Executive Summary

1. INTRODUCTION

M/s Ozone Steel & Power Limited has proposed to set up of a super critical Coal Based Thermal Power Project of 1X350 MW Capacity. The project is located at Village, Parsada & Bhadora, Tehsil Masturi Bilaspur, District Chhattisgarh.

The proposed project will be a base load station comprising of one Coal Fired Boiler and its Auxiliaries, one Steam Turbine & its Auxiliaries and one electric Generator and auxiliaries.

2. PROJECT DESCRIPTION

The summary of the proposed project is as follows:

Project Highlights

Location		Village, Parsada & Bhadora ,Tehsil Masturi Bilaspur District, Chattisgarh
Capacity		1X 350 MW
Technology		Supercritical
Type of Boiler		P C Fired Boiler using 100 % indigenous coal
Type of turbine		Tandem Compound Reheat Condensing type.
Steam condition at BMCR	**a**. Main flow at super –heater outlet	1100 T/Hr.
	b. pressure at super –heater outlet	259.8 kg/cm^2 (a)
	c. Out let steam temperature	565 + °C
	d. Feed water temp. At economizer inlet	280 + °C
Cooling Type		Re-circulating type cooling system
Land requirement & Type		350 acres of land - including Ash dyke Area

Water requirement & Source	About 10 Million m^3/year from Lilaghar or Arpa River
Fuel	About 1.9 MTPA coal (including 1% handling losses)
R&R Issue	No R & R issues involved
Estimated Project Cost	Rs. 20868.72 million

Fuel Requirement

Type & Amount of Fuel Requirement and Fuel Analysis:

Main Fuel: The main fuel will be Coal for the proposed power project which will be 100% indigenous. The steam generator would be designed primarily for coal firing. The amount of Indigenous coal to be required is 1.9 MTPA.

Secondary Fuel: The secondary fuel would be LDO/HFO conforming to IS: 1460 for Boiler start-up and flame stabilization

Source & Transportation

The coal required will be 100% indigenous and long term Coal Linkage likely to be allotted from:

1) Hasdeo-Arand (Korba)

2) Mand-Raigarh mines of SECL in Chhattisgarh State.

Water Requirement, Source & Transportation

The total raw water consumption is estimated to be 10 Million Cubic Meter per annum or 1225 Cubic Meter per hour for the proposed power project. The total water requirement has been summarized in the following **Table I**.

Table I : Water Requirement for Proposed 1x350 MW Power Units

S.No.	Description	Quantity (m^3/hr)
1	Ash handling	110
2	Cooling towers	920
3	DM water	30

4	Drinking water (colony + plant)	12
5	Coal handling	10
6	Plant general cleaning & washing	10
7	Green belt	50
8	Others	83
Total		**1225**

Land Requirement

The details of land break-up for all the sectors are given is given below in **Table II**

Table II: Land Break-up for the proposed project

S.No.	**Description**	**Area in Acres**
1.	Power Plant along with Buildings	70
2.	Coal Storage & conveyor	15
3.	400 kV Switchyard	15
4.	Green Belt Development	120
5.	Raw Water Reservoir	40
6.	Emergency Ash Pond	70
7	Residential Colony etc.	20
	TOTAL	**350 Acres**

Manpower Requirement

The total manpower requirement of the proposed plant during operation phase will be 220.

Project Cost Estimation

Capital cost break-up for 1x350 MW proposed plant is given below in **Table III**.

Table III: Capital Cost Break-up

Sl.No.	**Description**	**Amount (Rs. Million INR)**
1.	Land and Site Development	514.5
2.	Plant and Equipment	13127.5
	Steam Generator Island	
	Turbine Generator Island	
	Balance of Plant – Mechanical/Electrical	
3.	Infrastructure Development cost	1095
4.	Civil Works	1926.6
5.	Preliminary & Pre-Operative expenses on investigation, fees & survey work	468.00
6.	Contingency	820
7.	Working Capital Margin	445.72
8.	IDC	2471.4
	Total Capital Cost	**20868.72**

Technology & Process Description

Supercritical Technology

“Supercritical” is a thermodynamic expression describing the state of substance where there is no clear distinction between the liquid & the gaseous phase (i.e. they are homogenous fluid).

Basic Concept: To increase the efficiency of steam power plants, the basic method is to improve the thermal efficiency by increasing the operating pressure.

At normal atmospheric pressure when water is heated, it goes through following three phases.

- When water is heated, the temperature of water increases till it reaches 100°C. This is the Sensible Heat addition.
- Further heating does not increase the temperature; instead small bubbles of steam start to form. The temperature remains constant at 100°C till all the

water becomes steam. The water absorbs the heat without temperature change for conversion to steam. At atmospheric pressure the Latent Heat of vaporization is 2256 kJ/kg.

- Further heating called superheating will increase the temperature of the steam.

When the pressure is increased:

- The boiling temperature increases and the latent heat of vaporization decreases.
- A further increase in pressure and temperature leads to a point at which the latent heat of vaporization is zero, or there is no boiling. Water directly becomes steam. This is the Critical Pressure and the Critical Temperature.

The Supercritical Thermal Power Plants operate at pressures higher than the critical pressure.

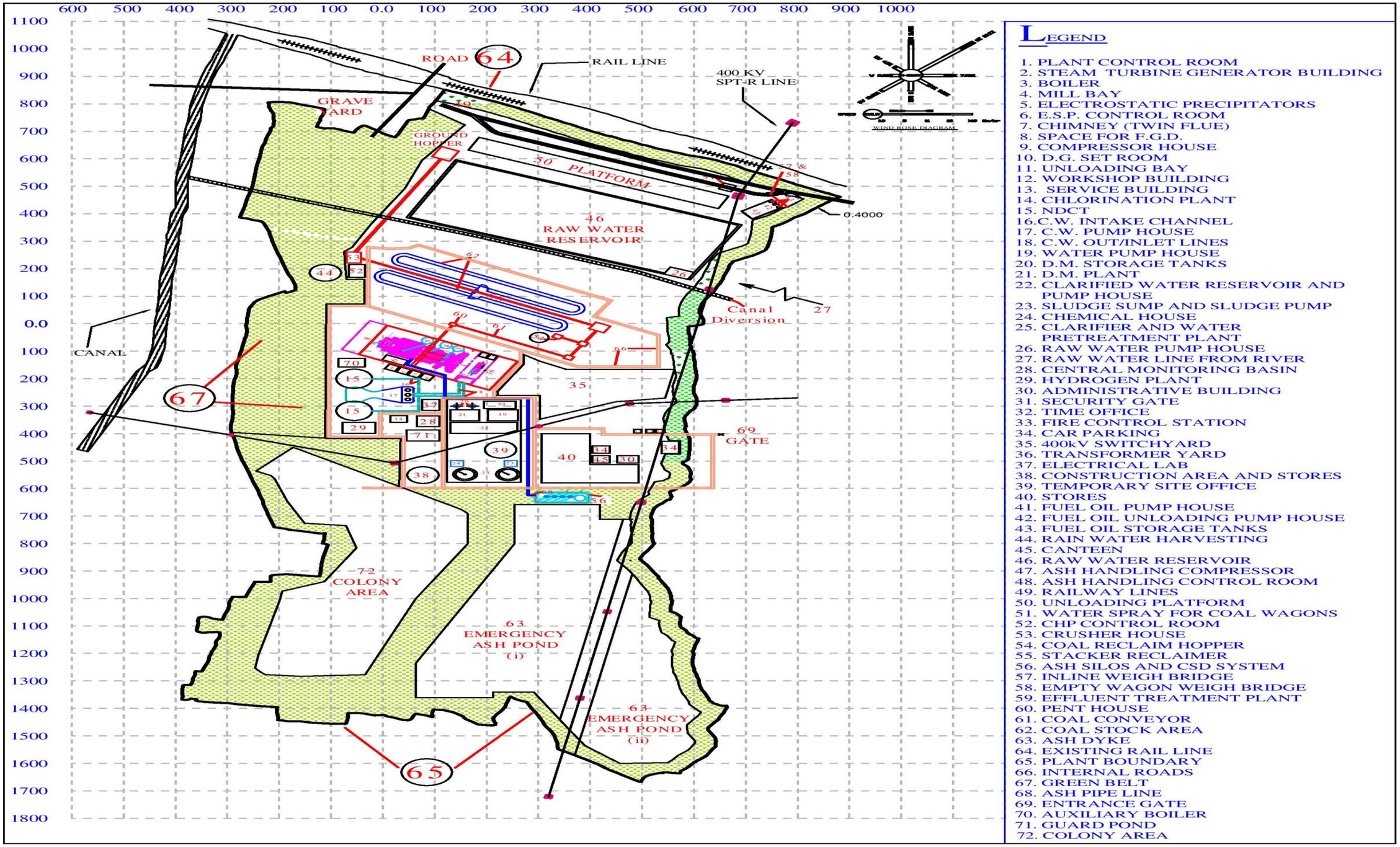
Supercritical Power Plant: A supercritical power plant is much more efficient than a subcritical plant, producing more power from less coal and with lower emissions. It operates at a very high temperature & pressure resulting in higher efficiencies. The "efficiency" of the thermodynamic process of a coal-fired power describes how much of the energy that is fed into the cycle is converted into electrical energy. The greater the output of electrical energy for a given amount of energy input, the higher the efficiency. This will significantly increase the kWh produced per kg. of coal burned, with fewer emissions. In addition to using less coal, lower emission levels for supercritical plants are achieved using well-proven emissions control technologies.

Advantage of Supercritical Power Plant: The main advantages of the Supercritical Power Plant include:

- Reduction in fuel cost due to improved plant efficiency.
- Reduction in Coal consumption.
- Excellent availability, comparable with that of an existing sub-critical plant.
- Plant costs comparable with sub-critical technology and less than other clean coal technologies.
- Much reduced NO_X, SO_2 and particulate emissions.

- Can be fully integrated with appropriate CO_2 capture technology.
- In summary, modernizing old plants with such highly efficient plants with best available pollution control technology will reduce existing pollution levels by burning less coal per megawatt-hour produced, reducing the emissions of vast majority of the pollutants, while allowing additional capacity to be added in a timely manner.

Layout of the plant, the process flow diagram and the water balance diagram is given in Fig. 1 to 3.



LEGEND

1. PLANT CONTROL ROOM
2. STEAM TURBINE GENERATOR BUILDING
3. BOILER
4. MILL BAY
5. ELECTROSTATIC PRECIPITATORS
6. E.S.P. CONTROL ROOM
7. CHIMNEY (TWIN FLUE)
8. SPACE FOR F.G.D.
9. COMPRESSOR HOUSE
10. D.G. SET ROOM
11. UNLOADING BAY
12. WORKSHOP BUILDING
13. SERVICE BUILDING
14. CHLORINATION PLANT
15. NDCT
16. C.W. INTAKE CHANNEL
17. C.W. PUMP HOUSE
18. C.W. OUT/INLET LINES
19. WATER PUMP HOUSE
20. D.M. STORAGE TANKS
21. D.M. PLANT
22. CLARIFIED WATER RESERVOIR AND PUMP HOUSE
23. SLUDGE SUMP AND SLUDGE PUMP
24. CHEMICAL HOUSE
25. CLARIFIER AND WATER PRETREATMENT PLANT
26. RAW WATER PUMP HOUSE
27. RAW WATER LINE FROM RIVER
28. CENTRAL MONITORING BASIN
29. HYDROGEN PLANT
30. ADMINISTRATIVE BUILDING
31. SECURITY GATE
32. TIME OFFICE
33. FIRE CONTROL STATION
34. CAR PARKING
35. 400kV SWITCHYARD
36. TRANSFORMER YARD
37. ELECTRICAL LAB
38. CONSTRUCTION AREA AND STORES
39. TEMPORARY SITE OFFICE
40. STORES
41. FUEL OIL PUMP HOUSE
42. FUEL OIL UNLOADING PUMP HOUSE
43. FUEL OIL STORAGE TANKS
44. RAIN WATER HARVESTING
45. CANTEEN
46. RAW WATER RESERVOIR
47. ASH HANDLING COMPRESSOR
48. ASH HANDLING CONTROL ROOM
49. RAILWAY LINES
50. UNLOADING PLATFORM
51. WATER SPRAY FOR COAL WAGONS
52. CHP CONTROL ROOM
53. CRUSHER HOUSE
54. COAL RECLAIM HOPPER
55. STACKER RECLAIMER
56. ASH SILOS AND CSD SYSTEM
57. INLINE WEIGH BRIDGE
58. EMPTY WAGON WEIGH BRIDGE
59. EFFLUENT TREATMENT PLANT
60. PENT HOUSE
61. COAL CONVEYOR
62. COAL STOCK AREA
63. ASH DYKE
64. EXISTING RAIL LINE
65. PLANT BOUNDARY
66. INTERNAL ROADS
67. GREEN BELT
68. ASH PIPE LINE
69. ENTRANCE GATE
70. AUXILIARY BOILER
71. GUARD POND
72. COLONY AREA

Fig-1 Plant Layout Plan

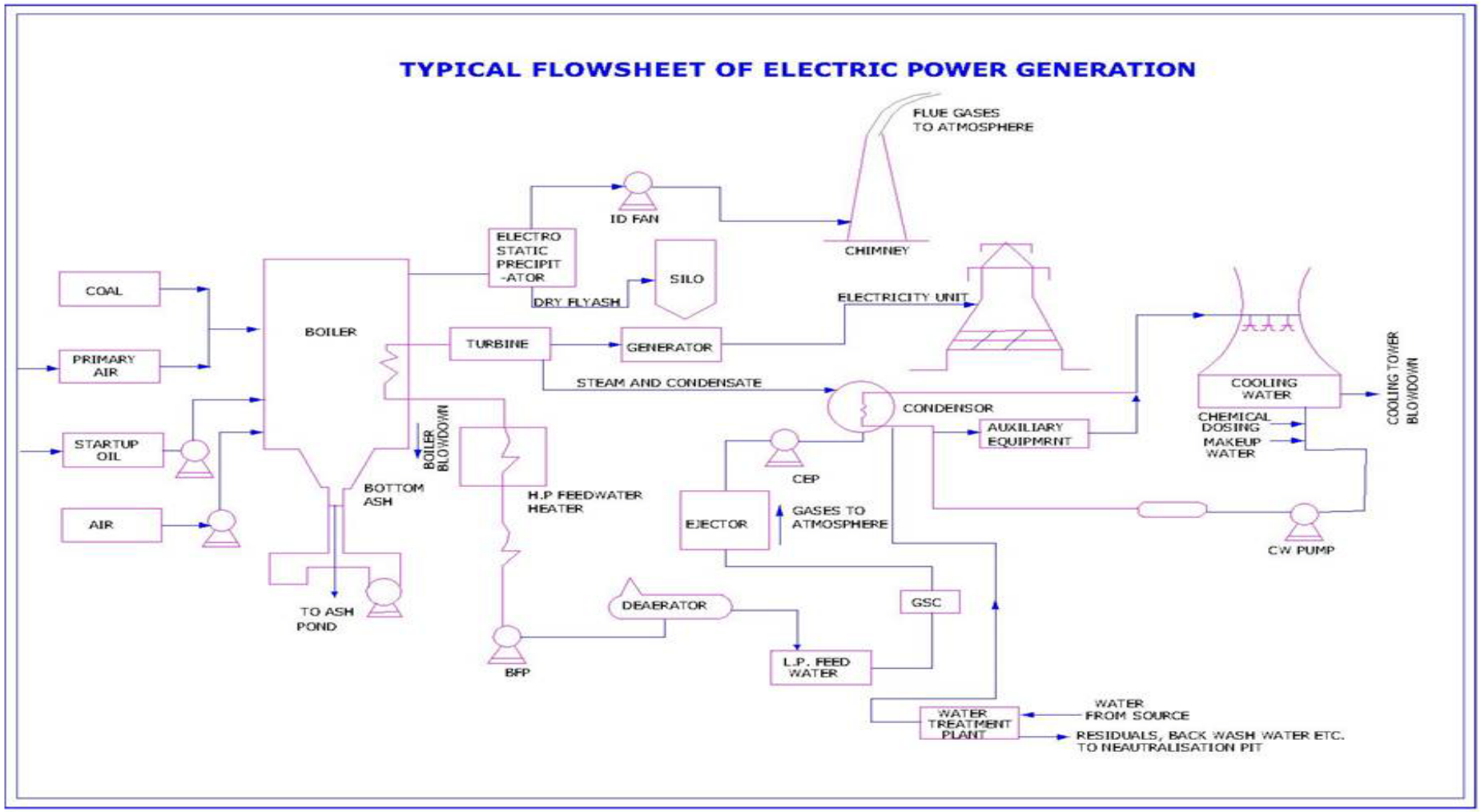
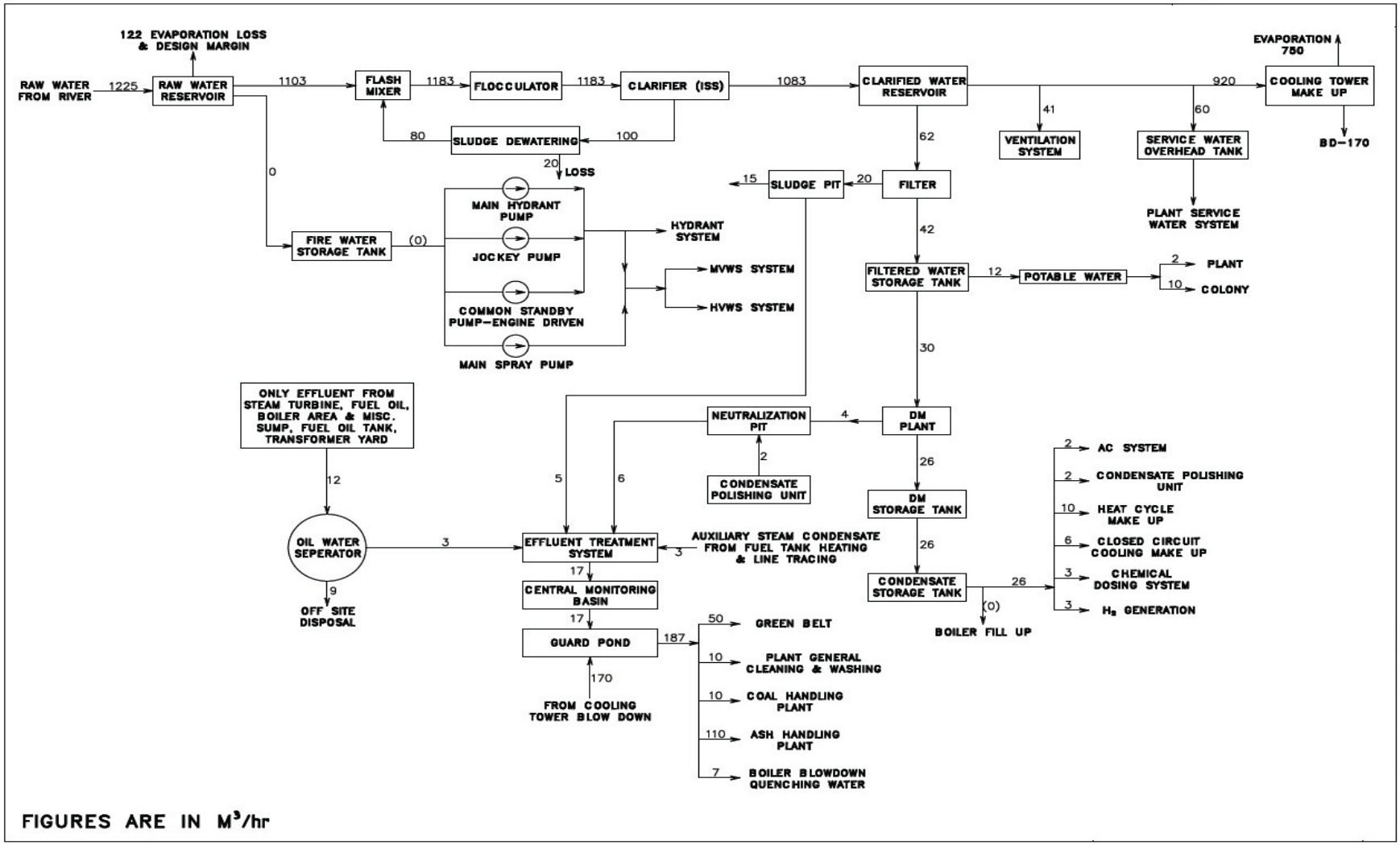


Fig-2: **Flow process Diagram**

Fig. 3: Water Balance Diagram



3. DESCRIPTION OF THE ENVIRONMENT

Study area

The study area includes 10 km radius around the project site proposed near, Parsada & Bhadora Village,Tehsil Masturi Bilaspur District, Chattisgarh .

The study area of 10km radius is covered in Survey of India toposheet no. 64 J/4.

The baseline environment quality represents the background environmental scenario of various environmental components such as air, water, noise, land, and socio economic status of the study area. The sources of emission in the study area are the vehicular traffic, agricultural fields and unpaved roads.

Study period

The baseline environmental quality represents the background scenario of various environmental components in the study area.

As part of Environmental Impact Assessment study, baseline environmental monitoring was carried out for three months December 2011-January 2012 February 2012

Methodology of EIA Study

The main objectives of characterization are:-

- To assess the existing baseline status of air, water, noise, land and socio-economic environments around 10 km radius of the project site (buffer zone).
- To identify and quantify significant impacts due to operations of the proposed power plant on various environmental components through prediction of impacts.
- To evaluate the beneficial and adverse impacts of the proposed power plant.
- To prepare an Environmental Management Plan (EMP) detailing control technologies and measures to be adopted for mitigation of adverse impacts if any, as a consequences of the proposed power plant.
- To prepare a Post Project Monitoring Programme for checking and regulating the environmental quality of the power plant and help in sustainable development of the area.

Collection of Baseline Data

Baseline Environment

In order to get an idea about the existing state of the environment, various environmental attributes such as meteorology, air quality, water quality, soil quality, noise level, ecology and socio-economic environment are being studied /monitored. The present report covers baseline environmental data generated during December 2011-February 2012 for meteorology, air quality, water quality, noise levels and soil characteristics. Sampling and analysis has been carried out by Training and Analytical Laboratory, a unit of GRC India, a recognised environmental laboratory as per Environment (Protection) Act, 1986 and recognised by MoEF.

The scope of the study includes preparation of Environmental Impact Assessment with detailed characterization of various environmental components such as air, noise, water, land and socio economic within the study area as per the latest guidelines of MOEF during the month of Dec. 11 to Feb. 12..

(A) Micro Meteorology

An auto weather monitoring station to record meteorological parameters was installed at Masturi village. Wind speed, Wind direction, maximum and minimum temperatures, relative humidity, cloud cover was recorded on hourly basis continuously during Dec. 11 to Feb. 12.

Wind speed & Wind direction data recorded during the study period were used for computation of relative percentage frequencies of different wind directions. The meteorological data thus collected has been used for interpretation of the existing Ambient Air Quality status, and the same data has been used for prediction of impacts of future scenario due to the activities of the proposed power plant.

(B) Ambient Air Quality

The scenario of the existing ambient air quality in the study region has been assessed through a network of 8 numbers of stations within 10 km radius around the project site. The monitoring network was so designed such that representative samples are obtained

from the upwind direction, down wind and cross wind directions of the project site. These monitoring sites have been established keeping in view the available climatological data of predominant wind direction and wind speed of this particular region. The following points were also taken into consideration in designing the network of sampling stations:

- Topography/ Terrain of the study area
- Populated areas within the study area
- Residential and sensitive areas within the study area.
- Proposed Power Plant

The existing Ambient Air quality status (AAQ) has been monitored for PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO. PM_{10} and $PM_{2.5}$ at each station has been monitored on 24 hourly basis. All gaseous sampling has been done on 24 hourly basis except CO which was monitored on 1 hourly basis.

Recalibrated Respirable dust samplers have been used for monitoring of the existing AAQ status. Methodologies adopted for sampling and analysis were, as per the approved methods of Central Pollution Control Board (CPCB). Maximum, minimum, average and percentile values have been computed from the raw data collected at all individual sampling stations to represent the ambient air quality status of the study area .The monitoring was carried for 3 months.

(C) Noise Environment

Noise monitoring has been carried out at 9 locations to identify the impact due to the existing sources on the surrounding in the study area. Noise levels were recorded at an interval of 30 minutes during the day and night times to compute the day equivalent level.

(D) Water Environment

9 surface water samples and 8 ground water samples from various locations around the project site within 10 km radius were collected for assessment of the existing physico-chemical and bacteriological quality. Methodologies adopted for sampling and analysis were according to the IS methods. Field parameters such as pH, Temperature were monitored on site. The surface parameters thus analyzed were compared with CPCB

surface water criteria and ground water samples as per IS:10500. The activities surrounding the source during sampling were taken into consideration in interpretation of the water quality of that particular source.

(E) Land Environment

Field surveys were conducted to identify the land use in and around 10 km radius of the project area. Representative soil samples were collected from 8 sampling locations within an area of 10 km radius around the proposed project site for analysis of the physico-chemical characteristics to assess the cropping pattern, microbial growth etc. Standard procedures were followed for sampling and analysis. Information on flora and fauna has been collected in the study area during the study period within 10 km radius.

(F) Socioeconomic Environment

Details on economic status of various villages within an area of 10 km around the project site have been collected.

All the above environmental parameters have been used for identification, evaluation and prediction of significant impacts.

(G) Prediction of Impacts, Environmental Management Plan & Disaster management Plan

Various technical aspects of the plant have been studied to identify the significant impacts, which would arise from proposed power plant. The identified impacts have been quantified through prediction of impacts to estimate the post project scenario by using ISCST 3 multi point model.

Identified impacts of the plant have been studied in detail to predict the impacts on various environmental components. Standard techniques and methodologies have been adopted to predict impacts on various environmental components. Predicted scenario has been superimposed over the baseline (pre project) status of environmental quality to drive the ultimate (post project) scenario of environmental conditions.

Environmental management Plan (EMP) of the proposed power plant details the control measure which are proposed to be undertaken by Proponent to maintain environmental quality within the stipulated limits specified by State Pollution Control Board/ CPCB/MOEF.

4. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The methodology adopted for the assessment of potential impacts consists of identification and prediction of sources of pollution within the study area. The main objectives of predicting the effects of project activities are delineation of an appropriate mitigation plan for minimizing the anticipated effects on environment. The methodology adopted for the prediction is based on mathematical modeling in case of air quality. Mathematical models attempt to quantitatively describe the cause-and-effect relationship between pollution source and the environment. The predicted results are superimposed over pre-project baseline data for arriving at the values of anticipated effects. A combination of quantitative/ qualitative techniques and professional judgment is employed on the basis of merits of proposed scheme.

The construction and operation phase of the proposed project comprises various activities each of which have been considered to assess the impact on one or another environmental components.

Impacts arising out of the proposed 1X350 MW green field project is made to assess the increase the level of impact on air quality, water requirement and ash generation. The baseline data collected from the project region and the review of the available information indicate that the air and water quality parameters are within the acceptable limits. Despite various initial impacts on the environment, the benefits due to this project outweigh such initial adverse impacts since the project would prove extremely beneficial for the State and the people living in the project region.

Impact Identification

The possible environmental attributes that may be affected by industrial activities are Air, Water, Noise, Soil / land, Ecology, Socio-economic & Infrastructure. Impacts on various environmental attributes are being analysed and have been discussed in two phases:

- During Construction Phase
- During Operation Phase

When the proposed plant is fully operational the generation of air pollutants, fugitive and process dust, heat and noise may have some negative impact on health and safety. The predominant environmental pollution would be the air pollution due to emissions of dusts and gases and water pollution due to Boiler blowdown and cooling tower blowdown and ETP effluents containing toxic substance like oil. In addition to air and water pollution, there would be generation of solid wastes such as fly ash, bottom ash and coarse ash, major part of which will be sold to cement manufacturers and brick manufacturers and will be utilized in cement making and brick making process. Due to proper mitigation technologies and management the negative impacts shall be minimal while the employment generated by the project for the operation is having positive socio-economic impact.

5. ANALYSIS OF ALTERNATIVES

Alternatives of Location

Three locations were considered as being potentially suitable for the project site. These three sites are located in the Bilaspur District. Selection of the project site was based on the following criteria:

- Nearest Railway Station
- Road Connectivity
- Nearest Water Body
- Site Contour
- Land-use
- Source of Water

Comparative Statement of the Sites

	Site I	**Site II**	**Site III**
Latitude	22^0 9’ 14”	22^0 1’ 17”	22^0 1’ 46.11”
Longitude	82^0 20’ 52”	82^0 29’ 22”	82^0 16’ 40.79”

	Site I	**Site II**	**Site III**
Location	Dhania (Teh –Kota Distt - Bilaspur)	Kapan (Teh –Akaltara Distt – Janjgir- Champa)	Parsada & Bhadora (Teh –Masturi Distt – Bilaspur)
Nearest Approach Road	Pucca road towards south of the site at a distance of 550mts connecting Sipat to Bilaspur in SW joining the NH-200 at adistance of 19 km SW.	Kutcha Road towards east of the site at a distance of 1.4 km, connecting Kapan railway station and NH-200 in the south.	Pucca Road at a distance of 1.4 km joining Jairamnagar station in NE to the NH-200, SE at a distance of 4.4 km.
Nearest National Highway	NH 111-14.8 km NW, NH-200-19 km, SW	NH-200-3km, S	NH-200 – 4 km SW,
Nearest Railway Station	Gatoura-16.8 km, SW	Kapan Railway Station, 684m NE	Jairamnagar Railway Station, 2 km, NE
Nearest River	Arpa River, 17.8 km SW	Hasdeo River, 16km E	Arpa River- 5 km E & Lilaghar river – 6 km, W

The proposed site (Site III) has the following preliminary advantages:

- Major coalmines/linkages are located within 100 km only from the site.
- Ample water is available in Lilagar River which is about 6 km away.
- Considering an expected nearest pooled EHV s/s of PGCIL at Pamgarh the transmission line for power evacuation would be about 23 km long.

- There is no forest land at selected site.
- No R & R issues involved
- The site is connected with a well-maintained tar road, and approachable from state highway.
- Minimum irrigated land is involved.
- Soil condition and terrain of the site are favorable.
- Minimum environmental issues.
- Easy availability of construction power – nearest 33 / 11 kV Masturi sub-station is about 7-8 km from the site.
- From HFL and seismic activities point of view also, the site is in a safe zone

Fuel Alternatives

As coal continues to be the main fuel for TPPs in India, the fuel used for Thermal Power Plant will be Indigenous coal with average calorific value 4000 kcal/kg. For transportation of coal to the tune of about 5400 Tonnes per day, dedicated railway siding is proposed to be arranged to ensure efficient and cost effective transportation. Adequate provision for Railway siding with tippers etc. has been made in the project. The nearest Railway station is Jairamnagar, on SERC railway located about 2.0 kms from project site.

Environmental Sensitivity & Site Suitability from Environmental View

- Site is beyond 25 km from metropolitan city
- There is no National park or Wildlife Sanctuary or any other ecologically sensitive zone within 25 km.
- Site more than 600 m away from nearest approach road
- No flood plains is there within 10 km radius

Alternatives for Technology

As already mentioned, the proposed plant will be using super-critical technology, which is one of the most energy efficient technologies for 500 MW and more, most commonly,

660 MW TPPs using coal. In China, super critical technology for even a size of 350 MW is working satisfactorily. The thermal efficiency of the power plant can be improved by using the steam at super critical condition. The improvement in overall efficiency of the plant compared to sub critical parameters will be at least 2% if the super critical parameters are implemented. The importance of thermal efficiency of the thermodynamic cycle and the methods to improve the thermal efficiency of the cycle are also analyzed. The indirect costs such as reduction in maintenance cost, auxiliary power consumption, ash dyke area and environmental benefits such as reduction in green house gases; water requirements, etc. are additional to the above increase in efficiency. Details are as follows:

Importance of Efficiency: Since the time thermal power stations have been engineered, there is a quest for efficiency improvement. One such effort in that direction is supercritical parameters (i.e.) the pressure above 225kg/cm^2 and temperature above 374.15ºC. The supercritical parameters for each 350 MW boiler are: 256 kg/cm^2 of pressure and 568ºC SH and 568ºC RH of temperature.

Methods of Increasing Rankin Cycle Efficiency: The steam power cycle efficiency can be

Improved by the following methods:

• **Raising supply temperature by super heating:** Increasing the turbine inlet temperature of steam will raise the heat supply to the boiler more than the heat rejection.

• **Raising inlet pressure of steam:** Increasing the pressure will mean increase in saturation temperature at which steam evaporates thus increasing the average inlet temperature.

• Efficiency can be improved by dropping the final pressure (or temperature) at which heat is rejected.

• **Regenerative heating:** Heating the feed water pumped to the boiler by bleeding steam from turbine.

• **Reheat cycle:** Reheating of steam in boiler after it has already expanded in high pressure (HP) turbine will avoid moisture formation in low pressure (LP) Turbine. Also more heat content of steam before LP turbine will improve efficiency.

Supercritical Conditions

The critical condition of water: Critical pressure = 225.56 Kg/cm2

Critical temperature = 374.15º C

At most elevated condition the steam is supercritical. Thus, if water is at a supercritical pressure and is heated the temperature will increase continuously. At a particular value the water will flash instantaneously into steam and super heating will commence. There is no change of specific volume from the liquid to the dry steam state.

Supercritical Boiler

A Boiler operating at a pressure above critical point is called Supercritical Boiler. Supercritical Boiler has no drum and heat-absorbing surface being, in effect, one continuous tube hence called 'once through Supercritical Pressure Boilers'. Boiler Feed Pump pressurizes the water in boiler, sensible heat is added in feed heaters, economizer and furnace tubes, until water attains saturation temperature and flashes instantaneously to dry saturated steam and super heating commences.

Advantages of Supercritical Thermal Cycle:

- Improvement in power plant efficiency is more than 2%
- Reduction in coal consumption
- Reduction in Green house gases
- Overall reduction in Auxiliary Power Consumption
- Reduction in requirement of Ash dyke land & Consumptive water.
- Sliding pressure operation due to once through system.
- Uniform distribution of heat due to spiral wall arrangement leading to less Boiler tube failure, thereby improving system continuity and availability of the station.
- Low thermal stress in turbine.
- Less start up time of the boiler.

As such, the location, fuel and technology alternatives decided to select the parameters of this project as a state-of-the-art TPPs in the country.

6. ENVIRONMENT MANAGEMENT CELL STRUCTURE AND RESPONSIBILITIES

Pre and Post project Environmental Monitoring is planned to keep the management informed about the functioning of the environmental control systems of the plant. A

separate environment management cell comprising of a team of experienced and qualified personnel reporting to a very senior level executive preferably the Executive Director is proposed for this purpose. He will be assisted by well trained staffs comprising of environmental and safety specialists. Staff will be trained for environment control measures like air, water quality monitoring, solid waste management, noise abatement etc. Staff would also be trained to operate ESP and other pollution control equipment at optimum efficiency. The Environment Management Cell will be responsible managing following activities related to environment function of proposed Power Plant:

- Coordinate and manage the EMP implementation during pre-construction, construction and operation phase
- Appoint dedicated environment staff to manage environmental monitoring responsibilities
- Manage and coordinate environmental monitoring and control
- Coordination with other sections of the plant and government agencies in relation to environmental management activities.
- Implement and monitor green belt protection and plantation activities
- Safety specialist will ensure safe working practices in all the sections of the plant

7. ADDITIONAL STUDIES

An Emergency Plan has been formulated to take care of any disaster in the Power plant and surrounding areas and is detailed as under:

In order to prevent occurrence of any disaster, the plant will be provided with various safety and disaster control facilities. Normally, in the power plant, no major disaster affecting nearby population areas are foreseen. However, accidents inside the plant affecting workplace in vicinity cannot be ruled out. Work-force inside the plant shall be exposed to various high pressure system pipelines and vessels, acids and chemicals, fuel such as coal and furnace oil and other process equipment which, if not properly operated and maintained, can cause serious accidents affecting life and property in the vicinity of accident site. In addition to

these, numerous material handling systems, heavy road transport, high-tension electric lines, level crossings, overhead cranes and various other handling and transport systems always have chances of accidents.

8. PROJECT BENEFITS

Social and community infrastructure and services are insufficient at present considering the need of communities. The proposed project is expected to contribute towards upliftment of quality of life of local people and it shall generate inputs for industrial/ economic development in the region. They enhance the quality of life, equity, law & order stability & social well being through community support, safety & security, sports, recreation and culture, justice, housing, health & education. Guidelines are given to proponents for protection of workmen likely to be engaged from the nearby villages, as also a discussion towards the end covering community benefits. The following measures are suggested for minimizing the adverse impacts on socio-economic and human interest:

- Communication with the local community should be institutionalized on regular basis by the project authorities to provide as opportunity for mutual discussion
- For social welfare activities to be undertaken by the project authorities, collaboration may be sought with local administration, gram panchayat, block development office etc. for better co-ordination.

In order to maintain good Industrial Relations and to implement the project smoothly, following facilities have been envisaged at the proposed power plant:

- Essential facilities like Electricity, Drinking Water, Toilets, and Bathrooms, Proper fencing, leveled ground with proper drainage, sanitation arrangements, and adequate illumination arrangements shall also be provided. PCO, canteen and grocery shop are also envisaged near labour colony.
- Provision of ambulance with doctor and First Aid shall be kept at work place.

- All contract workers and staff shall be provided personal protective appliances and safety gadgets. Safety during project implementation will be accorded highest priority. Regular awareness programmes shall be conducted to create and sustain a safe working culture.
- Rest rooms, canteen, drinking water near the workplace shall be provided for contract workers as well as transporters etc. Hygienic working conditions shall be maintained at workplace.
- Designated officials will ensure proper maintenance of infrastructure created for contract labours and to take immediate corrective actions whenever required after regular inspection.

9. ENVIRONMENT MANAGEMENT PLAN

Power is the basic need not only for industrial and agricultural sector but also for economic development and improvement of quality of life of the people of a country. Electricity is the cleanest form of energy at the consumption point. However, coal fired power station has certain adverse impact on the environment. Therefore a number of safeguards have to be built in during the design stage itself. The Environment Management Plan (EMP) outlines the environmental management system that will be implemented during the detailed design and construction works of the project for minimization of deleterious effects and implementation of enhancement measures. The EMP embraces environmental management issues comprising of, beneficial impacts as Well as long-term adverse impacts and their remedial measures. The plant management should implement sound Environment Management Plan (EMP), which will make environment protection an essential requirement. Prediction of the potential environmental and social impact arising due to development activities are considered as the heart of EIA process. An equally essential element of this process is to develop measure to eliminate, offset, or reduce adverse impacts to acceptable levels and enhance the beneficial ones during implementation and operation of the projects. The integration of the project planning is done by clearly defining the environment

requirements within an Environment Management Plan (EMP). The Management Action Plan aims at controlling pollution at the source level to the maximum possible extent with the available and affordable technology followed by treatment measures before they are discharged. Specifically, the EMP monitors and manages environmental aspects and issues of the project during construction and operation phase by:

- Identifying potential environmental impacts
- Recommending mitigation measures for the negative impacts
- Identifying opportunities for enhancement measures
- Providing an organizational framework for operating Environment Management System and other functions of the project by assigning roles and responsibilities for environmental monitoring and management;
- Formulating Environmental Management Plan, which specify mitigation, budgeting, monitoring activities and indicators to be attached to Annual and periodic activity plans for project implementation