपा करें।

दिनांक : 03.09.2012

प्रार्थी

फुफ्फू टेक्कर
अधिकृत प्रतिनिधि
वेलस्पन एनर्जी यूपी प्रा०लि०

3.9.12

5.9.12

तहसीलदार महोदय,

वेलस्पन इनर्जी यूपी प्राइवेट लिमिटेड के प्रार्थना पत्र पर पारित अपने आदेश दिनांक–03.09.2012 का अवलोकन करने की कृपा करें, जो ग्राम ददरीखुर्द, टप्पा 04, परगना कंतित, तहसील सदर, जिला मीरजापुर के पंजीकृत बैनामा के आधार पर प्रश्नगत कब्जा प्रमाण पत्र जारी करने विषयक है। उपर्युक्त के सम्बन्ध में अवगत कराना है कि ग्राम ददरीखुर्द, टप्पा 04, परगना कंतित, तहसील सदर, जिला मीरजापुर की निम्नांकित आराजियात पर पंजीकृत बैनामा के आधार पर वेलस्पन इनर्जी यूपी प्राइवेट लिमिटेड को स्वामित्व प्राप्त है :-

विवरण–आराजी

ग्राम ददरीखुर्द, टप्पा–04, परगना कंतित, तहसील सदर, जिला मीरजापुर। फसली वर्ष–1414 से 1419 की आराजियात जो निम्न है :-

खाता सं0–1 आ0सं0–120 रकबा 0.750 हेक्टे0, 124 रकबा 0.120 हेक्टे0, 125 रकबा 0.190 हेक्टे0, 126 रकबा 1.190 हेक्टे0, 127 रकबा 1.200 हेक्टे0, 128 रकबा 0.600 हेक्टे0 129 रकबा 0.220 हेक्टे0, 130 रकबा 0.650 हेक्टे0, 131 रकबा 0.490 हेक्टे0, 133 रकबा 0.550 हेक्टे0, 134 रकबा 0.120 हेक्टे0, 135 रकबा 0.370 हेक्टे0, 137 रकबा 0.230 हेक्टे0, 138 1.200 हेक्टे0, 139 1.550 हेक्टे0, 140 रकबा 0.550 हेक्टे0 141 रकबा 0.650 हेक्टे0, 142 0.1900 हेक्टे0 143 रकबा 0.460 हेक्टे0, 144 रकबा 0.0600 हेक्टे0, 145 रकबा 1.670 हेक्टे0, 146 रकबा 0.520 हेक्टे0, 147 रकबा 0.300 हेक्टे0, 148 रकबा 0.250 हेक्टे0, 149 रकबा 0.230 हेक्टे0, 150 रकबा 0.250 हेक्टे0, 151 रकबा 0.110 हेक्टे0, 152 रकबा 0.130 हेक्टे0 153 रकबा 0.100 हेक्टे0, 154 रकबा 0.200 हेक्टे0, 155 रकबा 0.150 हेक्टे0, 158 रकबा 0.320 हेक्टे0, 159 रकबा 0.320 हेक्टे0, 160 रकबा 0.200 हेक्टे0, 161 रकबा 0.020 हेक्टे0, 162 रकबा 0.490 हेक्टे0, 163 रकबा 0.350 हेक्टे0, 210घ रकबा 0.820 हेक्टे0, 223क रकबा 0.100 हेक्टे0, 229ख रकबा 1.100 हेक्टे0, 231च रकबा 1.360 हेक्टे0, 235क रकबा 1.420, 238ख रकबा 1.750 हेक्टे0 164ख 0.250 हेक्टे0, 164क रकबा 0.090 हेक्टे0, 164ङ रकबा 0.500 हेक्टे0, 164ग रकबा 1.660 हेक्टे0 132 रकबा 0.210 हेक्टे0, 136 रकबा 0.200 हेक्टे0।

योग कुल गाटा 49 रकबा 20.4600 हेक्टे0 =सम्पूर्ण रकबा 20.4600 हेक्टे0

खाता सं0–2

गाटा संख्या	रकबा	गाटा संख्या	रकबा
8ग	0.150 हेक्टे0	178ग	0.060 हेक्टे0
9ग	0.180 हेक्टे0	179ख	0.040 हेक्टे0
10ग	0.570 हेक्टे0	181ग	0.390 हेक्टे0
11ग	0.280 हेक्टे0	184क	0.470 हेक्टे0
12ग	0.300 हेक्टे0	186ग	0.300 हेक्टे0
13ख	0.200 हेक्टे0	187ग	0.340 हेक्टे0
14ग	0.010 हेक्टे0	189ग	0.690 हेक्टे0

15ख	0.070 हेक्टेयर	192ग	0.220 हेक्टेयर
17ग	0.450 हेक्टेयर	193ग	0.650 हेक्टेयर
18ग	0.220 हेक्टेयर	194ग	0.150 हेक्टेयर
19ग	0.150 हेक्टेयर	195ग	0.020 हेक्टेयर
20ख	0.100 हेक्टेयर	196ग	0.040 हेक्टेयर
21ग	0.050 हेक्टेयर	197ख	0.600 हेक्टेयर
22ग	0.220 हेक्टेयर	198ग	1.000 हेक्टेयर
23ग	0.250 हेक्टेयर	199ग	0.700 हेक्टेयर
24ख	0.050 हेक्टेयर	200ग	0.250 हेक्टेयर
25ग	0.070 हेक्टेयर	201ग	0.080 हेक्टेयर
26ग	0.350 हेक्टेयर	202ग	0.050 हेक्टेयर
27ग	0.010 हेक्टेयर	203ग	0.100 हेक्टेयर
28ग	0.410 हेक्टेयर	204ग	0.300 हेक्टेयर
29ख	0.560 हेक्टेयर	205ग	0.110 हेक्टेयर
34ग	0.070 हेक्टेयर	206ग	0.250 हेक्टेयर
35ग	0.050 हेक्टेयर	209ग	0.550 हेक्टेयर
36ग	0.100 हेक्टेयर	210ग	0.050 हेक्टेयर
37ग	0.150 हेक्टेयर	211ग	0.020 हेक्टेयर
41ग	0.310 हेक्टेयर	212ग	0.050 हेक्टेयर
42ग	0.230 हेक्टेयर	214ग	0.250 हेक्टेयर
43ग	0.060 हेक्टेयर	215ग	1.000 हेक्टेयर
46ग	0.200 हेक्टेयर	216ग	2.570 हेक्टेयर
47ख	0.120 हेक्टेयर	218ख	1.470 हेक्टेयर
48ख	0.050 हेक्टेयर	222ग	0.090 हेक्टेयर
49ख	0.220 हेक्टेयर	223ख	0.480 हेक्टेयर
50ख	0.170 हेक्टेयर	224ग	0.350 हेक्टेयर
51ग	0.150 हेक्टेयर	225ग	0.300 हेक्टेयर
52ख	0.200 हेक्टेयर	228ग	1.310 हेक्टेयर

54क	0.250 हेक्टेo	230क	3.400 हेक्टेo
55ख	0.480 हेक्टेo	235ख	2.640 हेक्टेo
56ङ	0.150 हेक्टेo	237क	0.440 हेक्टेo
57ख	0.240 हेक्टेo	226क	0.210 हेक्टेo
58ग	0.150 हेक्टेo		
59ग	0.130 हेक्टेo		
72क	0.250 हेक्टेo		
156	0.220 हेक्टेo		
157ख	0.100 हेक्टेo		
169क	0.750 हेक्टेo		
171ग	0.040 हेक्टेo		
172ख	0.050 हेक्टेo		
173ख	0.410 हेक्टेo		
174ग	0.050 हेक्टेo		
175ग	0.110 हेक्टेo		
176घ	0.050 हेक्टेo		
177ख	0.200 हेक्टेo		

खाता संख्या--3

गाटा संख्या	रकबा	गाटा संख्या	रकबा
9ख	0.560 हेक्टेo	178ख	0.200 हेक्टेo
9ख	0.280 हेक्टेo	184घ	0.060 हेक्टेo
11ख	0.600 हेक्टेo	186ङ	0.500 हेक्टेo
12ख	0.520 हेक्टेo	187ख	0.570 हेक्टेo
13ग	0.180 हेक्टेo	180क	0.850 हेक्टेo
14ग	0.020 हेक्टेo	189ख	0.920 हेक्टेo
15ग	0.200 हेक्टेo	190क	0.350 हेक्टेo
17ख	0.750 हेक्टेo	192ख	1.050 हेक्टेo

19क	0.080 हेक्टेo	194ख	0.220 हेक्टेo
19ख	0.320 हेक्टेo	195ख	0.050 हेक्टेo
20ग	0.170 हेक्टेo	196ख	0.080 हेक्टेo
21ख	0.110 हेक्टेo	197घ	0.360 हेक्टेo
22ख	0.310 हेक्टेo	198ख	2.450 हेक्टेo
23ख	0.500 हेक्टेo	199ख	1.200 हेक्टेo
24ग	0.070 हेक्टेo	200ख	0.280 हेक्टेo
25ख	0.130 हेक्टेo	201ख	0.100 हेक्टेo
26ख	0.850 हेक्टेo	202ख	0.100 हेक्टेo
27ख	0.320 हेक्टेo	203ख	0.150 हेक्टेo
29ग	0.680 हेक्टेo	204ख	0.350 हेक्टेo
34ख	0.080 हेक्टेo	205ख	0.300 हेक्टेo
35ख	0.080 हेक्टेo	207ख	0.020 हेक्टेo
36ख	0.120 हेक्टेo	209ख	1.250 हेक्टेo
37ख	0.220 हेक्टेo	212ख	0.090 हेक्टेo
40क	0.200 हेक्टेo	214ख	0.400 हेक्टेo
42ख	0.280 हेक्टेo	215ख	2.000 हेक्टेo
43ग	0.040 हेक्टेo	216ख	1.470 हेक्टेo
46ख	0.400 हेक्टेo	217	3.500 हेक्टेo
49ग	0.160 हेक्टेo	218ख	2.500 हेक्टेo
50ग	0.160 हेक्टेo	222ख	0.150 हेक्टेo
51ग	0.180 हेक्टेo	223ग	0.480 हेक्टेo
52ग	0.260 हेक्टेo	224ख	0.480 हेक्टेo
54ख	0.120 हेक्टेo	225ख	1.060 हेक्टेo
55ग	0.050 हेक्टेo	226ख	0.050 हेक्टेo
56ख	0.270 हेक्टेo	228ख	1.770 हेक्टेo

57ख	0.520 हेक्टे0	235ग	2.320 हेक्टे0
58ख	0.240 हेक्टे0	238ग	0.000 हेक्टे0
59ख	0.250 हेक्टे0	239क	1.900 हेक्टे0
64	0.190 हेक्टे0		
73	0.100 हेक्टे0		
95क	0.060 हेक्टे0		
96ख	0.140 हेक्टे0		
118क	0.410 हेक्टे0		
119ख	0.120 हेक्टे0		
157ख	0.550 हेक्टे0		
169ख	1.150 हेक्टे0		
171ख	0.150 हेक्टे0		
172ग	0.120 हेक्टे0		
173ग	0.700 हेक्टे0		
174ख	0.050 हेक्टे0		
175ख	0.070 हेक्टे0		
176ख	0.030 हेक्टे0		

<u>खाता सं0–4</u> 7 रकबा 1.710हेक्टे0, 8ग रकबा 1.250हेक्टे0, 9क रकबा 1.040हेक्टे0, 10क रकबा 2.040हेक्टे0, 11ग रकबा 2.390हेक्टे0, 12क रकबा 1.980हेक्टे0, 13क रकबा 1.580हेक्टे0, 14ग 0.090हेक्टे0, 15क 0.620हेक्टे0, 17ग रकबा 1.400हेक्टे0, 18क रकबा 0.500हेक्टे0, 19क रकबा 1.440हेक्टे0, 20क रकबा 0.680हेक्टे0, 21क रकबा 0.400हेक्टे0, 22ग रकबा 1.050हेक्टे0, 24क रकबा 0.270हेक्टे0, 25क 0.090हेक्टे0, 26क रकबा 2.000हेक्टे0, 27क रकबा 0.390हेक्टे0, 28क 2.150हेक्टे0, 29क 0.250हेक्टे0, 33 रकबा 0.510हेक्टे0, 34क रकबा 0.030हेक्टे0, 35क 0.470हेक्टे0, 36क 0.430हेक्टे0, 37क रकबा 0.600हेक्टे0, 40ख रकबा 0.050हेक्टे0, 41ग रकबा 2.370हेक्टे0, 42क रकबा 3.640हेक्टे0, 43ग रकबा 0.160हेक्टे0, 46क रकबा 0.580हेक्टे0, 48क रकबा 0.550हेक्टे0, 49क रकबा 0.330हेक्टे0, 50क रकबा 0.210हेक्टे0, 51क रकबा 0.610हेक्टे0, 52क रकबा 0.930हेक्टे0, 54ग रकबा 0.450हेक्टे0, 55क रकबा 1.640हेक्टे0, 57ग रकबा 1.540हेक्टे0, 58क रकबा 0.370हेक्टे0, रकबा 0.070हेक्टे0, 61 रकबा 0.470हेक्टे0, 62 रकबा 0.500हेक्टे0, 63ख रकबा 0.450हेक्टे0, 65क रकबा 0.400हेक्टे0, 67क रकबा 1.380हेक्टे0, 85ख रकबा 0.150हेक्टे0, 95ख रकबा 0.140हेक्टे0, 169ग रकबा 2.750हेक्टे0, 170क

रकबा 0.230हेक्टे0, 171क रकबा 0.950हेक्टे0 172क रकबा 0.670हेक्टे0, 173ख रकबा 2.400हेक्टे0, 174क रकबा 0.270हेक्टे0, 175क रकबा 0.250हेक्टे0, 177ख रकबा 0.100हेक्टे0, 179क रकबा 1.390हेक्टे0, 181ख रकबा 0.820हेक्टे0, 182 रकबा 0.630हेक्टे0, 183 रकबा 0.020हेक्टे0, 184ग रकबा 1.710हेक्टे0, 186ख रकबा 1.760हेक्टे0, 187क रकबा 2.160हेक्टे0, 188ख रकबा 0.160हेक्टे0, 189क रकबा 2.750हेक्टे0, 190क रकबा 0.690हेक्टे0, 192क रकबा 3.160हेक्टे0, 194क रकबा 0.650हेक्टे0, 195क रकबा 0.150हेक्टे0, 197ग रकबा 3.950हेक्टे0, 198क रकबा 7.000हेक्टे0 199क रकबा 2.600हेक्टे0, 200क रकबा 1.000हेक्टे0, 201क रकबा 0.050हेक्टे0, 202क रकबा 0.250हेक्टे0, 203क रकबा 0.050हेक्टे0, 204क रकबा 1.100हेक्टे0, 205क रकबा 0.930हेक्टे0, 206क रकबा 1.200हेक्टे0 207क रकबा 0.700हेक्टे0, 208 रकबा 2.850हेक्टे0, 209क रकबा 2.100हेक्टे0, 210क रकबा 0.250हेक्टे0, 212क रकबा 0.290हेक्टे0, 213क रकबा 0.830हेक्टे0, 214क रकबा 1.300हेक्टे0, 215क रकबा 0.980हेक्टे0, 216ग रकबा 0.980हेक्टे0, 220 रकबा 6.170हेक्टे0, 221 रकबा 4.170हेक्टे0, 222क रकबा 6.000हेक्टे0, 223ख रकबा 0.980हेक्टे0, 224क रकबा 1.350हेक्टे0, 225क रकबा 7.600हेक्टे0, 226ख रकबा 2.000हेक्टे0, 227क रकबा 1.300हेक्टे0, 228क रकबा 6.110हेक्टे0, 236ग रकबा 8.060हेक्टे0, 237ख रकबा 4.560हेक्टे0, 238क रकबा 5.200हेक्टे0, 119ग रकबा 0.130हेक्टे0 188 रकबा 0.400हेक्टे0, 196क रकबा 0.210हेक्टे0, 211क रकबा 0.120हेक्टे0.

<u>खाता संख्या–5</u> की आ0स0–10ख–0.520हे0, 177ग–0.4000, 206ख–0.3300.

<u>खाता संख्या–6</u> की आ0स0–41ख–0.160 हेक्टे0, 210ख–0.0600 हेक्टे0

<u>खाता संख्या–7</u> की आ0स0–211ख–0.040हेक्टे0।

<u>खाता संख्या–8</u> की आ0स0–23ख–1.200 हेक्टे0।

<u>खाता संख्या–9</u> की आ0स0–216ख–रकबा 2.370हेक्टे0।

<u>उपरोक्त खाता 2 से 9 में अंकित कुल गाटा 292 रकबा 239.890हेक्टे0 सम्पूर्ण।</u>

<u>फसली वर्ष 1414 से 1419 से के खाता सं0–11 की आराजी नम्बर–</u>

<u>आराजी नम्बर</u>–आ0नं0 75 रकबा 0.900हेक्टे0, 76 रकबा 0.120हेक्टे0, 77 रकबा 0.100हेक्टे0, 78 रकबा 0.160हेक्टे0, 79 रकबा 0.250 हेक्टे0, 70 रकबा 0.670हेक्टे0, 80 रकबा 0.670हेक्टे0, 81 रकबा 0.060हेक्टे0, 82 रकबा 1.100हेक्टे0, 83 रकबा 3.230हेक्टे0, 84 रकबा 0.280हेक्टे0, 85क रकबा 0.250हेक्टे0, 86 रकबा 0.800हेक्टे0, 87 रकबा 0.300हेक्टे0, 88 रकबा 0.900हेक्टे0, 89 रकबा 0.650हेक्टे0, 90 रकबा 0.120हेक्टे0, 91ख रकबा 1.240हेक्टे0, 92 रकबा 3.260हेक्टे0, 93 रकबा 0.040हेक्टे0, 94 रकबा 0.520हेक्टे0, 96क रकबा 0.390हेक्टे0, 97 रकबा 0.350हेक्टे0, 98 रकबा 0.210हेक्टे0, 99 रकबा 0.070हेक्टे0, 100 रकबा 0.090हेक्टे0, 102 रकबा 0.150हेक्टे0, 103 रकबा 0.110हेक्टे0, 104 रकबा 0.100हेक्टे0, 105 रकबा 0.100हेक्टे0, 106 रकबा 0.100हेक्टे0, 107 रकबा 0.040हेक्टे0, 108 रकबा 0.060हेक्टे0, 109 रकबा 0.050हेक्टे0, 110 रकबा 0.050हेक्टे0, 111 रकबा 0.040हेक्टे0, 112 रकबा 0.100हेक्टे0, 113 रकबा 0.170हेक्टे0, 114 रकबा 0.180हेक्टे0, 115 रकबा 0.130हेक्टे0, 116

रकबा 0.200हेक्टे0, 117क रकबा 0.470हेक्टे0 119ख रकबा 0.360हेक्टे0, 121 रकबा 0.320हेक्टे0, 123 रकबा 0.120हेक्टे0, 165ग रकबा 0.020हेक्टे0, 166 रकबा 0.770हेक्टे0, 222ङ रकबा 0.600हेक्टे0, 101 रकबा 1.420हेक्टे0।

अरसाजी के कुल गाटा 46 रकबा 21.730 मै=20.212हेक्टे0।

खाता सं0–12

अ0नं0–166ग रकबा 0.250, 43क रकबा 0.450, 191 रकबा 1.980, 210ङ रकबा 0.360, 222ग रकबा 0.260हे0 कुल 5 गाटा मे सम्पूर्ण रकबा =3.220हेक्टे0

खाता सं0–13

अ0नं0–166ङ रकबा 0.260, 43ख रकबा 0.450, 60 रकबा 1.760, 216ग रकबा 0.360, 222ङ रकबा 0.260हे0 कुल 5गाटा मे सम्पूर्ण रकबा =3.130हेक्टे0

खाता सं0–15

अ0नं0–196घ रकबा 1.010 कुल 1 गाटा सम्पूर्ण रकबा =1.010हेक्टे0

खाता सं0–16

अ0नं0–231ख रकबा 1.200 कुल 1 गाटा सम्पूर्ण रकबा =1.200हेक्टे0

खाता सं0–19

अ0नं0–56घ रकबा 0.770 कुल 1 गाटा सम्पूर्ण रकबा =0.770हेक्टे0

खाता सं0–22

अ0नं0–65ख रकबा 0.450, 225ग रकबा 0.200हे0 कुल 2 गाटा सम्पूर्ण रकबा =0.650हेक्टे0

खाता सं0–24

अ0नं0–164ख रकबा 0.540, 185 रकबा 0.220, 166ग रकबा 0.500 कुल 3 गाटा सम्पूर्ण रकबा =1.260हेक्टे0

खाता सं0–25

अ0नं0–66 रकबा 0.450, 69 रकबा 0.800हे0 कुल 2 गाटा सम्पूर्ण रकबा =1.250हेक्टे0

खाता सं0–26

अ0नं0–94 रकबा 0.350हेक्टे0, 100 रकबा 0.570हेक्टे0, 143क रकबा 0.350हेक्टे0, 154 0.120हेक्टे0 रकबा कुल 4 गाटा सम्पूर्ण रकबा =1.320हेक्टे0

खाता सं0–30

अ0नं0–52घ रकबा 0.260, 54ग रकबा 0.330हेक्टे0, 55ङ रकबा 0.370हेक्टे0, 57ङ रकबा 0.070हेक्टे0 58ग रकबा 0.090हे0 कुल 5 गाटा सम्पूर्ण रकबा =1.320हेक्टे0

खाता सं0–33

अ0नं0- 43ख रकबा 0.070, 67ख रकबा 1.170, 225ङ रकबा 0.200 कुल 3 गाटा सम्पूर्ण रकबा =1.440हेक्टे0

खाता सं0–35
आ0मं0–231क रकबा 1.220हे0 कुल 1 गाटा सम्पूर्ण रकबा =1.220हेक्टे0

खाता सं0–36
आ0मं0–87ग रकबा 0.290 6ख रकबा 0.830हेक्टे0 कुल 2 गाटा सम्पूर्ण रकबा =1.120हेक्टे0

खाता सं0–38
आ0मं0–264ग रकबा 0.350, 264घ रकबा 0.360हे0 कुल 2 गाटा सम्पूर्ण रकबा =0.710हेक्टे0

खाता सं0–39
आ0मं0–196क रकबा 1.310हे0 कुल 1 गाटा सम्पूर्ण रकबा =1.310हेक्टे0

खाता सं0–40
आ0मं0–82ग रकबा 0.190, 123 रकबा 0.460,
130 रकबा 0.210, 233ख रकबा 0.190हे0, कुल 4 गाटा सम्पूर्ण रकबा=0.950हेक्टे0

खाता सं0–41
आ0मं0–170क रकबा 0.170, 172ख रकबा 0.140,
197ख रकबा 0.190, 201ग रकबा 0.130, 226ङ कुल 5 गाटा सम्पूर्ण रकबा=0.990हेक्टे0

खाता सं0–42
आ0मं0–189ख रकबा 1.030, 197ग रकबा 0.250हे0 कुल 2 गाटा सम्पूर्ण रकबा =1.280हेक्टे0

खाता सं0–43
आ0मं0–188ग रकबा 0.190, 187घ रकबा 0.080, 199ख रकबा 0.400हे0 कुल 3 गाटा सम्पूर्ण रकबा =1.260हेक्टे0

खाता सं0–48
आ0मं0–39 रकबा 0.230, 71 रकबा 1.100हे0, कुल 2 गाटा सम्पूर्ण रकबा =1.350हेक्टे0

खाता सं0–49
आ0मं0–235ग रकबा 0.240, 36ग रकबा 0.150, 37ङ रकबा 0.230,
178ख रकबा 0.240, 216ङ रकबा 0.120, 233ख रकबा 0.250हे0 कुल 6गाटा सम्पूर्ण रकबा =1.230हेक्टे0

खाता सं0–51
आ0मं0–59क रकबा 0.820हे0, कुल 1 गाटा सम्पूर्ण रकबा =0.820हेक्टे0

खाता सं0–52
आ0मं0–37ग रकबा 0.300, 165क रकबा 0.140, 151घ रकबा 0.420हे0, कुल 3 गाटा सम्पूर्ण रकबा =0.860हेक्टे0

खाता सं0–63
आ0मं0–173घ रकबा 1.700हे0 222ग रकबा 1.350हे0 कुल 1 गाटा सम्पूर्ण रकबा =3.050हेक्टे0

उपरोक्त सम्पूर्ण खाता के आराजियात में कुल क्षेत्रफल=319.342हेक्टे0/789.094एकड़

दिनांक :

हस्ताक्षर

3 CR 13132

केवल नकल की फीस के लिए

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न्यायालय उप जिलाधिकारी सदर, मीरजापुर

वाद सं० 05 वर्ष 2012-2013

अन्तर्गत धारा 143 ज०वि० अधि०

वेलस्पन एनर्जी यूपी प्रा० लि० बनाम सरकार

मौजा — ददरी खुर्द तप्पा 84 परगना कंतित

तहसील सदर जिला मीरजापुर।

नकल आदेश दि० 05-11-2012 की छायाप्रति

मिलान को

P.T.O

वेलस्पन एनर्जी यूपी प्रा0लि0 बनाम परस्पार

मौजा–ददरीखुर्द, तप्पा 84, परगना कंतित, तहसील सदर, मीरजापुर।

निर्णय

प्रस्तुत पत्र वेलस्पन एनर्जी यूपी प्रा0लि0 पंजीकृत कार्यालय, वेलस्पन हाउस सावली गंजिल, कनाला सिटी, दोगामीति बापत मार्ग, लोअर परेल मुम्बई, से अजलिये अधिकृत प्रतिनिधि अनुराग बोखानी पुत्र अनिल बोखानी निवासी वार्ड नं0–15, लोहिया नगर, नौतनवां, महराजगंज उ0प्र0 द्वारा अपने पत्र में बताया है कि प्रार्थी कम्पनी ग्राम ददरीखुर्द, तप्पा 84, परगना कंतित, तहसील सदर, जिला मीरजापुर में 1320(660X2) मेगावाट की तापीय विद्युत परियोजना की स्थापना हेतु ग्राम ददरीखुर्द की खतौनी फसली सन् 1414 से 1419 के खाता संख्या–1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 19, 22, 24, 25, 26, 30, 33, 35, 36, 38, 39, 40, 41, 42, 43, 48, 49, 51, 52 व 63 की समस्त आराजियात की संकलनीय भूमिधर हैं। प्रार्थी कम्पनी द्वारा अपनी भूमि पर बाउण्ड्रीवाल बनाकर उसका प्रयोग औद्योगिक प्रयोजन हेतु किया जा रहा है। उक्त भूमि का प्रयोग कृषि कार्य हेतु नहीं किया जा रहा है, ऐसी स्थिति में ग्राम दसीरखुर्द सक्त की खारोजात खाते की भूमि को उ0प्र0ज0लि0अधि0 की धारा–143 के अन्तर्गत कृषिक प्रयोजन से भिन्न, अकृषिक/औद्योगिक घोषित किये जाने की याचना की गयी है।

मौके की स्थलीय एवं अभिलेखीय जाँच तहसीलदार सदर द्वारा करायी गयी। तहसीलदार सदर की आख्या दिनांक 17.10.2012 में स्पष्ट किया गया है कि ग्राम ददरीखुर्द, तप्पा 84, परगना कंतित, तहसील सदर, मीरजापुर के खाता संख्या 1 की गाटा संख्या–120 रकबा 0.750हेक्टे0, 124 रकबा 0.180हेक्टे0, 125 रकबा 0.180हेक्टे0, 126 रकबा 1.100 हेक्टे0, 127 रकबा 1.200 हेक्टे0, 128 रकबा 0.800 हेक्टे0 129 रकबा 0.220 हेक्टे0, 130 रकबा 0.650 हेक्टे0, 131 रकबा 0.400 हेक्टे0, 133 रकबा 0.650 हेक्टे0, 134 रकबा 0.120 हेक्टे0, 135 रकबा 0.370 हेक्टे0, 137 रकबा 0.230 हेक्टे0, 138 1.200 हेक्टे0, 139 1.500 हेक्टे0, 140 रकबा 0.550 हेक्टे0 141 रकबा 0.550 हेक्टे0, 142 0.1500 हेक्टे0 143 रकबा 0.450 हेक्टे0, 144 रकबा 0.0600 हेक्टे0, 145रकबा 1.670 हेक्टे0, 146 रकबा 0.520 हेक्टे0, 147 रकबा 0.300 हेक्टे0, 148 रकबा 0.250 हेक्टे0, 149 रकबा 0.200 हेक्टे0, 150 रकबा 0.250 हेक्टे0, 151 रकबा 0.110 हेक्टे0, 152 रकबा 0.110 हेक्टे0 153 रकबा 0.100 हेक्टे0 154 रकबा 0.200 हेक्टे0, 155 रकबा 0.150 हेक्टे0, 158 रकबा 0.320 हेक्टे0, 159 रकबा 0.320 हेक्टे0, 160 रकबा 0.200 हेक्टे0, 161 रकबा 0.020 हेक्टे0, 162 रकबा 0.490 हेक्टे0, 163 रकबा 0.350 हेक्टे0, 218ख रकबा 0.820 हेक्टे0, 223क रकबा 0.100 हेक्टे0, 229ध रकबा 1.100 हेक्टे0, 231घ रकबा 1.360 हेक्टे0, 235क रकबा 1.420, 238ख रकबा 1.750 हेक्टे0 164ख 0.290 हेक्टे0, 164क रकबा 0.060 हेक्टे0, 164ङ रकबा 0.500 हेक्टे0, 164ग रकबा 1.660 हेक्टे0, 132 रकबा 0.210 हेक्टे0, 136 रकबा 0.260 हेक्टे0, व खाता संख्या 2 की गाटा संख्या–8क रकबा 0.160 हेक्टे0, 9ग रकबा 0.180 हेक्टे0, 10ग रकबा 0.370 हेक्टे0, 11ग रकबा 0.280 हेक्टे0, 12ग रकबा 0.300 हेक्टे0, 13ख रकबा 0.260 हेक्टे0, 14ख रकबा 0.010 हेक्टे0, 15ख रकबा 0.070 हेक्टे0, 17ग रकबा 0.450 हेक्टे0, 18ग रकबा 0.220 हेक्टे0, 19ग रकबा 0.190 हेक्टे0, 20ख रकबा 0.100 हेक्टे0, 21ग रकबा 0.060 हेक्टे0, 22क रकबा 0.220 हेक्टे0, 23ग रकबा 0.230 हेक्टे0, 24ख रकबा 0.050 हेक्टे0, 25ग रकबा 0.070 हेक्टे0, 26ग रकबा 0.350 हेक्टे0, 27ख रकबा 0.010 हेक्टे0, 28ग रकबा 0.410 हेक्टे0, 29ख रकबा 0.560 हेक्टे0, 34ग रकबा 0.070 हेक्टे0, 35ग रकबा 0.050 हेक्टे0, 36ग रकबा 0.100 हेक्टे0, 37ग रकबा 0.150 हेक्टे0, 41क रकबा 0.310 हेक्टे0, 42ग रकबा 0.230 हेक्टे0, 43ग रकबा 0.060 हेक्टे0, 46ग रकबा 0.200 हेक्टे0, 47क रकबा 0.120 हेक्टे0, 48ख रकबा 0.050 हेक्टे0, 49ख रकबा 0.220 हेक्टे0, 50ख रकबा 0.170 हेक्टे0, 51ख रकबा 0.150 हेक्टे0, 52ख रकबा 0.330 हेक्टे0, 54क रकबा 0.250 हेक्टे0, 55ख रकबा 0.480 हेक्टे0, 56क रकबा 0.150 हेक्टे0, 57ख रकबा 0.240 हेक्टे0, 58ग रकबा 0.150 हेक्टे0, 59ग रकबा 0.130 हेक्टे0, 72क रकबा 0.250 हेक्टे0, 156 रकबा 0.220 हेक्टे0, 157क रकबा 0.190 हेक्टे0, 169क रकबा 0.750 हेक्टे0, 171ग रकबा 0.040 हेक्टे0, 172ख रकबा 0.050 हेक्टे0, 173ध रकबा 0.410 हेक्टे0, 174ग रकबा 0.050 हेक्टे0, 175ग रकबा 0.110 हेक्टे0, 176क रकबा 0.050 हेक्टे0, 177ख रकबा 0.200 हेक्टे0, 178ग रकबा 0.060 हेक्टे0, 179ख रकबा 0.040 हेक्टे0, 181ग रकबा 0.390 हेक्टे0, 184क रकबा 0.470 हेक्टे0, 186ग रकबा 0.300 हेक्टे0, 187ग रकबा 0.340 हेक्टे0, 189ग रकबा 0.690 हेक्टे0, 190ग रकबा 0.220 हेक्टे0, 192ग रकबा 0.850 हेक्टे0, 194ग रकबा 0.150 हेक्टे0, 195ग रकबा 0.020 हेक्टे0, 196ग रकबा 0.040 हेक्टे0, 197ङ रकबा 0.600 हेक्टे0, 198ग रकबा 1.600 हेक्टे0, 199ग रकबा 0.700 हेक्टे0, 200ग रकबा 0.260 हेक्टे0, 201ग रकबा 0.090 हेक्टे0, 202ग रकबा 0.050 हेक्टे0, 203ग रकबा 0.100 हेक्टे0, 204ग रकबा 0.300

रकबा 0.050 हेक्टे0, 211ग रकबा 0.020 हेक्टे0, 212ग रकबा 0.030 हेक्टे0, 215ग रकबा 0.200 हेक्टे0, 215ख रकबा 1.000 हेक्टे0, 218ख रकबा 2.570 हेक्टे0, 218ख रकबा 1.470 हेक्टे0, 222ग रकबा 0.090 हेक्टे0, 223ख रकबा 0.480 हेक्टे0, 224ग रकबा 0.360 हेक्टे0, 225ग रकबा 0.300 हेक्टे0, 228ग रकबा 1.370 हेक्टे0, 230ख रकबा 3.400 हेक्टे0, 235ख रकबा 2.640 हेक्टे0, 237ख रकबा 0.440 हेक्टे0, 226क रकबा 0.210 हेक्टे0, खाता संख्या–3 की गाटा संख्या–8ख रकबा 0.360हेक्टे0, 9ग रकबा 0.280 हेक्टे0, 11ख रकबा 0.600हेक्टे0, 12ख रकबा 0.520हेक्टे0, 13ग रकबा 0.180हेक्टे0, 14ग रकबा 0.020हेक्टे0, 15ग रकबा 0.200हेक्टे0, 17ख रकबा 0.750हेक्टे0, 18ख रकबा 0.380हेक्टे0, 19ख रकबा 0.320हेक्टे0, 20ग रकबा 0.170हेक्टे0, 21ख रकबा 0.110हेक्टे0, 22ख रकबा 0.310हेक्टे0, 23क रकबा 0.590हेक्टे0, 24ग रकबा 0.070 हेक्टे0, 25ख रकबा 0.130हेक्टे0, 26ख रकबा 0.550हेक्टे0, 27क रकबा 0.320हेक्टे0, 29ग रकबा 0.660हेक्टे0, 34ख रकबा 0.080हेक्टे0, 35ख रकबा 0.060हेक्टे0, 36ख रकबा 0.120हेक्टे0, 37ख रकबा 0.220हेक्टे0, 40क रकबा 0.200हेक्टे0, 42ख रकबा 0.260हेक्टे0, 43ख रकबा 0.040हेक्टे0, 46ख रकबा 0.400हेक्टे0, 49ग रकबा 0.160हेक्टे0, 50ग रकबा 0.160हेक्टे0, 51ग रकबा 0.180हेक्टे0, 52ग रकबा 0.260हेक्टे0, 54ख रकबा 0.120हेक्टे0, 55ग रकबा 0.230हेक्टे0, 59ख रकबा 0.270हेक्टे0, 57ख रकबा 0.520हेक्टे0, 58ख रकबा 0.240हेक्टे0, 59ख रकबा 0.250हेक्टे0, 64 रकबा 0.100हेक्टे0, 72 रकबा 0.100हेक्टे0, 96क रकबा 0.060हेक्टे0, 96ख रकबा 0.140हेक्टे0, 116क रकबा 0.410हेक्टे0, 119ख रकबा 0.120 हेक्टे0, 157ख रकबा 0.560हेक्टे0, 160ख रकबा 1.150हेक्टे0, 171ख रकबा 0.150हेक्टे0, रकबा 172ग रकबा 0.120हेक्टे0, 172ग रकबा 0.700हेक्टे0, 174ख रकबा 0.080हेक्टे0, 175ख रकबा 0.070 हेक्टे0, 176ख रकबा 0.030हेक्टे0, 178ख रकबा 0.200हेक्टे0, 184ख रकबा 0.060हेक्टे0, 186ख रकबा 0.500हेक्टे0, 187ख रकबा 0.870हेक्टे0, 188क रकबा 0.950हेक्टे0, 189ख रकबा 0.920हेक्टे0, 190ख रकबा 0.260हेक्टे0, 192ख रकबा 1.370हेक्टे0, 194ख रकबा 0.220हेक्टे0, 195ख रकबा 0.060हेक्टे0, 196ख रकबा 0.060हेक्टे0, 197ख रकबा 0.360हेक्टे0, 198ख रकबा 2.450हेक्टे0, 199ख रकबा 1.200 हेक्टे0, 200ख रकबा 0.280हेक्टे0, 201ख रकबा 0.100हेक्टे0, 202ख रकबा 0.100हेक्टे0, 203ख रकबा 0.150हेक्टे0, 204ख रकबा 0.350हेक्टे0, 205ख रकबा 0.500हेक्टे0, 207ख रकबा 0.020हेक्टे0, 208ख रकबा 1.250हेक्टे0, 212ख रकबा 0.090हेक्टे0, 214ख रकबा 0.400हेक्टे0, 215ख रकबा 2.000हेक्टे0, 216ख रकबा 1.470हेक्टे0, 217 रकबा 3.500हेक्टे0, 218क रकबा 2.500हेक्टे0, 222ख रकबा 0.150हेक्टे0, 223ग रकबा 0.480 हेक्टे0, 224ख रकबा 0.480हेक्टे0, 225ख रकबा 1.080हेक्टे0, 226ख रकबा 0.050 हेक्टे0, 228ख रकबा 1.770हेक्टे0, 235ग रकबा 2.520हेक्टे0, 239ग रकबा 0.900हेक्टे0, 239क रकबा 1.900 हेक्टे0, खाता सं0–4, वही आराजी नम्बर–7 रकबा 1.710हेक्टे0, 8ग रकबा 1.250हेक्टे0, 9क रकबा 1.040हेक्टे0, 10क रकबा 2.040हेक्टे0, 11क रकबा 2.390हेक्टे0, 12क रकबा 1.980हेक्टे0, 13क रकबा 1.580हेक्टे0, 14ख 0.990हेक्टे0, 15क 0.620हेक्टे0, 17क रकबा 1.400हेक्टे0, 18क रकबा 0.500हेक्टे0, 19ख रकबा 1.440हेक्टे0, 20क रकबा 0.680हेक्टे0, 21क रकबा 0.400हेक्टे0, 22ग रकबा 1.050हेक्टे0, 24क रकबा 0.270हेक्टे0, 25क 0.660हेक्टे0, 26क रकबा 2.000हेक्टे0, 27क रकबा 0.390हेक्टे0, 28क 2.150हेक्टे0, 29क 0.250हेक्टे0, 33 रकबा 0.510हेक्टे0, 34क रकबा 0.030हेक्टे0, 35क 0.470हेक्टे0, 36क0.430हेक्टे0, 37क रकबा 0.200हेक्टे0, 40ख रकबा 0.050हेक्टे0, 41ख रकबा 2.370हेक्टे0, 42क रकबा 3.540हेक्टे0, 43ग रकबा 0.160हेक्टे0, 46क रकबा 0.580हेक्टे0, 48क रकबा 0.590हेक्टे0, 49क रकबा 0.330हेक्टे0, 50क रकबा 0.210हेक्टे0, 51क रकबा 0.610हेक्टे0, 52क रकबा 0.930हेक्टे0, 54ग रकबा 0.450हेक्टे0, 55क रकबा 1.590हेक्टे0, 57क रकबा 1.520हेक्टे0, 59क रकबा 0.970हेक्टे0, 59ख रकबा 0.070हेक्टे0, 61 रकबा 0.470हेक्टे0, 62 रकबा 0.500हेक्टे0, 63ख रकबा 0.450हेक्टे0, 65क रकबा 0.100हेक्टे0, 67क रकबा 1.980हेक्टे0, 86ख रकबा 0.150हेक्टे0, 95ख रकबा 0.140हेक्टे0,169ग रकबा 2.750हेक्टे0, 170क रकबा 0.230हेक्टे0, 171क रकबा 0.950हेक्टे0 172क रकबा 0.070हेक्टे0, 173ख रकबा 2.400हेक्टे0, 174क रकबा 0.270हेक्टे0, 175क रकबा 0.250हेक्टे0, 177ख रकबा 0.100हेक्टे0, 179क रकबा 1.290हेक्टे0, 181ख रकबा 0.820हेक्टे0, 182 रकबा 0.650हेक्टे0, 183 रकबा 0.020हेक्टे0, 184ग रकबा 1.710हेक्टे0, 186ख रकबा 1.760हेक्टे0, 187क रकबा 2.160हेक्टे0, 188ख रकबा 0.150हेक्टे0, 189क रकबा 2.750हेक्टे0, 190क रकबा 0.690हेक्टे0, 192क रकबा 3.160हेक्टे0, 194क रकबा 0.650हेक्टे0, 195क रकबा 0.150हेक्टे0, 197क रकबा 3.950हेक्टे0, 198क रकबा 7.860हेक्टे0, 199क रकबा 2.600हेक्टे0, 200क रकबा 1.000हेक्टे0, 201क रकबा 0.050हेक्टे0, 202क रकबा 0.250हेक्टे0, 203क रकबा 0.050हेक्टे0, 204क रकबा 1.100हेक्टे0, 205क रकबा 0.930हेक्टे0, 206क रकबा 1.200हेक्टे0, 207क रकबा 0.700हेक्टे0, 208 रकबा 2.850हेक्टे0, 209क रकबा 2.100हेक्टे0, 210क रकबा 0.260हेक्टे0, 212क रकबा 0.290हेक्टे0, 213क रकबा 0.830हेक्टे0, 214क रकबा 1.200हेक्टे0, 215क रकबा 6

600हेक्टे0, 226ख रकबा 2.000हेक्टे0, 227क रकबा 1.300हेक्टे0, 228क रकबा 6.110हेक्टे0, 228ग रकबा 0.050हेक्टे0, 237ख रकबा 4.500हेक्टे0, 238क रकबा 5.200हेक्टे0, 119ग रकबा 0.130हेक्टे0, 156 रकबा 0.400हेक्टे0, 195क रकबा 0.210हेक्टे0, 211क रकबा 0.120हेक्टे0, खाता संख्या–5 की आ0सं0–103ख–0.5200, 177क–0.4000, 206ख–0.3300हेक्टे0, खाता संख्या–6 की आ0सं0–41ख–0.160 हेक्टे0, 210ख–0.0800 हेक्टे0, खाता संख्या–7 की आ0सं0–211ख–0.0400हेक्टे0, खाता संख्या–8 की आ0सं0–23ख–1.200 हेक्टे0, खाता संख्या–9 की आ0सं0–216ख–रकबा 2.370हेक्टे0, खाता संख्या–10 की आ0नं0–87क रकबा 1.380हेक्टे0, 220 रकबा 6.170हेक्टे0, 218ग रकबा 0.380हे0, खाता संख्या–11 की आ0नं0 75 रकबा 0.060हेक्टे0, 76 रकबा 0.120हेक्टे0, 77 रकबा 0.100हेक्टे0, 78 रकबा 0.160हेक्टे0, 79 रकबा 0.250 हेक्टे0, 70 रकबा 0.670हेक्टे0, 80 रकबा 0.670हेक्टे0, 81 रकबा 0.050हेक्टे0, 82 रकबा 1.100हेक्टे0, 83 रकबा 3.230हेक्टे0, 84 रकबा 0.280हेक्टे0, 85क रकबा 0.250हेक्टे0, 86 रकबा 0.800हेक्टे0, 87 रकबा 0.300हेक्टे0, 88 रकबा 0.900हेक्टे0, 89 रकबा 0.650हेक्टे0, 90 रकबा 0.120हेक्टे0, 91ख रकबा 1.240हेक्टे0, 92 रकबा 3.280हेक्टे0, 93 रकबा 0.040हेक्टे0, 94 रकबा 0.520हेक्टे0, 96क रकबा 0.560हेक्टे0, 97 रकबा 0.350हेक्टे0, 98 रकबा 0.210हेक्टे0, 99 रकबा 0.070हेक्टे0, 100 रकबा 0.090हेक्टे0, 102 रकबा 0.150 हेक्टे0, 103 रकबा 0.110 हेक्टे0, 104 रकबा 0.100हेक्टे0, 105 रकबा 0.100हेक्टे0,106 रकबा 0.110हेक्टे0, 107 रकबा 0.040हेक्टे0, 108 रकबा 0.060हेक्टे0, 109 रकबा 0.050 हेक्टे0, 110 रकबा 0.060हेक्टे0, 111 रकबा 0.060हेक्टे0, 112 रकबा 0.100हेक्टे0, 113 रकबा 0.170हेक्टे0, 114 रकबा 0.160 हेक्टे0, 115 रकबा 0.130हेक्टे0, 116 रकबा 0.200 हेक्टे0, 117क रकबा 0.470हेक्टे0, 119क रकबा 0.900हेक्टे0, 121 रकबा 0.320 हेक्टे0, 123 रकबा 0.120 हेक्टे0, 165ग रकबा 0.020 हेक्टे0, 166 रकबा 0.770हेक्टे0, 222ङ रकबा 0.600हेक्टे0, 101 रकबा 1.420हेक्टे0, खाता सं0–12–आ0नं0–16क रकबा 0.250हे0, 43क रकबा 0.450हे0, 181 रकबा 1.880हे0, 216ख रकबा 0.380हे0, 222ख रकबा 0.260हे0. खाता सं0–13 की आ0 नं0–18ख रकबा 0.260, 43ख रकबा 0.450, 50 रकबा 1.780, 216ख रकबा 0.320, 222ङ रकबा 0.260हेक्टे0 खाता संख्या–15 की आ0नं0–198ख रकबा 1.010हेक्टे0, खाता सं0–16 आ0नं0–231ख रकबा 1.260 हेक्टे0, खाता सं0–19 आ0नं0–56ख रकबा 0.770हेक्टे0, खाता सं0–22 की आराजी नं0 65ख रकबा 0.460, 225ग रकबा 0.200हेक्टे0, खाता सं0–24 आ0नं0–184ख रकबा 0.540हे0, 185 रकबा 0.220हे0, 186ख रकबा 0.500हेक्टे0, खाता सं0–25 की आ0 नं0–69 रकबा 0.450 व आ0नं0–69 रकबा 0.500हेक्टे0, खाता सं0–26 की आ0नं0–9ख रकबा 0.330हे0, 10ख रकबा 0.570हे0, 14क रकबा 0.300हे0, 15ख रकबा 0.120हेक्टे0, खाता सं0–30 की आ0नं0–52ख रकबा 0.250हे0, 54ख रकबा 0.330हे0, 55ङ रकबा 0.370हे0, 57ङ रकबा 0.070हे0, 59ख रकबा 0.290हेक्टे0, खाता सं0–33 की आ0नं0–43ख रकबा 0.070हे0, 67ख रकबा 1.170हे0, 225ख रकबा 0.200हेक्टे0, खाता सं0–35 की आ0नं0–231क रकबा 1.220हेक्टे0, खाता सं0–36 की आ0नं0–57ग रकबा 0.200हे0, 58 रकबा 0.920हेक्टे0, खाता सं0–38 की आ0नं0–204ख रकबा 0.360हे0, 206ख रकबा 0.360हे0, खाता सं0–39 की आ0नं0–198ङ रकबा 1.3100हेक्टे0, खाता सं0–40 की आ0नं0–8ङ रकबा 0.190हे0, 12ङ रकबा 0.450हे0, 13ख रकबा 0.210हे0, 23ख रकबा 0.100हेक्टे0, खाता सं0–41 की आ0नं0–170ख रकबा 0.170, 172ख रकबा 0.140, 197ख रकबा 0.100, 201ख रकबा 0.120, 228ङ रकबा 0.460हेक्टे0, खाता सं0–42 की आ0नं0–189ख रकबा 1.030, 197ग रकबा 0.250 हेक्टे0, खाता सं0–43 की आ0नं0–186ख रकबा 0.180, 187ख रकबा 0.680हे0, 199ख रकबा 0.400हेक्टे0, खाता सं0–48 की आराजी नं0–39 रकबा 0.250हेक्टे0, आ0नं0–71 रकबा 1.100हेक्टे0, खाता सं0–49 की आराजी नं0–23ङ रकबा 0.240, 36ख रकबा 0.1500, 37ङ रकबा 0.230, 178ख रकबा 0.2400, 218ङ रकबा 0.1200, 233ख रकबा 0.2500हेक्टे0, खाता सं0–51 की आ0नं0–59क रकबा 0.820हेक्टे0, आता सं0–62 की आ0नं0–37ख रकबा 0.300, 165क रकबा 0.140, 181ख रकबा 0.420 हेक्टे0, खाता सं–63 की आराजी नं0–173क रकबा 1.700 हेक्टे0, 222ज रकबा 1.350हेक्टे0, कुल क्षेत्रफल–319.342 हेक्टे0 भूमि मौके पर अकृषिक एवं परती है तथा चारो तरफ झाड़ीयाल बनी है। उपरोक्त भूमि कृषि, बागवानी, पशुपालन, कुक्कुट पालन किसी गतिय सम्बर्धन में शामिल है से भिन्न प्रयोजन हेतु प्रयोग में लाया जा रहा है। उक्त भूमि को अकृषिक/औद्योगिक घोषित करते हुये मू0–राजस्व समाप्त किया जाना है। मौके पर सम्पूर्ण भूमि अकृषिक एवं परती है तथा चारो तरफ झाड़ीयाल बनी है। अतः ग्राम दवरीखुर्द उक्त की उपरोक्त खाते की भूमि को नियम–135 के अर्न्तगत उ0प्र0ज0वि0अधि0 की धारा 143 के अर्न्तगत औद्योगिक/अकृषिक घोषित करते हुये मू0–राजस्व समाप्त किये जाने की आख्या प्रस्तुत की गयी है।

की आख्या दिनांक 17.10.2012 का सम्यक परीक्षण किया। परीक्षण से स्पष्ट है कि ग्राम ददरीखुर्द, तप्पा 84, परगना कंतित, तहसील सदर, मीरजापुर की खतौनी फसली वर्ष–1414 से 1419 के खाता संख्या–1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 19, 22, 24, 25, 29, 30, 33, 35, 36, 38, 39, 40, 41, 42, 43, 48, 49, 51, 52 व 63 की समस्त आराजी का रकबा 319.342 हे0 भूमि कृषि, उद्यानकरण, पशुपालन जिसमें मत्स्य संवर्धन, कुक्कुट पालन और सामाजिक वानिकी भी है से भिन्न प्रयोजन अर्थात औद्योगिक प्रयोजन के रूप में प्रयुक्त होने के कारण उ0प्र0ज0वि0 अधि0 की धारा 143 के अन्तर्गत प्रख्यापित कर भू–राजस्व से मुक्त किया जाना न्यायोचित है।

आदेश

अतः तहसीलदार सदर की आख्या दिनांक 17.10.2012 के आधार पर ग्राम ददरीखुर्द, तप्पा 84, परगना कंतित, तहसील सदर, मीरजापुर के खाता संख्या 1 की गाटा संख्या–120 रकबा 0.750हेक्टे0, 124 रकबा 0.180हेक्टे0, 125 रकबा 0.180हेक्टे0, 126 रकबा 1.100 हेक्टे0, 127 रकबा 1.200 हेक्टे0, 128 रकबा 0.800 हेक्टे0 129 रकबा 0.220 हेक्टे0, 130 रकबा 0.650 हेक्टे0, 131 रकबा 0.400 हेक्टे0, 133 रकबा 0.650 हेक्टे0, 134 रकबा 0.120 हेक्टे0, 135 रकबा 0.370 हेक्टे0, 137 रकबा 0.230 हेक्टे0, 138 1.200 हेक्टे0, 139 1.500 हेक्टे0, 140 रकबा 0.580 हेक्टे0 141 रकबा 0.550 हेक्टे0, 142 0.1500 हेक्टे0 143 रकबा 0.450 हेक्टे0, 144 रकबा 0.0600 हेक्टे0, 145रकबा 1.570 हेक्टे0, 146 रकबा 0.620 हेक्टे0, 147 रकबा 0.300 हेक्टे0, 148 रकबा 0.250 हेक्टे0, 149 रकबा 0.200 हेक्टे0, 150 रकबा 0.250 हेक्टे0, 151 रकबा 0.110 हेक्टे0, 152 रकबा 0.110 हेक्टे0 153 रकबा 0.100 हेक्टे0 154 रकबा 0.200 हेक्टे0, 155 रकबा 0.150 हेक्टे0, 158 रकबा 0.320 हेक्टे0, 159 रकबा 0.320 हेक्टे0, 160 रकबा 0.200 हेक्टे0, 161 रकबा 0.020 हेक्टे0, 162 रकबा 0.490 हेक्टे0, 163 रकबा 0.350 हेक्टे0, 218घ रकबा 0.820 हेक्टे0, 223क रकबा 0.300 हेक्टे0, 229ग रकबा 1.100 हेक्टे0, 231घ रकबा 1.380 हेक्टे0, 235क रकबा 1.420, 238ख रकबा 1.750 हेक्टे0 164ख 0.290 हेक्टे0, 164क रकबा 0.080 हेक्टे0, 164ङ रकबा 0.600 हेक्टे0, 164ग रकबा 1.660 हेक्टे0, 132 रकबा 0.210 हेक्टे0, 136 रकबा 0.280 हेक्टे0, व खाता संख्या 2 की गाटा संख्या–8क रकबा 0.160 हेक्टे0, 9ग रकबा 0.160 हेक्टे0, 10ग रकबा 0.370 हेक्टे0, 11ग रकबा 0.280 हेक्टे0, 12ग रकबा 0.200 हेक्टे0, 13ख रकबा 0.260 हेक्टे0, 14ख रकबा 0.010 हेक्टे0, 15ख रकबा 0.070 हेक्टे0, 17ग रकबा 0.460 हेक्टे0, 18ग रकबा 0.220 हेक्टे0, 19ग रकबा 0.190 हेक्टे0, 20ख रकबा 0.100 हेक्टे0, 21ग रकबा 0.080 हेक्टे0, 22क रकबा 0.220 हेक्टे0, 23ग रकबा 0.230 हेक्टे0, 24ख रकबा 0.050 हेक्टे0, 25ग रकबा 0.070 हेक्टे0, 26ग रकबा 0.350 हेक्टे0, 27ग रकबा 0.010 हेक्टे0, 28ग रकबा 0.410 हेक्टे0, 29ख रकबा 0.500 हेक्टे0, 34ग रकबा 0.070 हेक्टे0, 35ग रकबा 0.050 हेक्टे0, 36ग रकबा 0.100 हेक्टे0, 37ग रकबा 0.150 हेक्टे0, 41क रकबा 0.310 हेक्टे0, 42ग रकबा 0.230 हेक्टे0, 43ख रकबा 0.060 हेक्टे0, 46ग रकबा 0.200 हेक्टे0, 47क रकबा 0.120 हेक्टे0, 48ख रकबा 0.050 हेक्टे0, 49ख रकबा 0.220 हेक्टे0, 50ख रकबा 0.170 हेक्टे0, 51ख रकबा 0.150 हेक्टे0, 52ख रकबा 0.330 हेक्टे0, 54क रकबा 0.250 हेक्टे0, 55ख रकबा 0.480 हेक्टे0, 56क रकबा 0.150 हेक्टे0, 57ख रकबा 0.240 हेक्टे0, 58ग रकबा 0.150 हेक्टे0, 59ग रकबा 0.130 हेक्टे0, 72क रकबा 0.250 हेक्टे0, 156 रकबा 0.220 हेक्टे0, 157क रकबा 0.100 हेक्टे0, 169क रकबा 0.750 हेक्टे0, 171ग रकबा 0.040 हेक्टे0, 172ख रकबा 0.060 हेक्टे0, 173ख रकबा 0.410 हेक्टे0, 174ग रकबा 0.050 हेक्टे0, 175ग रकबा 0.110 हेक्टे0, 176घ रकबा 0.050 हेक्टे0, 177ख रकबा 0.200 हेक्टे0, 178ग रकबा 0.060 हेक्टे0, 179ग रकबा 0.040 हेक्टे0, 181ग रकबा 0.290 हेक्टे0, 184ग रकबा 0.470 हेक्टे0, 186ग रकबा 0.300 हेक्टे0, 187ग रकबा 0.340 हेक्टे0, 189ग रकबा 0.660 हेक्टे0, 190ग रकबा 0.220 हेक्टे0, 192ग रकबा 0.850 हेक्टे0, 194ग रकबा 0.150 हेक्टे0, 195घ रकबा 0.020 हेक्टे0, 196घ रकबा 0.040 हेक्टे0, 197ङ रकबा 0.600 हेक्टे0, 198ग रकबा 1.600 हेक्टे0, 199ग रकबा 0.700 हेक्टे0, 200ग रकबा 0.260 हेक्टे0, 201ग रकबा 0.080 हेक्टे0, 202ग रकबा 0.050 हेक्टे0, 203ग रकबा 0.100 हेक्टे0, 204ग रकबा 0.300 हेक्टे0, 205ग रकबा 0.110 हेक्टे0, 208ग रकबा 0.250 हेक्टे0, 209ग रकबा 0.550 हेक्टे0, 210ग रकबा 0.050 हेक्टे0, 211ग रकबा 0.020 हेक्टे0, 212ग रकबा 0.050 हेक्टे0, 213ग रकबा 0.250 हेक्टे0, 215घ रकबा 1.000 हेक्टे0, 216क रकबा 2.670 हेक्टे0, 218ख रकबा 1.470 हेक्टे0, 222ग रकबा 0.090 हेक्टे0, 223ख रकबा 0.490 हेक्टे0, 224ग रकबा 0.350 हेक्टे0, 226ग रकबा 0.300 हेक्टे0, 228ग रकबा 1.370 हेक्टे0, 230ङ रकबा 3.400 हेक्टे0, 235ख रकबा 2.640 हेक्टे0, 237क रकबा 0.440 हेक्टे0, 226क रकबा 0.210 हेक्टे0, खाता संख्या–3 की गाटा संख्या–8ख रकबा 0.380हेक्टे0, 9ख रकबा 0.290 हेक्टे0, 11ख रकबा 0.600हेक्टे0, 12क

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17ख रकबा 0.700हेक्टे0, 18ख रकबा 0.350हेक्टे0, 19ख रकबा 0.320हेक्टे0, 20ग रकबा 0.170हेक्टे0, 21ख रकबा 0.110हेक्टे0, 22ख रकबा 0.310हेक्टे0, 23क रकबा 0.590हेक्टे0, 24ग रकबा 0.070 हेक्टे0, 25ख रकबा 0.130हेक्टे0, 26ख रकबा 0.650हेक्टे0, 27ख रकबा 0.320हेक्टे0, 29ग रकबा 0.680हेक्टे0, 34ख रकबा 0.080हेक्टे0, 35ख रकबा 0.080हेक्टे0, 36ख रकबा 0.120हेक्टे0, 37ख रकबा 0.220हेक्टे0, 40क रकबा 0.200हेक्टे0, 42ख रकबा 0.260हेक्टे0, 43ग रकबा 0.040हेक्टे0, 46ख रकबा 0.400हेक्टे0, 49ग रकबा 0.150हेक्टे0, 50ग रकबा 0.160हेक्टे0, 51ग रकबा 0.180हेक्टे0, 52ग रकबा 0.260हेक्टे0, 54ख रकबा 0.120हेक्टे0, 55ग रकबा 0.800हेक्टे0, 56ख रकबा 0.270हेक्टे0, 57ख रकबा 0.520हेक्टे0, 58ख रकबा 0.240हेक्टे0, 59ख रकबा 0.250हेक्टे0, 64 रकबा 0.100हेक्टे0, 73 रकबा 0.100हेक्टे0, 95क रकबा 0.050हेक्टे0, 98ख रकबा 0.140हेक्टे0, 118क रकबा 0.410हेक्टे0, 119ख रकबा 0.120 हेक्टे0, 157ख रकबा 0.550हेक्टे0, 169ख रकबा 1.150हेक्टे0, 171ख रकबा 0.150हेक्टे0, रकबा 172ग रकबा 0.120हेक्टे0, 173ग रकबा 0.700हेक्टे0, 174ख रकबा 0.050हेक्टे0, 175ख रकबा 0.070 हेक्टे0, 176ख रकबा 0.030हेक्टे0, 178ख रकबा 0.200हेक्टे0, 184ख रकबा 0.060हेक्टे0, 186ख रकबा 0.500हेक्टे0, 187ख रकबा 0.570हेक्टे0, 188ख रकबा 0.950हेक्टे0, 189ख रकबा 0.920हेक्टे0, 190ख रकबा 0.250हेक्टे0, 192ख रकबा 1.370हेक्टे0, 194ख रकबा 0.220हेक्टे0, 195ख रकबा 0.050हेक्टे0, 196ख रकबा 0.050हेक्टे0, 197ख रकबा 0.360हेक्टे0, 198ख रकबा 2.450हेक्टे0, 199ख रकबा 1.200 हेक्टे0, 200ख रकबा 0.280हेक्टे0, 201ख रकबा 0.100हेक्टे0, 202ख रकबा 0.100हेक्टे0, 203ख रकबा 0.150हेक्टे0, 204ख रकबा 0.350हेक्टे0, 205ख रकबा 0.300हेक्टे0, 207ङ रकबा 0.020हेक्टे0, 209ख रकबा 1.250हेक्टे0, 212ख रकबा 0.090हेक्टे0, 214ख रकबा 0.400हेक्टे0, 215ख रकबा 2.000हेक्टे0, 216ग रकबा 1.470हेक्टे0, 217 रकबा 3.500हेक्टे0, 218क रकबा 2.500हेक्टे0, 222ख रकबा 0.150हेक्टे0, 223ग रकबा 0.480 हेक्टे0, 224ख रकबा 0.480हेक्टे0, 225ख रकबा 1.080हेक्टे0, 226च रकबा 0.050 हेक्टे0, 226ख रकबा 1.770हेक्टे0, 235ग रकबा 2.320हेक्टे0, 238ग रकबा 0.900हेक्टे0, 239क रकबा 1.900 हेक्टे0, खाता सं0–4, की आराजी नम्बर–7 रकबा 1.710हेक्टे0, 8ग रकबा 1.250हेक्टे0, 9क रकबा 1.040हेक्टे0, 10क रकबा 2.040हेक्टे0, 11क रकबा 2.390हेक्टे0, 12क रकबा 1.980हेक्टे0, 13क रकबा 1.580हेक्टे0, 14ख 0.090हेक्टे0, 15क 0.620हेक्टे0, 17क रकबा 1.400हेक्टे0, 18क रकबा 0.500हेक्टे0, 19क रकबा 1.440हेक्टे0, 20क रकबा 0.660हेक्टे0, 21क रकबा 0.600हेक्टे0, 22ग रकबा 1.050हेक्टे0, 24क रकबा 0.270हेक्टे0, 25क 0.660हेक्टे0, 26क रकबा 2.000हेक्टे0, 27क रकबा 0.390हेक्टे0, 28क 2.150हेक्टे0, 29क 0.250हेक्टे0, 33 रकबा 0.510हेक्टे0, 34क रकबा 0.030हेक्टे0, 35क 0.470हेक्टे0, 36क0.430हेक्टे0, 37क रकबा 0.800हेक्टे0, 40ख रकबा 0.050हेक्टे0, 41घ रकबा 2.370हेक्टे0, 42क रकबा 3.640हेक्टे0, 43ग रकबा 0.160हेक्टे0, 46क रकबा 0.580हेक्टे0, 48क रकबा 0.550हेक्टे0, 49क रकबा 0.330हेक्टे0, 50क रकबा 0.210हेक्टे0, 51क रकबा 0.610हेक्टे0, 52क रकबा 0.930हेक्टे0, 54ग रकबा 0.450हेक्टे0, 55क रकबा 1.530हेक्टे0, 57क रकबा 1.520हेक्टे0, 58क रकबा 0.970हेक्टे0, 59घ रकबा 0.070हेक्टे0, 61 रकबा 0.470हेक्टे0, 62 रकबा 0.500हेक्टे0, 63ख रकबा 0.450हेक्टे0, 65क रकबा 0.100हेक्टे0, 67क रकबा 1.390हेक्टे0, 85ख रकबा 0.150हेक्टे0, 95ख रकबा 0.140हेक्टे0,169ग रकबा 2.750हेक्टे0, 170क रकबा 0.230हेक्टे0, 171क रकबा 0.950हेक्टे0 172क रकबा 0.670हेक्टे0, 173ख रकबा 2.400हेक्टे0, 174क रकबा 0.270हेक्टे0, 175क रकबा 0.250हेक्टे0, 177घ रकबा 0.100हेक्टे0, 179क रकबा 1.390हेक्टे0, 181ख रकबा 0.820हेक्टे0, 182 रकबा 0.650हेक्टे0, 183 रकबा 0.020हेक्टे0, 184ग रकबा 1.710हेक्टे0, 186ख रकबा 1.780हेक्टे0, 187क रकबा 2.160हेक्टे0, 188ख रकबा 0.150हेक्टे0, 189क रकबा 2.750हेक्टे0, 190क रकबा 0.690हेक्टे0, 192क रकबा 3.160हेक्टे0, 194क रकबा 0.650हेक्टे0, 195क रकबा 0.150हेक्टे0, 197क रकबा 3.950हेक्टे0, 198क रकबा 7.060हेक्टे0, 199क रकबा 2.600हेक्टे0, 200क रकबा 1.000हेक्टे0, 201क रकबा 0.050हेक्टे0, 202ख रकबा 0.250हेक्टे0, 203ख रकबा 0.050हेक्टे0, 204क रकबा 1.100हेक्टे0, 205क रकबा 0.930हेक्टे0, 206क रकबा 1.200हेक्टे0, 207क रकबा 0.700हेक्टे0, 208 रकबा 2.950हेक्टे0, 209क रकबा 2.100हेक्टे0, 210क रकबा 0.250हेक्टे0, 212क रकबा 0.290हेक्टे0, 213क रकबा 0.830हेक्टे0, 214क रकबा 1.300हेक्टे0, 215क रकबा 6.900हेक्टे0, 218ग रकबा 0.360हेक्टे0, 220 रकबा 6.170हेक्टे0, 221 रकबा 4.170हेक्टे0, 222क रकबा 6.000हेक्टे0, 223घ रकबा 0.860हेक्टे0, 224क रकबा 1.350हेक्टे0, 225क रकबा 7.600हेक्टे0, 226घ रकबा 2.000हेक्टे0, 227क रकबा 1.300हेक्टे0, 228ग रकबा 6.110हेक्टे0, 235ग रकबा 8.060हेक्टे0, 237ख रकबा 4.560हेक्टे0, 238क रकबा 6.200हेक्टे0, 119ग रकबा 0.130हेक्टे0, 169 रकबा 0.400हेक्टे0, 195क रकबा 0.210हेक्टे0, 211क रकबा 0.120हेक्टे0, खाता संख्या–5 की आ0सं0–10ख–0.5200, 177क–0.4000, 205ख–0.3300हेक्टे0, खाता संख्या–6 की आ0सं0–41ख–0.160 हेक्टे0, 210ख–0.0800

200 हे0, खाता संख्या–9 की [illegible]

आ0नं0–67क रकबा 1.380हेक्टे0, 220 रकबा 6.170हेक्टे0, 216ग रकबा 0.360हे0, खाता संख्या–11 की आ0नं0 75 रकबा 0.900हेक्टे0, 76 रकबा 0.120हेक्टे0, 77 रकबा 0.100हेक्टे0, 78 रकबा 0.160हेक्टे0, 79 रकबा 0.250 हेक्टे0, 70 रकबा 0.670हेक्टे0, 80 रकबा 0.570हेक्टे0, 81 रकबा 0.080हेक्टे0, 82 रकबा 1.100हेक्टे0, 83 रकबा 3.220हेक्टे0, 84 रकबा 0.280हेक्टे0, 85क रकबा 0.250हेक्टे0, 86 रकबा 0.900हेक्टे0, 87 रकबा 0.300हेक्टे0, 88 रकबा 0.900हेक्टे0, 89 रकबा 0.650हेक्टे0, 90 रकबा 0.120हेक्टे0, 91ख रकबा 1.240हेक्टे0, 92 रकबा 3.260हेक्टे0, 93 रकबा 0.040हेक्टे0, 94 रकबा 0.520हेक्टे0, 96क रकबा 0.360हेक्टे0, 97 रकबा 0.350हेक्टे0, 98 रकबा 0.210हेक्टे0, 99 रकबा 0.070हेक्टे0, 100 रकबा 0.090हेक्टे0, 102 रकबा 0.150 हेक्टे0, 103 रकबा 0.110 हेक्टे0, 104 रकबा 0.100हेक्टे0, 105 रकबा 0.100हेक्टे0,106 रकबा 0.110हेक्टे0, 107 रकबा 0.040हेक्टे0, 108 रकबा 0.060हेक्टे0, 109 रकबा 0.050 हेक्टे0, 110 रकबा 0.050हेक्टे0, 111 रकबा 0.060हेक्टे0, 112 रकबा 0.100हेक्टे0, 113 रकबा 0.170हेक्टे0, 114 रकबा 0.180 हेक्टे0, 115 रकबा 0.130हेक्टे0, 116 रकबा 0.200 हेक्टे0, 117क रकबा 0.470हेक्टे0, 119क रकबा 0.300हेक्टे0, 121 रकबा 0.320 हेक्टे0, 123 रकबा 0.120 हेक्टे0, 165ग रकबा 0.020 हेक्टे0, 186 रकबा 0.770हेक्टे0, 222ङ रकबा 0.600हेक्टे0, 191 रकबा 1.420हेक्टे0, खाता सं0–12–आ0नं0–16क रकबा 0.250हे0, 43क रकबा 0.450हे0, 191 रकबा 1.890हे0, 216छ रकबा 0.380हे0, 222ख रकबा 0.260हे0, खाता सं0–13 की आ0 नं0–16ख रकबा 0.280, 43ख रकबा 0.450, 60 रकबा 1.780, 216घ रकबा 0.380, 222ठ रकबा 0.260हेक्टे0 खाता संख्या–15 की आ0नं0–196घ रकबा 1.010हेक्टे0, खाता सं0–16 आ0नं0–231ख रकबा 1.200 हेक्टे0, खाता सं0–19 आ0नं0–56घ रकबा 0.770हेक्टे0, खाता सं0–22 की आराजी नं0 65ख रकबा 0.450, 225ग रकबा 0.200हेक्टे0, खाता सं0–24 आ0नं0–184ख रकबा 0.540हे0, 185 रकबा 0.220हे0, 186घ रकबा 0.500हेक्टे0, खाता सं0–25 की आ0 नं0–66 रकबा 0.450 व आ0नं0–69 रकबा 0.900हेक्टे0, खाता सं0–26 की आ0नं0–3घ रकबा 0.330हे0, 10घ रकबा 0.570हे0, 14क रकबा 0.300हे0, 15घ रकबा 0.120हेक्टे0, खाता सं0–30 की आ0नं0–52घ रकबा 0.260हे0, 54घ रकबा 0.330हे0, 55ङ रकबा 0.370हे0, 57ङ रकबा 0.070हे0, 59घ रकबा 0.290हेक्टे0, खाता सं0–33 की आ0नं0–43छ रकबा 0.070हे0, 67ख रकबा 1.170हे0, 225छ रकबा 0.200हेक्टे0, खाता सं0–35 की आ0नं0–231क रकबा 1.220हेक्टे0, खाता सं0–36 की आ0नं0–67ग रकबा 0.200हे0, 69 रकबा 0.920हेक्टे0, खाता सं0–38 की आ0नं0–204घ रकबा 0.350हे0, 206घ रकबा 0.360हे0, खाता सं0–39 की आ0नं0–196ङ रकबा 1.3100हेक्टे0, खाता सं0–40 की आ0नं0–8ङ रकबा 0.190हे0, 12ङ रकबा 0.450हे0, 13घ रकबा 0.210हे0, 23ख रकबा 0.100हेक्टे0, खाता सं0–41 की आ0नं0–170ख रकबा 0.170, 172घ रकबा 0.140, 197ज रकबा 0.100, 201घ रकबा 0.120, 226ङ रकबा 0.460हेक्टे0, खाता सं0–42 की आ0नं0–189च रकबा 1.030, 197ग रकबा 0.250 हेक्टे0, खाता सं0–43 की आ0नं0–186च रकबा 0.180, 197च रकबा 0.680हे0, 199च रकबा 0.400हेक्टे0, खाता सं0–48 की आराजी नं0–39 रकबा 0.260हेक्टे0, आ0नं0–71 रकबा 1.100हेक्टे0, खाता सं0–49 की आराजी नं0–23ज रकबा 0.240, 36च रकबा 0.1500, 37ङ रकबा 0.230, 178ख रकबा 0.2400, 216ङ रकबा 0.1200, 233द रकबा 0.2500हेक्टे0, खाता सं0–51 की आ0नं0–59क रकबा 0.820हेक्टे0, खाता सं0–52 की आ0नं0–37ग रकबा 0.300, 165क रकबा 0.140, 191घ रकबा 0.420 हेक्टे0, खाता सं–83 की आराजी नं0–173क रकबा 1.700 हेक्टे0, 222ज रकबा 1.350हेक्टे0, कुल क्षेत्रफल–319.342 हेक्टे0 कुल क्षेत्रफल–319.342 हे0 भूमि पर अंकित खातेदार वेलस्पन एनर्जी यूपी प्राइवेट लिमिटेड पंजीकृत कार्यालय, वेलस्पन हाउस सातवीं मंजिल, कमला सिटी, सेनापति बापट मार्ग, लोवर परेल मुम्बई की भूमि कृषि, उद्यानकरण, पशुपालन, जिसके मत्स्य सम्वर्धन, कुक्कुट पालन और सामाजिक वानिकी भी है से भिन्न प्रयोजन अर्थात औद्योगिक प्रयोजन के रूप में प्रयुक्त होने के कारण उक्त भूखण्ड ज0वि0अधि0 की धारा 143 के अन्तर्गत प्राख्यापित कर भू0–राजस्व से मुक्त किया जाता है। आदेश की एक प्रति उप निबन्धक सदर को धारा 145 सपठित नियमावली 137 ज0वि0अधि0के तहत निःशुल्क निबन्धन हेतु भेजा जाये। तदनुसार परवाना अमलदरामद जारी हो। बाद आवश्यक कार्यवाही पत्रावली अभिलेखागार में संचित हो।

(डी0एस0 पाण्डेय)
उप जिलाधिकारी सदर

सत्य प्रतिलिपि

पेशकार
उप जिलाधिकारी सदर

नकलकर्ता.......
मुकाबलाकर्ता.......
नकल सम्बन्ध....... 7-8-10

Mirzapur Thermal Project (Welspun Energy U.P. Pvt. Ltd.)

Details of all pending litigation in District & Revenue Courts

S.N.	Court Name	Case No./Year	Plaintiff	Defendant	Date of filing	Last Date of hearing	Current Status	Next Date of Hearing	Disputed Area in Acre	Advocate of the Company	Advocate of the other Party	Legal Team View
Court Case in the court of SDM. Sadar-Mirzapur-												
1	ASDM Court, Mirzapur	D-2015165300154/2015	Ramashankar Etc.	Govt. of U.P. U/S-33/39 UP L.R. Act.	23.06.2014	**04.03.2024**	**For hearing on the re-report of Tehsildar Sadar.**	**27.03.2024**	0.322 Acre	Mr.Kripashankar Mishra Advocate.	Mr. Kamala Prasad Srivastava Advocate/	It a good case in our favour and there is likelihood of a favorable judgment
2	SDM Court, Mirzapur	D-20151653001669/2015, U/s.-161 UPZA & LR. Act.	State	WEUPPL	06.07.2017	**01/03/2024.**	For Hearing on restoration application of Welspun./ Name change application of MTEUPPL	**15/03/2024.**	5.140 Acre	Mr.Kripashankar Mishra Advocate of the Company	Mr.Amarnath Yadav, A.D.G.C.Revenu	It a good case in our favour and there is likelihood of a favorable judgment
3	Tehsildar Court, Mirzapur	790/2012 / T201916530106369 /2019 , U/s.-34 / 35 UP Revenue code bill 2006.	Welspun energy UP Pvt. Ltd.	Ll ji lal	15.11.2019	**01.03.2024.**	For Hearing	**13.03.2024.**	12.50 Acre	Mr.Kripashankar Mishra Advocate of the Company	Mr. Vidya Shankar Tiwari Advocate.	It a good case in our favour and there is likelihood of a favorable judgment
4	Tehsildar Court, Mirzapur	Mutation Case No-285/2022.	Mirzapur Thermal Energy UP Pvt.Ltd.	Welspun Energy UP. Pvt. Ltd.	10.05.2022	**16.02.2024**	For Hearing	**18.03.2024**		Mr.Kripashankar Mishra/ Vinay Dubey Advocate of the Company		It a good case in our favour and there is likelihood of a favorable judgment
Court Case in the court of Civil Judge(J.D.)Mirzapur-												
1	Civil Judge Junior Division, Mirzapur	174/2015 Original Suit 174/2015	1-Ramashankar 2-kripa shankar, 3-sharan shankar, 4-jitendra bahadur s/o Haridwar singh Etc.	Welspun Energy UP. Pvt. Ltd.	19.02.2015	**28.01.2024**	**For hearing on name change application of company.**	**10.04.2024**	65.382 Acre	Mr. Kripashankar Mishra Advocate	1-Mr.Ram Suresh Singh, 2-Mr. Bhola Singh Advocate,	It a good case in our favour and there is likelihood of a favorable judgment
2	Civil Judge Junior Division , Mirzapur	569 / 2021 Civil Suit 701/2021	1- Sushama Singh, 2-Mamata 3- Indu 4-Shanti Devi.	Govt.of UP & 14 others.	05.08.2021	**05.12.2023**	**To make issues in this case.**	**06.03.2024**	49.943 Acre.	Mr. K.S. Mishra. Advocate.	Kamala Prasad Shrivastava, Advocate.	
3	Civil Judge Junior Division , Mirzapur	570 / 2021 Civil Suit 699/2021	Vikash Bahadur Singh.	Govt. of UP & 3 Others.	05.08.2021	**05.12.2023**	**To make issues in this case.**	**06.03.2024**	19.375 Acre.	Mr. K.S. Mishra. Advocate.	Kamala Prasad Shrivastava, Advocate.	
4	Civil Judge Junior Division , Mirzapur	571 / 2021 Civil Suit 695/2021	Praksh Bahadur Singh.	Govt. of UP & 3 Others.	05.08.2021	**05.12.2023**	**To make issues in this case.**	**06.03.2024**	4.623 Acre.	Mr. K.S. Mishra. Advocate.	Kamala Prasad Shrivastava, Advocate.	
Court Case in the court of C.J.M.-Mirzapur-												

1	C.J.M.-Mirzapur	2982/2012	State (Kuku Tacker Authorized Signatory WEUPPL)	1-Chandrabali	F.I.R. dated 26.04.2012	**08.01.2024**	**For framing of charge / Recall of N.B.W..**	**25.03.2024**	Criminal Case	Mr. Kripashankar Mishra Advocate	Mr. Kripashankar Pandey, Advocate	
2	ACJ.. Court, Mirzapur CJ ./ FTC Court, Mirzapur	Case No. 971/2019 Crime No.246/2017, U/s.147,323,504,506,392,452, I.P.C. Police Station-Marihan, District-Mirzapur.	State	1-Ramaghya Singh 2-Devoditya Sinha 3-Shivkumar Upadhyay, 4-Sanjay Upadhyay 5-Mulchand 6-Narendra Singh	F.I.R. dated 20.06.2017	**30.01.2024**	**For Bail & framing of charge.**	**02.04.2024**	Criminal Case	Mr. Kripashankar Mishra Advocate		
High Court of Allahabad												
1	High Court Allahabad	Cr.Misc.Application-34569/2012 Under Section-482 Cr.P.C.	Ramawadh Singh	1-State Of UP 2-Sri Kuku Tacker S/o Amarnath Tacker, Resident of C-303 Indralok Lokhandwala, Police Station-Barsowa, Andheri West-Mumbai-53 at present resident-Room No-26, Glaixi Hotel, laldiggi Road, Police Station-Katra Kotwali, District-Mirzapur.	21.01.2015	1/11/2015	**For hearing / filling coutner affidavit**	Case is not on list	Criminal Case	Mr.Shikandr B Kochar, Adovcate	Mr. Yeshpall Singh, Advocate	
2	High Court Allahabad	Writ - C / 67835 / 2014	Narendra Kumar	**State of U.P. and 5 Others.**	11.12.2014	19-03-2018	For Argument	Case is not on list	789.13	Mr. Prashant Tripathi ADV.	Mr. Anand Kumar Singh	It a good case in our favour and there is likelihood of a favorable judgment
3	High Court Allahabad	Writ - C /30516/ 2015	Kuldeep Singh, Bindoo Singh	State of U.P. and 10 Others (In this pittionWEUPPL is respodent no.11 and Sri KuKu Tacker is respondent no.10)	20.05.2015	**16.12.2023**	For Argument	**Next listing date is not updated yet.**	Nil	Mr. Prashant Tripathi ADV.	Mr. Anand Kumar Singh	It a good case in our favour and there is likelihood of a favorable judgment
4	High Court Allahabad	Writ - C /35072/ 2021	1-Ram awadh singh 2- Girija Devi	State of UP & 2 Others.	20-12-2021	**3/8/2022**	For Argument	Not listed	9.263 acre	Mr.Rakesh Tiwari	MR . Mithilesh Kr. Srivastava	

Mirzapur Thermal Project (Welspun Energy U.P. Pvt. Ltd.)

Details of all pending SC Land litigation U / S 157 AA UP ZA. And L.R. Act. in Revenue Courts

S.N.	Court Name	Case No./ Year	Plaintiff	Defendant	Date of filing	Last Date of Hearing	Current Status	Next Date of Hearing	Disputed Area in Acre	Advocate of the Company	Advocate of the other Party	Legal Team View
1	**Commissioner Court- Mzp.**	**AppealN0- / 2023 (DM Court Case No.D2015165300727 / 2015)**	**Mirzapur Thermal Energy UP Pvt. Ltd.**	**1-State of UP 2- DM Mirzapur.**	**22.07.2023**	**15.02.2024**	**For hearing**	**28.03.2024**	3.138 Acre	Mr. Kripashankar Mishra Advocate	DGC Revenu	
2	**Commissioner Court- Mzp.**	**AppealN0- / 2023 (DM Court Case No.D2015165300726 / 2015)**	**Mirzapur Thermal Energy UP Pvt. Ltd.**	**1-State of UP 2- DM Mirzapur.**	**22.07.2023**	**15.02.2024**	**For hearing**	**28.03.2024**	9.340 Acre	Mr. Kripashankar Mishra Advocate	DGC Revenu	