ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR

KHURJA SUPER THERMAL POWER PROJECT (2X660 MW)

THDC INDIA LIMITED

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Abbreviations

AAQ	Ambient Air Quality
APTI	Air Pollution Tolerance Index
BDL	Below Detection Limit
BFA	Behat Fan Alluvium
C.W	Cooling Water
CDM	Clean development Management
CEA	Central Electricity Authority
CER	Certified Emission Reduction
CHP	Combined-cycle Heat and Power Plant
COC	Cycle of Concentration
CPCB	Central pollution Control Board
CPSE	Central Public Sector Enterprises
CSR	Corporate Social Responsibility
CTBD	Cooling tower blow down
CWPH	Circulating water & Make-up water pump house & fore bay
DM Plant	Demineralization Plant
DMP	Disaster Management Plan
EAC	Expert Appraisal Committee
EIA	Environmental Impact Assessment
EMCR	Economic Maximum Continuous Rating
EMP	Environment Monitoring Programme
EPS	Electric Power Survey
ERDAS	Earth Resources Data Analysis System
ESP	Electrostatic precipitators
FGD	Flue Gas Desulphurization
GHG	Green House Gases
HCSD	High Concentration Slurry Disposal
HFO	Heavy fuel oil
IDC	Interest During construction
IMD	India Meteorological Department
IS	International Standards
LDO	light Diesel oil
LNB	Low Nox Burner
MDBFP	Motor driven Boiler Feed Pump
MoEF	Ministry of Environment & Forest
MoEF&CC	Ministry of Environment, Forest and Climate Change
MOU	Memorandum Of Understanding
NH	National Highway
NHAI	National Highway Authority of India
OFAF	Oil Forced Air Forced
OFP	Older Flood Plain
ONAF	Oil Natural Air Forced
ONAN	Oil Natural Air Natural
PAFs	Project Affected Families
PAP	Project Affected Person
PFR	Pre Feasibility Report
PM	Particulate Matter

PRDS	Pressure Reducing and De-Superheating System
PT	Pre-Treatment
R&R	Resettlement and Rehabilitation
RO	Reverse Osmosis
SCR	Selective Catalytic Reduction
SG	Steam Generators
SNCR	Selective Non-Catalytic NOx Reduction
SPCB	State Pollution Control Board
SPM	Suspended particulate matter
STPP	Super Thermal Power Plant
TDBFP	Turbine driven Boiler Feed Pump
TG	Turbo Generator
THDCIL	Tehri Hydro Development Corporation India Limited
TOR	Terms of Reference
TPD	Tons Per Day
TPH	Tons per Hour
UPPCL	Uttar Pradesh Power Corporation Ltd.
UPPTCL	Uttar Pradesh Power Transmission Corporation Limited
UPSIDC	Uttar Pradesh State Industrial Development Corporation
VAP	Varanasi Alluvial Plain
VOA	Varanasi Older Alluvium
WCM	Working Capital Margin

CHAPTER-1: EXECUTIVE SUMMARY

1.1 INTRODUCTION

1.1.1 Project Proponent

THDC India Limited, a Mini Ratna, Schedule 'A' CPSE, is a joint venture of Government of India & Government of Uttar Pradesh, established in 1988. The company was formed to execute the Tehri Dam and Power House Complex (2400MW) on Bhagirathi River. After implementation of Tehri Dam, Koteshwar Dam and associated power house complex, THDC India Limited has now been entrusted to execute a Thermal Power Project in Khurja, District Bulandshahr (U.P.).

THDC India Ltd. has entered into a MoU with Government of Uttar Pradesh for setting up a coal based 1320 MW Super Thermal Power Plant (STPP) near Khurja in Bulandshahr District of Uttar Pradesh. The proposed Khurja STPP will benefit Uttar Pradesh and other willing states/UTs of Northern Region.

1.1.2 Project Proposal

The proposed project is to establish a 2X660 MW coal based thermal power plant near Khurja. Land for implementing the project has already been acquired by UPSIDC and shall be handed-over to THDCIL. Provision for another unit of 660MW has been kept in the layout considering availability of land due to rerouting of NH-91. The present project proposal is for setting up two units of 660 MW in 1200.843 acre of land. The power generated in the proposed project will be evacuated through 400kV transmission lines.

1.1.3 Regulatory Compliances

Thermal power plants fall at Sl. No. 1(d) of Schedule-I of the EIA Notification, 2006, and require prior environmental clearance. Further, as the proposed generation capacity is >500 MW, it is classified as category "A" project. Scoping for EIA study (in form of Terms of Reference) has already been carried out by MoEF, New Delhi, vide MoEF letter no. J-13012/100/2011-IA.II(T) dated 27.10.2011, and the validity extended up to 26th October, 2015, vide letter dated 15th January, 2015. On the basis of the draft EIA report submitted to Uttar Pradesh Pollution Control Board, Public Hearing was conducted on 1st August, 2015.

1.2 PROJECT DESCRIPTION

1.2.1 Need of the Project

Demand Estimation (12th& 13thplan)

The demand scenario has been prepared as per latest publication of Electric Power Survey (EPS-18) published by CEA and is presented below in **Table-1**:

Table 1: Energy Requirement & Peak Demand in 12th& 13th Plan

Region	Energy Requirement As per 18th EPS (MU)		Peak Demand As per 18th EPS (MW)	
	2016-17	**2021-22**	**2016-17**	**2021-22**
NR	415220	576010	60676	82784
WR	389807	535851	60259	83268
SR	364443	506589	56388	78857
ER	163294	231646	24020	33747
NER	15751	22421	2834	3905
Andaman & Nicobar	366	505	67	89
Lakshadweep	47	60	10	16
All India	**1348515**	**1872517**	**196398**	**271795**

Demand & Supply Scenario at the end of 12th Plan based on Demand projections in 17thEPS considering capacity addition of 86500MW is presented in **Table-2** below:

Table 2: Demand & Supply Scenario at the End of 12th Plan*

Region	Peak (MW)			Energy (MU)		
	Availability	**Load/ Demand**	**Deficit/ Surplus**	**Availability**	**Load/ Demand**	**Deficit/ Surplus (%)**
All India	195821	218209	-10.3%	1365379	1392066	- 1.9

From the above, it can be seen that overall peak deficit of 10.3% and energy deficit of 1.9% exists in the country at the end of 12th Plan. Further, there is likelihood of shortfall from the projected capacity addition in the 12th Plan and as a result the energy deficit is likely to increase.

Considering the demand/supply scenarios at the end of 12th Plan Period as mentioned above, and also the likelihood of shortfall in the projected capacity addition in the 12thPlan, Khurja Super Thermal Power Project (2 x 660 MW) is justified from demand supply consideration.

1.2.1 Location

The proposed site for Khurja Super Thermal Power Project (2 x 660 MW) is located at Tehsil Khurja, district Bulandshahr in the state of Uttar Pradesh. The site is located approximately 11km from Khurja town and 36 km from Aligarh City, a major town of Uttar Pradesh. The proposed site is surrounded by villages Dushehra Kherli, Jahanpur, Naiphal (Unchagaon) and Rukanpur. The site is approachable from NH-91. The Howrah-Delhi railway line (via Kanpur & Aligarh) passes near the Western side of the site approximately at 5km distance.

The Nearest railway station is Danwar which is about 5 km from the site. The nearest major railway station is at Khurja at a distance of about 11 km on northern side. The nearest airport is IGI, New Delhi, which is approximately at 90km from the project site.

The proposed power plant is geographically situated between 28°08'35" to 28°10'25" Northern latitude and between 77°53'47" to 77°55'22" Eastern longitude.

1.2.2 Raw Materials & Inputs

Land Requirement: The project is proposed to be accommodated in 1200.843 acre of land. The site is situated on either sides of the National Highway (NH-91) in between Khurja & Aligarh. For optimum utilization of the land, it is proposed to re-route the NH. Proposition for re-routing of NH-91 has been taken up with National Highway Authority of India (NHAI), which has provided its "in-principle" consent for re-routing. Main plant, Switchyard, Coal Handling Plant, Water System facilities, Raw Water Reservoir &, Township is proposed to be located on the east side of the existing highway. On Western side of the highway, Ash Dyke & Railway Siding Facilities are envisaged. About 123 acres land shall be required for railway & pipe corridors outside the plant boundary. The land is fairly flat with undulations in few pockets and is not prone to flooding. It is observed that land is made up of brownish grey soil.

Make-up Water: Make-up water required for the proposed 2x660 MW plant and associated facilities, including losses in the reservoir and the potable water for plants and township, will be 3265 m^3/hr (equivalent to 2.47 m^3/KWH)with Ash water Recirculation system and 4415 m^3/hr with once through ash water system. Make-up water for the project will be sourced from Upper Ganga Canal, located at a distance of approximately 8km (north-east) from proposed site. Water is available in Upper Ganga Canal throughout the year (except for 25 days for maintenance) and hence the same is considered as water source for the power project. Make-up water shall be drawn from the canal by constructing suitable intake structure, and pumped to the site through pipeline. A raw water reservoir of 25 days capacity is proposed within the project area.

Fuel Requirement: The basic fuel for this project is coal. As per the MoEF notification dated 02-01-2014, the ash content in the coal transported to and used by thermal power plants has been limited to 34% on quarterly average basis. Recently, Khurja STPP of THDCIL has been allotted Amelia Coal Block. As per preliminary coal parameters available regarding Amelia Coal Mine, 42% of the total coal reserve belongs to Grade 'E' (34.1 to 40.0% ash content), 24% to Grade 'D' and 22% to Grade 'C'. Although the boilers will be designed to operate with worst quality coal, the project proponent shall make suitable arrangement at the pit head to ensure that the coal transported to and used in the proposed plants contains less than 34% ash on quarterly average basis. Considering the calorific value of 4200 kcal/kg and heat rate of 2247.97 kcal/kwh, the coal requirement shall be approximately 5.4 Million Tonne per annum (16,280 TPD) corresponding to 90% PLF. Coal will be transported through Indian Railway Systems. The broad gauge rail route distance from nearest railway station at Danwar would be approximately 5km. The Coal quality parameters considered tentatively for the EIA are as follows:

- Ash : <34%
- GCV : > 4200 (kcal/kg)
- Total moisture (average) : <13.0%

Construction Power: The requirement of the construction power supply would be met from existing power supply network of UPPTCL (220kV/33kV substation located at Khurja). Necessary 11kV ring main/LT sub-station shall be provided.

1.2.3 Process Description

In a thermal power plant, the chemical energy of the fuel (coal) is first converted into thermal energy (during combustion), which is then converted into mechanical energy (through a turbine) and finally into electrical energy (through a generator). Coal is pulverized, mixed with air and burned in boilers. The generated high pressure steam is discharged through nozzles on the turbine blades, which makes the turbine to rotate. This rotates the generator coupled to the end of the turbine. Rotation of generator produces electricity, which is passed to the step-up transformer to increase its voltage so that it can be transmitted efficiently. The power is evacuated via switchyard through a Transmission System.

The Steam Generators (SG) shall be super-critical, once through type, water tube, direct pulverized coal fired, top supported balanced draft furnace, single reheat, radiant, dry bottom type, suitable for outdoor installation. The gas path arrangement shall be single pass (tower type) or two pass type having 256 kg/cm^2 pressure at super heater outlet and 568°C/ 596°C temperature at SH/RH outlet.

Pollution Control Measures

Air Pollution Control: The following measures are incorporated for control of air pollution:

- High Electro Static Precipitators (ESPs) to limit the particulate matter concentration below 30mg/Nm^3.
- Selective Catalitic Reduction (SCR) system, in combination with Low Nox Burner to limit NOx concentration below 100 mg/Nm^3.
- Flue Gas Desulphurization (FGD) system to limit SO_2 concentration below 100 mg/Nm^3.
- Discharge of flue gases through a chimney of 275 m height
- Dust extraction/ suppression system in Coal handling Plant.

Water Conservation & Pollution Control: An effluent management scheme, consisting of optimization of COC in Cooling water system (>5 COC), collection, treatment and recirculation of effluent streams shall be implemented in order to optimize the make up water requirement as well as to operate the plants with zero effluent discharge. The sewage from plant and township shall be treated in a sewage treatment plant and the treated sewage, conforming to prescribed standards, shall be utilized for plantation and green belt development.

Solid wastes: An ash management scheme shall be implemented consisting of dry collection of fly ash, supply of ash to entrepreneurs for utilization and promoting ash utilization to maximum extent and safe disposal of unused ash. The plant shall have two different systems for ash disposal – Conventional wet slurry disposal with ash water re-circulation for bottom ash and High Concentration Slurry Disposal (HCSD) for fly ash. HCSD system will require less quantity of water.

Noise: Acoustic enclosures, mufflers and hoods will be provided to the equipment to control the noise level below 90 dB (A).

1.3 BASELINE ENVIRONMENTAL SCENARIO

1.3.1 Study Area & Period

The area falling within 10 km distance from the project area has been considered as the study area for establishing the baseline environmental status. The baseline environmental scenario has been established through primary data generated in the study area and secondary data available at site/published in literature. The study was started 1st October, 2012, and was continued up to 31st December, 2012. However, baseline data generation for ambient air quality, water quality, soil characteristics and micro meteorological data generation was repeated during pre-monsoon (summer) season of 2016. The EIA Report is based on primary data for meteorology, air quality, water quality, ecology & biodiversity, soil quality & noise quality and simultaneously secondary data for all the disciplines generated during the study.

1.3.2 Landuse/Landcover

Agricultural land is the major constituent of the study area, accounting for 82.56% of the total area, which indicates considerable agricultural practices in the area. Land use pattern of the study area is as follows:

- Agricultural land : 82.56%
- Area under plantation and green cover : 8.49%
- Area under settlements : 5.13%
- Waste and barren land : 2.78
- Area under water bodies : 1.04%

Although the land identified for siting of the proposed project has been acquired by UPSIDC, the land is still in possession of the individual owners. The current land use of the project area is as follows:

- Agricultural use : 97.04
- Settlements : 0.18
- Plantation : 0.92
- Waste land : 1.85
- Water bodies : 0.07

1.3.3 Soil Quality

To determine the soil quality of the study area, 10 samples were collected from 10 different locations in the study area to assess the existing soil conditions. Results of analysis show that the texture of soil at all locations is Sandy Loam. The value of pH ranges from 6.80 to 7.41 indicating that all soil samples are neutral. The average concentration of Nitrogen, Phosphorus and Potassium in the soil samples varies from 26.1 to 69.1 mg/100gm, 72.2 to 110.4 mg/100gm and 0.7 to 0.9 mg/100gm.

1.3.4 Water Quality

The assessment of present status of water quality within the study area was conducted by sampling and analyzing samples from 4 ground water and 3 surface water sources during the two seasons. Standard methods and procedures, prescribed by CPCB, relevant IS Codes and Standard Methods of Examination of Water were adopted for sampling and analysis. The physico-chemical characteristics of ground water samples conform to drinking water quality standards, prescribed in IS: 10500. Surface water quality results for all the three sites show that the physico-chemical characteristics of Surface water are found within the limits, prescribed by CPCB.

1.3.5 Meteorology

A fully automatic continuous recording meteorological observatory was established and operated near the site from October to December, 2012 and again from March to May, 2016. The observed seasonal minimum and maximum temperature were 7.2^{0}C and 36^{0}C respectively during October-December, 2012 and 15^{0}C to 46^{0}C respectively during March to May, 2016. The monthly mean wind speed varied from 4.0 to 4.58 km/hr during October to December, 2012, and from 8.4 to 11.2 km/hr during March to May, 2016. Western winds were dominant during both seasons.

1.3.6 Ambient Air Quality

Ambient air quality has been established with respect to SPM, PM_{10}, $PM_{2.5}$, SO_2, NO_2, O_3 and Hg. by field monitoring at four locations during the two seasons, viz., October to December, 2012, and March to May, 2016. At each location, 24 hour average sampling was undertaken twice a week. The data was analyzed for maximum, minimum & average and compared with Ambient Air Quality Standards. Summary of the observations, presenting minimum, maximum, mean and 98th percentile values observed during the two seasons is follows.

Parameter	October-December, 2012				March to May, 2016			
	Min.	Max.	Mean	98%tile	Min.	Max.	Mean	98%tile
SPM	161	196	173-177	190-196	176	198	187-190	198
PM_{10}	61	84	68-70	76-84	67	92	76-78	84-92
$PM_{2.5}$	31	42	34-36	38-42	32	48	37-40	45-48
SO_2	10	17	11-13	14-17	10	19	13-14	16-19
NO_2	20	32	24-27	30-32	18	35	27-29	33-35
O_3	21	32	25-27	29-31	23	35	28-29	28-35

Mercury was not detected in any of the samples. The monitoring results indicate that the air quality is well within the Ambient Air Quality Standards.

1.3.7 Noise Quality

Noise levels were measured, using an Integrating sound level meter Cygnet make (Model No. 2031), at 10 locations within the study area to assess the background noise levels in different zones viz., Residential, Industrial, Commercial and Silence zones. It is observed from the results that the noise levels ranges from 41.8 to 59.6 dB (A) during daytime and 32.6 to 50.2 dB (A) during night time. It

can be concluded that the noise levels during daytime and during night time are within prescribed limits for respective areas.

1.3.8 Ecology

In the core zone (proposed project area), only shrubby vegetation was found in dominance at the project site like *Zyziphus sp.*, *Acacia* Sp., *Lantana camara, Sacchrum munja, Calotropis procera* etc. besides some tree species like *Azadirachta indica, Acacia catechu, , Acacia nilotica, Mangifera indica* etc. were also seen growing in the area. The observations made in the study area reveal that the diversity and affinities of the flora of the region has a sum of 93 taxa of plants belonging to 39 families. It is evident from the study that, the study area is showing dry deciduous vegetation. According to the growth habit these species are distributed as: 15 tree species (16%), 16 shrub species (17%) and 62 herb species (67%). The commonly occurring species are *Acacia catechu*, *Acacia nilotica, Ageratum conyzoides, Amaranthus viridis*, *Azadirachta indica, Datura stramonium, Lantana camara, Launaea aspleniifolia, Mangifera indica, Ricinus communis, Tridax procumbens* etc.

Some tree and shrub species of *Acacia*, *Lantana, Ziziphus, Calotropis* etc. are seen in the core zone (project area), which are supporting few faunal species like *Rattus rattus, Lepus nigricollis, Funambulus palmarum* etc. The study area includes agricultural land, villages, and the part of Bhogpur reserved forest. In village areas, only domesticated animals were seen. However, some rodents and mammals were also noticed roaming in the area. The RF area is the main habitat supporting the faunal diversity of this area. The inventory of the fauna species present in and around the area was prepared and cross checked with the schedules of Wildlife acts, 1972. A total of 9 Mammals, 17 Birds, 6 Reptiles and 3 Amphibians were listed during the study. No schedule-I animal is reported in the study area. However, 4 schedule-II mammals are reported in the area.

1.3.9 Demography & Socio-Economics

In the study area, there are 118 villages. Out of these, 93 villages come under Khurja Tahsil in Bulandshahar District and 25 villages under Gabhana Tahsil in Aligarh District. The total population of these villages as per Census of 2011 is 253252 and 211973 as per Census of 2001. The population growth for the period is about 41279. The percentages of male, female population are 53.14% and 46.86% in 2011 as against 53.66% and 46.34% in 2001. There is a marginal decrease of (-) 0.52% in male % in the same period. There are about 40021 households as per 2011 census as against 33,775 households in 2001. The average family size is about 6 persons per house as per both the census.

1.4 IMPACT ASSESSMENT AND MITIGATION MEASURES

1.4.1 Land-Use/Land-Cover

The establishment of Khurja STPP will lead to permanent change in the land use pattern of the project site from agricultural land to industrial land. Land may get contaminated due to waste generated due to construction activities. Other source of impact for land environment can be the disposal of solid wastes from the plant. Development activity also induces changes in land-use

pattern of the adjoining areas because of the increased availability of infrastructural facilities, increase in commercial activities.

All the raw materials required for construction will be stored in the designated area within the plant boundary. No solid waste will be disposed on outside land.

1.4.2 Soil Quality

Constructional activities like leveling, excavation and removal of existing vegetation would invariably disturb the soil of the area. The impacts on soil during construction phase shall be mainly due to loss of topsoil in the construction areas and contamination of the soils of surrounding area due to construction materials such as cement, sand, oils, etc. The disturbances would be more pronounced during the summer and monsoon seasons with strong rains. However, it is temporary and shall be confined to the areas of construction only. Appropriate soil conservation measures associated with improved construction techniques would minimize such local impacts.

During operation of a thermal power project, the soil within the deposition zone of pollutants may undergo physico-chemical change due to deposition of SPM and washout of gases (SO_2 and NO_x) during the rains. However, the impacts of these are likely to be marginal.

1.4.3 Water Quality

During the construction phase, site preparation (leveling, excavations etc.) and erection of structures will have temporary effect on the water quality of receiving water body. Flow of loose materials (soil and construction material) into the drain, especially during monsoons will result in higher turbidity and suspended solids content. Domestic wastewater generated from temporary toilets may cause contamination in water. During site development and construction phase, necessary precautions will be taken, so that the runoff water from the site gets collected in sedimentation tank for treatment. The treated water will be reused for construction purposes and for sprinkling on roads to control the dust emissions. The domestic wastewater generated from temporary toilets used by the work force will be diverted to septic tank followed by soak pit. Therefore, impact on water quality due to proposed unit would be insignificant.

Make-up water requirement during operation phase, approx. 3265 m^3/hr (equivalent to 2.47 m^3/KWH), will be met from Upper Ganga Canal. Withdrawal of water from the canal would affect the downstream users. To meet the additional requirement of water, it is proposed to provide lining to the canal so as to minimize losses due to seepage/infiltration.

During operation phase, water quality may be affected by the discharge of liquid effluent from the plant into the receiving water body. Ground water pollution can take place due to leachate from ash pond. It is, therefore, proposed to operate the plants with quantitative recycle of effluents, after treatment of individual wastewater streams. The ash ponds will be provided with impervious lining. Sewage from the township, together with domestic wastewater from the plants, will be treated in Sewage Treatment Plant, and the treated sewage will be utilized for plantation and green belt development. Therefore, impact on water quality is not foreseen.

1.4.4 Air Quality

The potential sources of air pollution during construction phase of the project are fugitive dust from land preparation and exhaust gases from vehicular traffic and construction equipment. Regular water sprinkling will be done to avoid the dust entering into the atmosphere. During windy days, the frequency of water sprinkling will be increased. Temporary tin sheets of sufficient height will be erected around the project site as a barrier for dust control. Vehicles and construction equipment will be maintained properly to minimize emissions. With these control measures, and also because the project area is very large, it is expected that the impact of emissions will be minimum, confined within the project area, and will be temporary.

During operational phase, the major source of pollution would be the emissions from the boiler stack. Another source is fugitive emissions from Coal and ash handling operations. Flue gases shall be passed through high efficiency electrostatic precipitators to maintain particulate matter concentration below 30 mg/Nm^3. Control of SO_2 and NO_x will be achieved through provision of FGD and DeNOx systems (SCR with LNB) in the flue gas path, so as to limit their concentrations to 100 mg/Nm^3. A common stack of 275 m height shall be provided for discharge of flue gases. Control of fugitive dust in coal handling plant shall be achieved through dust extraction and dust suppression systems. Fly ash will be handled through closed circuit ash handling system.

Dispersion modelling (Aermode Dispersion Model) of stack emissions demonstrates that the maximum incremental 24-hr concentrations of SPM, SO_2 and NO_x will be 1.51 µg/m^3, 5.06 µg/m^3 and 5.06µg/m^3, respectively. When super-imposed over the observed maximum concentrations of these pollutants, the resultant concentrations are well within the specified limits. It is, therefore, concluded that the impacts of the proposed project on ambient air quality will be within the acceptable level.

1.4.5 Noise Quality

The major noise generating sources during the construction phase are vehicular traffic, construction equipment like dozer, scrapers, concrete mixers, cranes, generators, pumps, compressors, rock drills, pneumatic tools, vibrators etc. High noise levels will be experienced within the plant area as well during operational phase.

Adequate protective measures in the form of ear muffs/ear plugs to the workers working in high noise areas need to be provided. In addition reduction in noise levels in the high noise machinery areas could be achieved by adoption of suitable preventive measures such as use of enclosures with suitable absorption material, etc. Further, in addition to the noise control measures in plant, all the open areas within the plant premises and all along the plant boundary will be provided with adequate green belt to diffuse the noise. Thus there would not be any adverse impact due to construction and operation of the plant on the residents in the nearby villages.

1.4.6 Ecology

Particulates and Sulphur dioxide are major air pollutants of a coal based thermal power plant. The impact on the terrestrial ecosystem due to operation of the thermal power project may occur from deposition and absorption of air pollutants on flora and soil surfaces.

Deposition of fly ash may interrupt gaseous exchange through leaves, thereby affecting plant growth. However, the impact of the project is envisaged to be negligible, as increased (baseline + incremental) ground level concentration of PM, SO_2 and NOx due to emissions from the project are well within the Indian Standards for Ambient Air Quality. Since most of the tree species occurring in the area are deciduous, they have high Air Pollution Tolerance Index (APTI), and therefore impact of SO_2 will not be significant.

The runoff from construction area may lead to a short-term increase in suspended solids and decrease in dissolved oxygen near the discharge point in receiving water body. This may lead to a temporary decrease in the photosynthetic activity of phytoplanktons, rise in anaerobic conditions, habitat destruction and food chain modification. However, for major part of the year during construction phase, no detectable impact is expected because water quality will not change significantly.

The water system of the project has been designed with maximum recycle/ reuse of water, and a comparatively small quantity shall be drawn as a make-up to the system. Therefore, there is no likelihood of entrapment or impingement of phyto plankton/ zooplankton in the water intake system. Further, as the project will have a close cycle cooling system with cooling towers and clarified water as make-up to the cooling system, there will be no thermal impact on aquatic ecosystem due to operation of the project.

1.4.7 Demographics & Socio-Economics

The impacts on demography and socio-economic status of the area due to construction and operation of Khurja STPP will be positive as well as negative in nature. These impacts may be broadly classified into two groups:

1) Direct impact due to acquisition of land
2) Indirect impacts due to
    a) Immigration of work force
    b) Change in socio-economic scenario of the area, and
    c) Increased stress on public utilities and resources of the area.

The construction activities attract a sizeable population and influx of population is likely to be associated with construction of temporary hutment for construction work force. However, this impact is envisaged to be insignificant because this will be only a temporary change and shall be restricted to construction period only.

1.5 ADDITIONAL STUDIES

1.5.1 Public Hearing

Public hearing for the proposed project was organized by Uttar Pradesh Pollution Control Board, and was held on 1st August, 2015 at Tehsil Conference Hall, Khurja. The meeting was chaired by Mr. Vishal Singh, ADM, Bulandshahr. The meeting was attended by approx. 150 members of the public, who raised their issues and suggestions during the deliberations. The issues raised by the public as well by the panel members were responded suitably by representatives of the project proponent and their consultants. Details of the public hearing proceedings and action plan are included in the report.

1.5.2 Risk Analysis

Fuel oil (LDO/HFO), used as support fuel in the boiler, is classified as Highly Flammable liquid as its flash point remains within 30^0C–90^0C. Its threshold quantity is 2500 tonnes. Similarly Chlorine is a toxic gas and its MAH quantity is 25 tonnes. Quantity of stored transformer oil is too low to be considered for the study. Sulphuric Acid and Caustic soda are hazardous chemicals but are not included in Schedule-3 for MAH. The risk analysis study covers fire and explosion due to fuel storages such as LDO & HFO, and toxic exposure due to failure of containment or leakage of chlorine, caustic soda and Sulphuric acid. The broad conclusions drawn from the preliminary risk assessment are as follows:

- There will be no significant community impacts or environmental damage consequences; and
- The hazardous event scenarios and risks in general at this facility can be adequately managed to acceptable levels by performing the recommended safety studies as part of detailed design, applying recommended control strategies and implementing a Safety Management System.

1.5.3 Disaster Management

A Disaster Management Plan has been developed to make best possible use of resources at THDC's command and/or outside agencies for the following purposes.

- Prevention, Mitigation & Preparedness (Pre phase)
- Response, Rehabilitation & Recovery (Post phase)
- Safe guard others by evacuating them to safer places;
- Rescue of victims and treating them suitably to effect speedy recovery at hospital;
- Identify the personnel affected / dead;
- Inform relatives of those deceased / affected;
- Providing relevant records / data needed as evidence for subsequent enquiry;
- Rehabilitation of the affected persons.

The plan consists of the following:

- On-site Emergency Planning
- Off-site Emergency Planning
- Control Measures for Coal Yards
- Preventive Measures for Loading/Unloading of Chemicals
- Fire Detection & Protection System
- Electrical Protection System
- Preventive Measures for Men & Material
- Responsibilities
- Reporting of Incidents

1.5.4 Rehabilitation & Resettlement Plan

For Khurja STPP, about 1400 acres of land is being acquired in five villages, namely Dushehra Kheri, Jahanpur, Naiphal Unchagaon, Rukanpur, & Rukanpur Nagla, which will affect 4171 population in these villages. A part of Rukanpur villages (Nagla village) is directly affected due to displacement during the land acquisition. The number of directly affected families of Nagla village is **88** and directly affected population is **452**, coming from **88** families. These 88 families of Nagla village are not authorized land owners. In addition, during construction of Khurja STPP, there could be indirect impacts due to immigration of work force. The immigration of work force for construction phase (including contractor labourers) may have marginal impacts on demography (e.g. changes in total population, sex ratio, literacy level, main workers etc.) of the immediate vicinity area. The socio-economic status of the area may also get affected due to influx of men, material and money.

Effect of employment generation and additional transport requirements on local Infrastructural facilities are adequately addressed for the project construction activities. Operational phase of the plant covers the entire life span of the plant. Hence the impacts of the operational phase extend over a long period of time. The policy of THDCIL towards social welfare & community development aims at strengthening the bond between Project Authorities and local population in the vicinity of Super Thermal Power Plant. In line with this policy, the positive impacts include opportunities for employment, improvement of transport facilities, enhancement of basic facilities in the areas of education, health, and Infrastructure facilities. In addition to the compensation for acquired property, THDCIL proposes R& R Package for the Project Affected Families (PAFs) at Rukanpur, Rukanpur Nagla, Dushehra Kheri, Jahanpur, and Naiphal Unchagaon in line with the best of the provisions of National Rehabilitation & Resettlement Policy 2007.

For rehabilitation of Nagla Villagers the land requirement has been assessed as around 1.2118 hectare. THDCIL along with the district administration have identified 1.367 ha Gram Sabha land for rehabilitation of Nagla Villagers outside the Plant boundary. The land has also been visited by Distt. Magistrate, Bulandshahr who have found the same suitable for rehabilitation of Nagala Villagers. Approval from competent authority has been obtained for construction of EWS (Economical Weaker Section) accommodation on above land through UPRNN after acquiring the land thorough Distt. Administration.

The compensation matters are being dealt by UPSIDC. Apart from compensation, THDCIL is committed to do the remaining R&R of the PAP.

With the help of District Administration, the essential inputs containing lists of land losers and project affected persons are being prepared. THDCIL is committed to establish requisite system for organizing vocational and formal training and education for all such identified persons and extend full assistance to them to become eligible for seeking employment with the project proponent or any other organized sector THDCIL is committed to implement the R & R package as per the mutual agreement with the State Government. Site for rehabilitation and resettlement has been identified and R & R package will be primarily based on the Rehabilitation and Resettlement Policy of Uttar Pradesh Government (2011), supplemented by National Policy on the Resettlement and Rehabilitation (2007) and Rehabilitation and Resettlement act-2013.

1.6 ENVIRONMENTMANAGEMENT PLAN

1.6.1 Air Environment

Coal based thermal power plants emit fly ash as the major pollutant besides varying degree of other pollutants namely coal dust, sulphur dioxide and oxides of nitrogen, carbon monoxide and dust in the ash disposal area. The following mitigative measures will be employed to reduce the impacts on air quality:

- Electrostatic precipitators (ESP) with 99.89% efficiency would be installed to control the emission of fly ash particles. The precipitators would be designed to limit the particulate matter concentrations below 30 mg/Nm^3.
- The boilers will be provided with Low NOx Burners and the flue gases shall be passed through Selective Catalytic NOx Reduction and Flue gas desulphurization systems to limit NOx and SO_2 concentrations below 100 mg/Nm^3.
- The flue gases will be re-heated and discharged through a stack of 275m height.
- For the control of fugitive coal dust emission within and around the coal handling plant, dust extraction and suppression systems would be provided.
- Ambient air quality monitoring system would be provided as per CPCB guidelines.
- All the internal roads will be of concrete/asphalt to reduce the fugitive dust generated due to the vehicular movement

1.6.2 Water Environment

An effluent management scheme, consisting of optimization of COC in CW system to >5, collection, treatment and recirculation of effluents shall be implemented in order to optimize the make-up water requirement as well as liquid effluent generation. The liquid effluents shall be collected and treated/ recycled as per the following design philosophy to achieve zero effluent discharge:

- The filter backwash water of pre-treatment (PT) Plant shall be collected and recycled back to the inlet of clarifiers.
- The sludge from clarifiers of Water PT Plant shall be collected in a sump/ pit and shall be pumped to bottom ash slurry sump for disposal to bottom ash dyke.

- The waste effluents from neutralization pits of DM Plant and Condensate Polishing Plant shall be collected in the respective neutralization pits and neutralized before pumping to Ash Slurry Pump, and utilized for ash disposal.
- Re-Circulating type Cooling Water (C.W) system with cooling towers, with C. W. blow down from cold water side to ensure no thermal pollution.
- The CW system blow down shall be utilized quantitatively for service water system, ash handling and coal dust suppression.
- The sludge from clarifier/ tube settler shall be disposed off in bottom ash dyke along with bottom ash slurry.
- A coal particle settling pond shall be provided to remove coal particles from coal handling plant waste. Decanted water shall be pumped back to the coal dust suppression system.
- Service water effluent collected from plant drains shall be led to a sump. From the sump the service water shall be pumped upto tube settler/ clarifier for treatment of suspended solids. Treated service water shall be recycled back to service water tank to the extent possible.
- RO system for ZERO discharge concept: A Reverse Osmosis (RO) plant is proposed with a capacity to handle 400 cum/hr effluent. Cooling tower blow down (CTBD) water, if available, shall be used as feed water to RO plant. The purpose of RO system is to remove the dissolved solids from the water to produce specified quantity of CW make up. Reject water from RO trains shall be led to CHP dust suppression tank.

1.6.3 Noise Environment

The major noise generating sources are the turbines, turbo-generators, compressors, pumps, fans, coal handling plant etc. from where noise is continuously generated. Acoustic treatment/ equipment design shall be done to control the noise level below 90 dB (A). Wherever required, the workers shall be provided with protective equipment such as ear plugs/ ear muffs.

1.6.4 Solid Waste Management

Ash will be the major solid waste generated from the power project. An ash management scheme shall be implemented consisting of dry collection of fly ash, supply of ash to entrepreneurs for utilization and promoting ash utilization to maximum extent and safe disposal of unused ash. The plant shall have two different systems for ash disposal – conventional wet slurry disposal with ash water re-circulation for bottom ash and High Concentration Slurry Disposal (HCSD) for fly ash. HCSD system will require less quantity of water.

Gypsum formed in the FGD system will be recovered and disposed through sale to interested agencies.

Spent catalyst from the SCR System will be filled in metallic containers and disposed through approved recyclers.

1.6.5 Green Belt

A green belt of about 50 m to 100 m width has been planned all around the main plant area except the switch yard side. In addition, extensive afforestation and plantation activities shall be

undertaken in all available spaces within the main plant and township areas. Further, avenue plantation will be undertaken along roadside in Plant and Township areas. The characteristics of plants for green belt are given below:

- The species should be permeable to help create air turbulence and mixing within the belt
- There should be no large gaps for the air to spill through
- Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces
- Ability to withstand conditions like inundation and drought
- Soil improving plants (Nitrogen fixing rapidly decomposable leaf litter)
- Attractive appearance with good flowering and fruit bearing
- Bird and insect attracting tree species
- Sustainable green cover with minimal maintenance

1.6.6 Environmental Monitoring

Regular monitoring of critical environmental parameters is of immense importance to assess the status of environment during plant operation. Post project monitoring will be carried out as per conditions stipulated in Environmental Clearance Letter issued by MoEF, Consent issued by SPCB as well as according to CPCB guidelines.

The frequency of reporting of monitored data will be on six monthly bases to the State PCB and to Regional Office of MoEF, New Delhi. Compliance report will be submitted twice in a year for 6 months interval. The Environmental statement will be prepared for the entire year of operations and will be regularly submitted to regulatory authorities.

The monitoring plan for the project has been drawn with the following broad objectives:

- Assess the changes in environmental conditions, if any, during operation of the project.
- Monitor the effective implementation of mitigation measures envisaged for the proposed project.
- Warning of any significant deterioration in environmental quality so that additional mitigation measures may be planned in advance.

1.6.7 Environmental Cost

Out of the estimated project cost of Rs. 9747.5 crore, a cost provision of Rs. 1783.5 crore has been made towards environmental measures, including pollution control, monitoring and green belt development. The levelized cost of energy has been estimated at 463 paise per KWH.

CHAPTER-2: INTRODUCTION

2.1 PREAMBLE

2.1.1 General

Power development is one of the key infrastructure elements for the economic growth of the country. The entire Indian economy hinges on the availability of reliable and quality power at competitive rates. The state of Uttar Pradesh has ambitious plans for infrastructure & industrial development and thus requires quantum of reliable power sources.

The development of power sector in the country, since independence has been pre dominantly through the State Electricity Boards formed in each state under the Electricity (Supply) Act 1948, with responsibility of generation, transmission and distribution of electric power. THDC India Limited (Formerly Tehri Hydro Development Corporation) has entered into a MoU on 31st December 2010, with Government of Uttar Pradesh and UPPCL for setting up of 2 x 660MW Khurja Super Thermal Power Project in District Bulandshahr of State U.P. About 1200 acres of land was acquired by UPSIDC earlier at Khurja for industrial use which shall be utilized for construction of the project.

THDC was formed to execute the Tehri Dam & Power House (1000MW) project in Bhagirathi River. After implementation of Tehri Dam & Power House and Koteshwar Hydroelectric Power Project (400MW), THDC India Limited has been entrusted to execute a Thermal Power Project at Khurja in District Bulandshahr of UP along with various other hydro projects.

The present proposal is to establish 2X660 MW coal based Khurja Super Thermal Power Project for the benefit of Uttar Pradesh, Rajasthan, Uttarakhand, Himachal Pradesh and Delhi during 13th plan period. While finalizing the plant layout, provision has been made for accommodating another unit of 660 MW in future to utilize the land available optimally.

2.1.2 Purpose of Report

Economic, social and environmental changes are inherent to development. The need to avoid adverse impacts and ensure long term benefits leads to the concept of sustainability. Environmental impact assessment is used as a decision making tool in the planning stage of a developmental project. It helps to forecast the changes in environment quality due to direct or indirect consequences of the developmental activities.
As per the EIA Notification 2006 and its subsequent revisions, coal based thermal power plants; with generation capacity more than 500 MW require prior environmental clearance from the Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India. Therefore, the prime objective of this EIA report is for seeking prior environmental clearance from the MoEF&CC, Government of India. Additional objectives of the EIA study are:

- To describe the project and associated activities together with the need for implementation of the project;

- To identify and describe the baseline status of components of the natural and man-made environment likely to be affected by the project;
- To identify and quantify the environmental impacts associated with the project and recommend appropriate mitigation measures;
- To propose mitigation measures to minimize environmental deterioration and nuisance during construction and operation of the project;
- To identify, assess and specify methods, measures and standards, to be taken into consideration during detailed engineering design, construction and operation of the project;
- To identify and justify the scope for post-project environmental monitoring to ensure the implementation and the effectiveness of the environmental protection and pollution control measures; and
- To identify any additional studies necessary to fulfill the objectives to the requirements of this EIA Study.

2.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

2.2.1 Project Proposal

The proposed project is for establishment of 2 X 660 MW coal based Khurja Super Thermal Power Plant in Villages Dushahara Kherli, Jahanpur, Naiphal (Unchagaon) and Rukunpur in Bulandshahr district of Uttar Pradesh. Land required for setting-up of the project has already been acquired by UPSIDC and shall be handed-over to THDC for project implementation. Provision for future expansion by adding another unit of 660 MW has been kept in the layout considering, availability of land subsequent to re-routing of NH-91. Make-up water requirement for the plant shall be met from Upper Ganga Canal at a distance of about 8.0km. Make up water shall be drawn from the canal by constructing suitable intake structures. Depending upon analysis of water, suitable water treatment system will be provided. The power generated in the new units will be evacuated through 400 KV transmission lines.

2.2.2 Project Proponent

THDC India Limited (formerly known as Tehri Hydro Development Corporation Ltd.), is the project proponent of the proposed project. It is a Joint Venture of Govt. of India and Govt. of Uttar Pradesh. The equity is shared in the ratio of 75:25 between GoI and GoUP for the Power Component. The Company was incorporated in July' 88 to develop, operate & maintain the 2400MW Tehri Hydro Power Complex and other hydro projects. The Company has an authorized share capital of Rs. 4000 Crore. THDCIL is a Mini Ratna Category-I and Schedule 'A' CPSE.

THDCIL presently has 16 projects totaling to an installed capacity of 8,796 MW under various stages of implementation / development.

- The commissioning of the 1,000 MW Tehri Power Station by THDCIL in 2006-07 was a landmark for the Country's Power Sector. The Tehri Project is a multi purpose project

providing power benefits to the northern region, irrigation benefits to Uttar Pradesh, and drinking water benefits to NCT Delhi and U.P.

- The 400 MW Koteshwar HEP, downstream of Tehri was commissioned in 2011-12. The 1,000 MW Tehri Pumped Storage Plant, which would utilize the Tehri and Koteshwar reservoirs as the pre-requisite upstream and downstream reservoirs, is presently under implementation.
- In addition to the 2,400 MW Tehri Hydro Complex, THDCIL is implementing the 444 MW Vishnugad Pipalkoti Hydro Electric Project (VPHEP) on river Alaknanda in Uttarakhand.
- THDCIL is also implementing 24 MW Dhukwan Small Hydro Project on Betwa River in Uttar Pradesh.
- Government of UP has allotted Khurja Super Thermal Power Plant (2 X 660 MW) in Bulandshahar District to THDCIL for implementation.
- Under India-Bhutan Co-operation in hydro Sector development, THDCIL is implementing Bunakha HEP (180 MW) and updating the DPR of Sankosh HEP (2585 MW) in Bhutan.

2.3 BRIEF DESCRIPTION OF THE PROJECT

2.3.1 Nature & Size of Project

The capacity of the proposed Super Thermal Power Project is 2X660 MW. Mode of operation of the plant is base load and type of fuel to be used in plant is coal. The daily maximum coal requirement for 2 x 660 MW units shall be approximately 5.4 million tonnes per annum based on Gross Calorific Value of 4200Kcal/kg and 2247.97 Kcal/KWh unit heat rate, considering 90% plant load factor. The makeup water for the project is proposed to be drawn from Upper Ganga Canal at a distance of about 8.0 km.

2.3.2 Location of Project

The Proposed site is located near Khurja town in Bulandshahar district of Uttar Pradesh. The site is located along NH-91 between Khurja and Aligarh. It is surrounded by villages Dushahara Kherli, Jahanpur, Naiphal (Unchagaon) and Rukunpur. It is situated at approx. 11 km from Khurja town. 36km from Aligarh and 32km from Bulandshahar Location Plan and Vicinity map, indicating the location of project site are shown in **Figure-1** & **Figure-2.**

Geographically, the site is situated between 28°08’35” to 28°10’25” northern latitude and between 77°53’47” to 77°55’22” eastern longitude.

Road Link: The proposed site is situated at a distance of 11 km (approx) from Khurja town and 36 km from Aligarh and plot is approachable from National Highway (NH-91). The proposed site is located on both sides of existing National Highway. However, NHAI has agreed to divert the road to facilitate optimum utilization of available land.

Rail Link: The Northern Railway main line passes near the Western side of the site. The nearest railway station is Danwar which is about 5 km from the site. The nearest major Railway Station is at Khurja at a distance of about 11 km on northern side.

Airport: The nearest airport is at New Delhi at a distance of approx. 90 km.

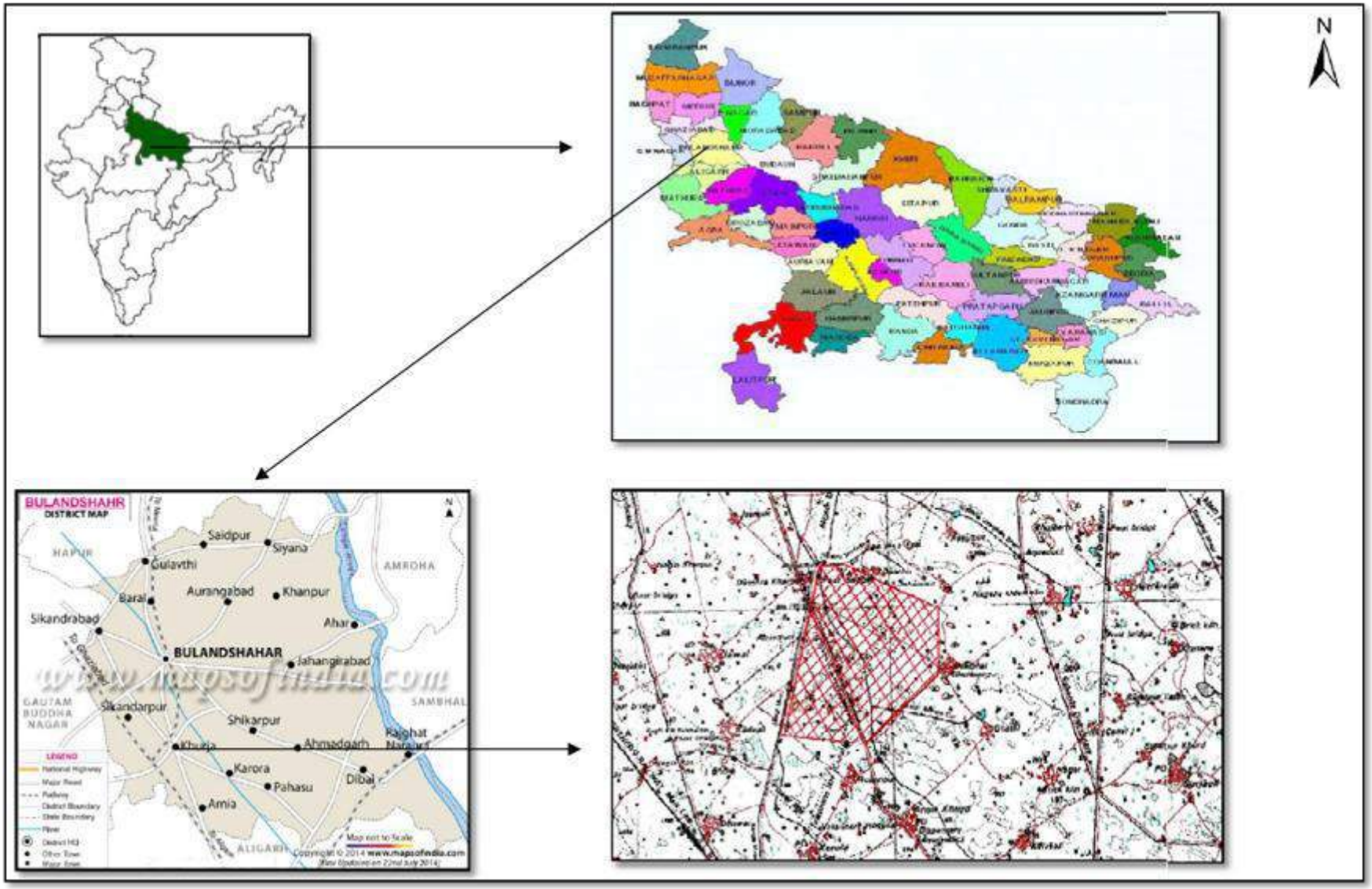


Figure 1: Location Map of the Study Area

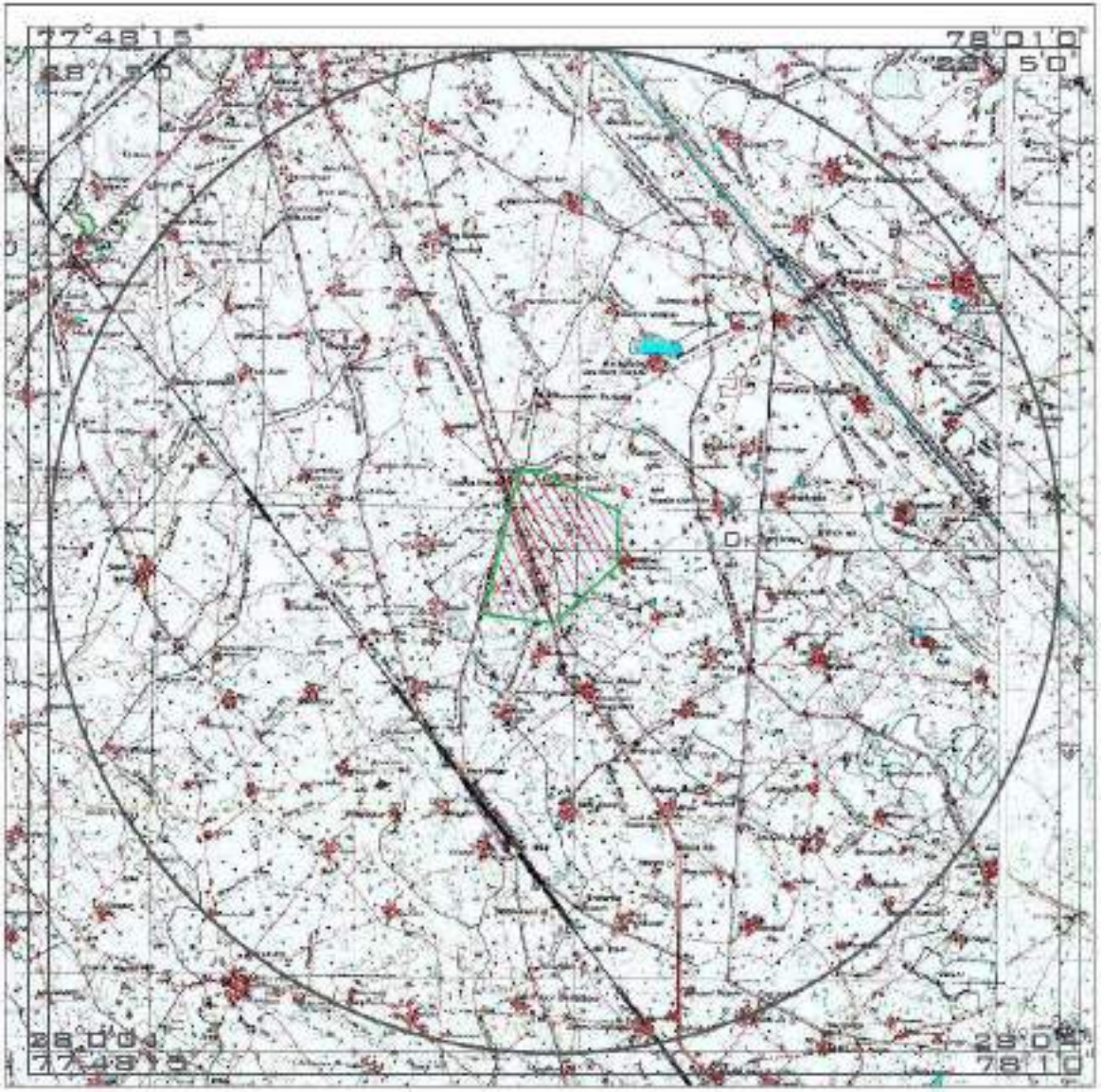


Figure 2: Vicinity Map Showing the Site and Surroundings

2.3.3 Importance of Project

Northern India has been facing an acute shortage of electric power. The proposed project will be implemented to meet the power demand of northern region beneficiaries. The power generated from the project will be evacuated through 400 KV transmission systems by Power Grid Corporation Limited. The project is expected to start yielding benefits during the end of XIII Plan Period.

THDCIL is establishing generating stations in various regions of the country for supply of power to states in the concerned and other regions. Khurja Super Thermal Power Station in the Bulandshahr, District of Uttar Pradesh is one such station being set up for supply of power to the beneficiaries of northern region and State of Uttar Pradesh. Project comprising two units of 660 MW each is being implemented at present. The Power Purchase Agreement has been signed as detailed below in **Table-3**:

Table 3: Allocation of Generated Power

S. No.	State/Agency	Share
1.	Rajasthan/Jaipur VVNL, Ajmer VVNL, Jodhpur VVNL	328MW
2.	Uttarakhand/UPCL	328MW
3.	Uttar Pradesh/UPPCL	792MW
4.	Himachal Pradesh/HPSEB	200MW
5.	Delhi/BSES Rajdhani Power Ltd	125MW

2.4 SCOPE OF THE STUDY

2.4.1 Environmental Clearance Process

The Ministry of Environment and Forests, Govt. of India, through EIA notification No. SO1533 (E) dated 14th September 2006 and subsequent amendments under the Environment Protection Act 1986 has placed thermal power plant at Sl. No. 1(d) in the list of projects requiring prior environmental clearance (Schedule). Further, as the capacity of the proposed coal based thermal power plant is more than 500 MW, it falls under category 'A' of the schedule and shall require prior environmental clearance from the Central Government in the Ministry of Environment, Forest & Climate Change (MoEF&CC) on the recommendations of an Expert Appraisal Committee (EAC) constituted by the Central Government.

The Environmental Clearance process for the project will comprise of three stages. These stages in sequential order are given below:-

1. Scoping,
2. Public consultation, and
3. Appraisal

Scoping of the EIA study (in the form of Terms of Reference) has already been carried out by MoEF, New Delhi, after the presentation for obtaining Terms of Reference (TOR) before the Expert Appraisal Committee during its 32nd Meeting held during September 12-13, 2011. The same was communicated vide MoEF letter no. J-13012/100/2011-IA.II(T) dated 27.10.2011.The compliance of the conditions stipulated in TOR is presented below in **Sub-section-2.4.3**. The prescribed Terms of Reference have been extended twice and are valid up to 26th October, 2015.

THDCIL has engaged M/s Mantec Consultants Pvt. Ltd., New Delhi to carry out Environmental Impact Assessment (EIA) Study for the project. The assessment covers the baseline data generation, predictions and evaluation of impact on various environmental components and formulation of Environmental Management Plan and Disaster Management Plan.

The draft EIA report, prepared as per the "Generic Structure of Environmental Impact Assessment Document (Appendix III of EIA Notification)", taking into account the Terms of Reference issued by MoEF, was submitted to the Uttar Pradesh SPCB, Uttar Pradesh for the public consultation. The comments/suggestions from the public have been addressed and this final report is being submitted to MoEF&CC for appraisal of the proposed project. The report has been prepared using the following references:

- ✓ Technical EIA Guidance Manual for Thermal Power Plants, Prepared for Ministry of Environment and Forests, by IL&FS Ecosmart Limited 2010
- ✓ Form-1 as per EIA Notification, 14th September, 2006
- ✓ Pre-Feasibility Report
- ✓ Detailed Project Report
- ✓ Baseline data generated from the area and collected from secondary sources
- ✓ In addition, other relevant standards for individual activities such as sampling and testing of environmental attributes have been followed.

2.4.2 Regulatory Compliances

All the regulatory compliances related to the proposed project are provided as per the chronological sequence in the **Table-4** and **Table-5** given below:

Table 4: Steps Taken for Environment Clearance till Date

PARTICULARS	DETAILS
Submission of Form-1 and PFR	Form-1 and Pre-feasibility report (PFR) for the Khurja Super Thermal Power Project was submitted to MoEF on 19.08.2011.
Issue of Terms of Reference	A term of Reference (TOR) has been granted vide MoEF letter no. J-13012/100/2011-IA.II (T) dated 27.10.2011. (Refer **Annexure-I**)
ToR Amendment	Validity period of the Terms of Reference was extended {vide letter no.J-

& Extension	13012/100/2011-IA.II(T)dated 15.01.2015} for one year till 26.10.2015 for submission of Final EIA/EMP reports and other requisite documents for consideration of environmental clearance. Additionally, during second extension of the validity of TOR an amendment in TOR was accorded by MoEF&CC for the layout of the Project by utilising entire Plot of 1200.843 acre land, with provision for future expansion by additional 1 x 660 MW Unit subsequent to re-routing of NH-91. (Refer **Annexure-II**)
Public Hearing	Public hearing for the project was held on 1st August, 2015. Issued raised during the public hearing have been addressed in the report. (Refer **Annexure-III**)

Table 5: Statutory Compliances

PARTICULARS	**DETAILS**
Consent from State Government	The project has been allotted to THDCIL by Government of Uttar Pradesh and MOU for implementation of power project has been done vide letter no. AM491400 dated 31.12.2010.(Refer **Annexure-IV**)
In-principle Land Availability Clearance	UPSIDC has transferred the identified land to the project proponent, THDCIL for setting up Khurja STPP vide letter no. 788/SIDC/ABGopCentreKhurja-III dated 07.09.2011. (Refer **Annexure-V**)
In-principle Water Availability Clearance	The Government of Uttar Pradesh has accorded its commitment for release of required water from Upper Ganga Canal vides letter no. 48/MU No.14-27-Irr.-4-136(W)/11 dated 12.06.2014. (Refer **Annexure-VI**)
Coal Linkage	THDC has been allotted Amelia Coal Mine by Ministry of coal, Govt. of India vide F. No. 13016/9/2014-CA-II(Pt. II) dated 29th August, 2016. The coal block has already been accorded environmental clearance.(Refer **Annexure-VII**)
NOC from Airport Authority of India	No objection certificate has already been issued by Airport Authority of India for construction of 275m high chimney by THDC at the proposed location of the Plant vide letter no. AAI/NOC/2011/277/2169-73 dated 18.07.2011. (Refer **Annexure-VIII**)
In-principle Consent of NHAI for NH Re-routing	NHAI has given in-principle approval for re-routing of NH-91 falling under area of proposed Khurja Super Thermal Power Plant vide letter no. NHAI/13013/655/CO/11-12/GC Ghz-Ali/BOT/45285 dated 29.10.2013. (Refer **Annexure-IX**)

2.4.3 Compliance of Terms of Reference

The statement of compliance to the terms of reference is as follows in **Table-6.**

Table 6: Statement of ToR Compliance

S. No.	Terms of Reference	Compliance
i.	Vision document specifying prospective long term plan of the site shall be formulated and submitted.	Vision document is enclosed as **Annexure-XI**.
ii.	Status compliance to the conditions stipulated for environmental and CRZ clearances of the previous phase(s), as applicable, shall be submitted.	Not applicable.
iii.	Executive summary of the project indicating relevant details along with photograph of site shall be provided and responses to the issues raised in public hearing and to the written representations (if any) along with action plan and budgetary allocations to address the same shall, be provided in tabular form, against each action proposed.	Executive Summary has been enclosed in EIA/EMP Report as **Chapter-1** and details of public hearing are given in **Section-1.5** of **Chapter-1**. Details of Public Hearing Proceedings & action Plan in **Section-8.1** of **Chapter-8** in EIA/EMP report.
iv.	Harnessing solar power within the premises of the plant particularly at available rooftops and other available areas shall be formulated and status of implementation shall be submitted to the Ministry.	Harnessing of solar power will be done as per the norms at the detailed engineering stage.
v.	The coordinates of the approved site including location of ash pond shall be submitted along with toposheet (1:50,000 scale) and confirmed GPS readings of plant boundary, ash pond with respect to HFL of water body/nallah/river shall be specified, if the site is located in proximity to them.	The project site is bound between latitudes from 28°10.407' N to 28°08.586' N and longitudes from 77°55.373' E to 77°53.783' E. Coordinates on toposheet are shown in **Figure-2** in **Subsection-2.3.2** of **Chapter-2** of EIA/EMP report.
vi.	Layout plan indicating break-up of plant area, ash pond, area for green belt, infrastructure, roads etc. shall be provided.	Layout plan details and land breakup details has been given in **Subsection-3.2.1** and **3.4.1** of **Chapter-3** in EIA/EMP report. Layout plan has been enclosed as **Exhibit-2**.
vii.	Layout shall be revised keeping 500 m distances on either side of the National Highway.	Layout has been revised and In-Principle consent from NHAI for NH re- routing has been obtained. (Refer **Annexure-IX**)

S. No.	Terms of Reference	Compliance
viii.	Land requirement shall be restricted to 850 acres.	Central Electricity Authority, vide letter No. 166/GC/BO/TPI/CEA/3578 dated 28-12-2012 (Anexure-5A), have stated that the land requirement of 1362 acres is in order. Further MoEF&CC on dated 15.01.2015 has issued an amendment to the TOR for layout of the project by utilizing entire plot of 1200.843 acre land with provision of future expansion by additional 1 x 660 MW unit subsequent to re-routing of NH-91.
ix.	Land requirement for the project shall be optimized and in any case not more than what has been specified by CEA from time to time. Item wise break up of land requirement and revised layout (as modified by the EAC) shall be provided.	Land breakup for Khurja STPP as per CEA norms has been given in **Subsection-3.2.1**&**3.4.1** of **Chapter-3** of EIA/EMP report. The same has been found in order by CEA (CEA letter at Anexure-5A).
x.	Present land use as per revenue records (free of all encumbrances of the proposed site, shall be furnished. Information on land to be acquired) if any, for coal transportation system as well as for laying of pipeline including ROW shall be specifically stated.	Present landuse has been given in **Subsection-4.2.3** of **Chapter-4**. Details of land identification for routing of railway line & water pipeline are under process.
xi.	The issues relating to land acquisition and R & R scheme with a time bound Action Plan should be formulated and clearly spelt out in EIA report.	Study for R & R issue has been given in **Section-8.4 of Chapter-8** in EIA/EMP report.
xii.	Satellite imagery or authenticated toposheet indicating drainage, cropping pattern, water bodies (wetland, river system, stream, nallahs, ponds etc.), location of nearest villages, creeks, mangroves, rivers, reservoirs etc in the study area shall be provided.	Landuse Map based on satellite imagery has been given in **Figure-6** in **Subsection-4.2.3** in **Chapter-4** of EIA/EMP report.
xiii.	Location of any National park, Sanctuary, Elephant/tiger Reserve (existing as well as proposed), migratory routes/ wildlife corridor, if any, within 10 km of the project site shall be specified and marked on the map duly authenticated by the Office of Chief Wildlife	No National park, Sanctuary, Elephant/tiger Reserve (existing as well as proposed), migratory routes, exist within 10 km of the project site.

S. No.	Terms of Reference	Compliance
	Warden of the area concerned.	
xiv.	Topography of the area supported by toposheet on 1:50.000 scale of Survey of India, along with a large scale map preferably of 1:25,000 scale and the specific information whether the site requires any filling shall be provided. In that case, details of filling, quantity of fill material required; its source, transportation etc. shall be submitted.	Project location on toposheet is given in **Figure-2** of **Chapter-2** of EIA/EMP report. Some minor filling at main plant site will be one by utilizing the soil extracted from the areas identified for raw water reservoir and ash ponds.
xv.	A detailed study on land use in the study area shall be carried out including identification of common property resources (such as grazing and community land, water resources etc.) available and Action plan for its protection and management shall be formulated. If acquisition of grazing land is involved, it shall be ensured that an equal area of grazing land to be acquired is developed alternatively and details plan shall be submitted.	Please refer **Section-4.2** of **Chapter-4** for detailed information.
xvi.	A mineralogical map of the proposed site (including soil type) and information (if available) that the site is not located on economically feasible mineable mineral deposit shall be submitted.	No mineral deposit located within the plant site and ash pond.
xvii.	Details of 100% fly ash utilization plan as per latest fly ash Utilization Notification of GOI along with firm agreements/MoU with contracting parties including other usages etc. shall be submitted. The plan shall also include disposal method / mechanism of bottom ash.	Market study for ash utilization was conducted in the year 2012. Based on this, the Ash Utilization Plan has been prepared. The same has been described briefly in **Subsection-10.3.4** of the EIA/EMP report.
xviii.	Water requirement, calculated as per norms stipulated by CEA from time to time, shall be submitted along with water balance diagram. Details of water balance calculated shall take into account reuse and recirculation of effluents which shall be explicitly specified.	Water requirement for Khurja STPP as per CAE norms is given **Subsection-3.2.2** of **Chapter-3**. The plant to be operated with zero effluent discharge by quantitative recycle of waste water streams. Please refer **Exhibit-6** for Water Balance Diagram and for reuse and recirculation of effluents in **Chapter-3**.
xix.	Water body/nallah (if any) passing across the site should not be disturbed as far as possible.	The drain (Aligarh Drain) passing through the site will be re-routed

S. No.	Terms of Reference	Compliance
	In case any nallah / drain have to be diverted, it shall be ensured that the diversion does not disturb the natural drainage pattern of the area. Details of diversion required shall be furnished which shall be duly approved by the concerned department.	within the site itself.
xx.	It shall also be ensured that a minimum of 500 m distance of plant boundary is kept from the HFL of river system / stream etc.	Not applicable.
xxi.	Hydro-geological study of the area shall be carried out through an institute / organization of repute to assess the impact on ground and surface water regimes. Specific mitigation measures shall be spelt out and time bond action plan for its implementation shall be submitted.	Please refer **Section-4.3.1** of **Chapter-4** for hydrology study. The plant will be operated with zero effluent discharge, and the ash ponds will be provided with impervious lining. Therefore, impact on ground or surface water regime is not forseen.
xxii.	Detailed studies on the impacts of the ecology including fisheries of the wastewater into the river / creek/sea etc. shall be carried out and submitted along with the EIA report. In case of requirement of marine impact assessment study, the location of intake and outfall shall be clearly specified along with depth of water drawl and discharge into open sea.	Impact on ecology has been given in **Section-5.7** of **Chapter-5** of EIA/EMP Report.
xxiii.	Source of water and its sustainability even in lean season shall be provided along with details of ecological impacts arising out of withdrawal of water and taking into account inter-state shares (if any). Information on other competing sources downstream of the proposed project. Commitment regarding availability of requisite quantity of water from the competent authority shall be provided along with letter / document stating firm allocation of water.	Please refer to **Annexure-6**. The source of water for this proposed project will be Upper Ganga canal. The distributaries of the canal shall be lined to minimize the loss of water presently being incurred due to seepage, and the water so saved will be utilized for the project.
xxiv.	Detailed plan for carrying out rainwater harvesting and its proposed utilization in the plan shall be furnished	Rain water harvesting provision has been considered and will be carried out in consultation with Central Groundwater Board. An amount of Rs. 1.5 Crore has been allocated for rainwater harvesting.

S. No.	Terms of Reference	Compliance
xxv.	Feasibility of zero discharge concept shall be critically examined and its details submitted.	Please refer **Exhibit-6** for Water Balance Diagram and for reuse and recirculation of effluents in **Sub-section-3.4.6** & **3.5.2** of **Chapter-3**.
xxvi.	Optimization of COC along with other water conservation measures in the project shall be specified	The cycle of concentration has been Optimized to >5 COC, and the same has been described in **Chapter-3**.
xxvii.	Plan for recirculation of ash pond water and its implementation shall be submitted.	Plan for Recirculation of Ash Pond Water has been provided in **Subsection-10.3.4** of **Chapter-10**.
xxviii.	Detailed plan for conducting monitoring of water quality regularly with proper maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface / ground water) shall be submitted. It shall be ensured that parameter to be monitored also include heavy metals	Please refer **Chapter-7** for monitoring program. For the parameters of water quality monitoring refer **Subsection-4.3.2** of **Chapter-4**.
xxix.	Socio-economic study of the study area comprising of 10 km from the plant site shall be carried out by a reputed institute / agency which shall consist of detail assessment of the impact on livelihood of local communities.	Details of Socio-economic study have been given in **Section-4.8** of **Chapter-4**.
xxx.	Action plan for identification of local employable youth for training in skills, relevant to the project, for eventual employment in the project itself shall be formulated and numbers specified during construction and operation phases of the project	Please refer to **Chapter-4.**
xxxi.	If the area has tribal population it shall be ensured that the rights of tribals are well protected. The project proponent shall accordingly identify tribal issues under various provisions of the law of the land	No tribal population exists in the area.
xxxii.	A detailed CSR plan along with activities wise break up of financial commitment shall be prepared. CSR component shall be identified considering need based assessment study. Sustainable income generation measures which can help in upliftment of poor section of	Corporate Social Responsibility of THDCIL has been incorporated in Chapter 10, sub-section 10.7 and also CSR & Sustainability Policy-2015 of THDCIL has been enclosed as **Annexure-10**.

S. No.	Terms of Reference	Compliance
	society, which in competent with the traditional skills of the people shall be identified. Separate budget for community development activities and income generating programmes shall be specified	
xxxiii.	While formulating CSR schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest government institute of repute in the region shall be prepared. The project proponent shall also provide action plan for the status of implementation of the scheme from time to time and dovetail the same with any govt. scheme(s). CSR details done in the past should be clearly spelt out in case of expansion projects.	Corporate Social Responsibility of THDCIL has been incorporated in Chapter 10, sub-section 10.7 and also CSR & Sustainability Policy-2015 of THDCIL has been enclosed as **Annexure-10**.
xxxiv.	R & R plan, as applicable, shall be formulated wherein mechanism for protecting the rights and livelihood of the people in the region who are likely to be impacted, is taken into consideration. R & R plan shall be formulated after a detailed census of population based on the socio-economic surveys who were dependant on land falling in the project, as well as, population who were dependant on land not owned by them.	R&R plan is required. It has been given in **Section-8.4** of **Chapter-8**.
xxxv.	Assessment of occupational health as endemic diseases of environmental origin shall be carried out and action plan to mitigate the same shall be prepared.	Please refer **Section-7.2** of **Chapter-7**.
xxxvi.	Occupational health and safety measures for the workers including identification of work related health hazards shall be formulated. The company shall engage full time qualified doctors who are trained in occupational health. Health monitoring of the workers shall be conducted at periodic intervals and health records maintained. Awareness programme for workers due to likely adverse impact on their health due to working in non-conducive	Please refer to **Chapter-10 sub-section 10.6**.

S. No.	Terms of Reference	Compliance
	environment shall be carried out and precautionary measures like use of personal equipments etc shall be provided. Review of impact of various health measures undertaken at intervals of two years shall be conducted with an excellent follow up plan of action wherever required.	
xxxvii.	One complete season site specific meteorological and AAQ data (except monsoon season) as per MoEF Notification dated 16-11-2009 shall be collected and the dates of monitoring recorded. The parameters to be covered for AAQ shall include SPM, RSPM, (PM10, PM2.5), SO2. NOx, Hg and O3 (ground level). The location of the monitoring stations should be so decided so as to take into consideration the pre-dominant downwind direction, population zone, villages in the vicinity and sensitive receptors including reserved forests. There should be at-least one monitoring station each in the upwind and in the pre-dominant downwind direction at a location where maximum ground level concentration is likely to occur.	Site specific meteorological and AAQ data have been collected during two complete seasons (Post-monsoon season of 2012 and pre-monsoon season of 2016), and the results are given in **Section-4.4** and **4.5** of **Chapter-4**.
xxxviii.	A list of industries existing and proposed in the study area shall be furnished	No major industries are present in the study area.
xxxix.	Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be well assessed. Details of the model used and the input data used for modeling shall also be provided. The air quality contours should be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The wind roses should also be shown on the location map as well.	Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area is given in **Section-5.5** of **Chapter-5**.
xl.	Radio activity and heavy metal contents of coal to be sourced shall be examined and submitted along with laboratory reports.	Coal block has been recently accorded for the project and the studies are in progress.
xli.	Fuel analysis shall be proved. Details of auxiliary fuel, if any, including its quantity,	Please refer to **Subsection-3.2.3** of **Chapter-3** for tentative analysis of

S. No.	Terms of Reference	Compliance
	quality, storage etc should also be furnished.	coal likely to be used.
xlii.	Quantity of fuel required, its source and characteristics and documentary evidence to substantiate confirmed fuel linkage shall be furnished.	Please refer to **Subsection-3.2.3** of **Chapter-3**. THDC has been allotted Amelia Coal Mine by Ministry of coal, Govt. of India vide F. No. 13016/9/ 2014-CA-II(Pt. II) dated 29th August, 2016 (Refer **Annexure-VII**)
xliii.	Details of transportation of fuel from the source (including port handling) to the proposed plant and its impact on ambient AAQ shall be suitably assessed and submitted. If transportation entails a long distance it shall be ensured that rail transportation to the site shall be first assessed. Wagon loading at source shall preferably be through silo / conveyor belt.	Please refer to **Subsection-3.4.4** of **Chapter-3.**
xliv.	For proposals based on imported coal, inland transportation and port handling and rolling stocks / rail movement bottle necks shall be critically examined and details furnished.	Not applicable
xlv.	Details regarding infrastructure facilities such as sanitation, fuel, restrooms, medical facilities, safety during construction phase etc to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase should be adequately catered for and details furnished.	Please refer to Chapter-9.
xlvi.	EMP to mitigate the adverse impacts due to the project along with item-wise cost of its implementation and time bound manner shall be specified.	EMP has been given in **Chapter-10.**
xlvii.	A Disaster Management Plan (DMP) along with risk assessment study including fire and explosion issues due to storage and use of fuel should be carried out. It should take into account the maximum inventory of storage at site at any point of time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same,	Risk assessment has been given in **Section-8.2** and DMP has been given in **Section 8.3** of **Chapter-8**.

S. No.	Terms of Reference	Compliance
	proposed safeguard measures should be provided. Measures to guard against fire hazards should also be invariably provided.	
xlviii.	The DMP so formulated shall include measures against likely Tsunami / Cyclones / Storm Surges / Earthquakes etc., as applicable. It shall be ensured that DMP consists of both on-site and off-site plan, complete with details of containing likely disaster and shall specifically mention personnel identified for the task. Smaller version of the plan shall be prepared both in English and local languages.	DMP has been given in **Section 8.3** of **Chapter-8**.
xlix.	Detailed plan for raising green belt of native species of appropriate width (50 to 100 m) and consisting of at-least 3 tiers around plant boundary (except in areas not possible) with tree density of 2000 to 2500 trees per ha with a good survival rate of about 80% shall be submitted. Photographic evidence must be created and submitted periodically including NRSA reports.	Green belt development plan has been given in **Subsection-10.3.5**.
l.	Over and above the green belt, as carbon sink, additional plantation shall be carried out in identified blocks of degraded forests; in close consultation with the District Forests Department in pursuance to this the project proponent shall formulate time bound action plans along with financial allocation and shall submit status of implementation to the ministry every six months.	Additional plantation will be carried out in identified blocks of degraded forests; in close consultation with the District Forests Department. Status report of implementation will be submitted to the ministry in every six months.
li.	Corporate Environment Policy	Please refer to **Annexure-XII**.
lii.	a. The company to have a well laid down Environment Policy approved by its Board of Directors	Please refer to **Annexure-XII**.
	b. The environment policy must prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions.	Please refer to **Section-10.4** of **Chapter-10**.
	c. The hierarchical system or administrative order of the company to deal with the	Please refer to **Section-10.4** of **Chapter-10**.

S. No.	Terms of Reference	Compliance
	environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished	
	d. To have proper checks and balances the company should have a well laid out system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large. All the above details should be adequately brought out in the EIA report and in the presentation to the committee.	Please refer to **Section-10.4** of **Chapter-10**.
liii.	Details of litigation pending or otherwise with respect to project in any court, tribunal etc shall invariably be furnished	No litigation is pending.

2.4.4 Brief Description of EIA Studies

The study area of the EIA covers an area within 10km radius around the proposed project site. The scope of the study comprises of the following stages:

- Description of the proposed project, description of proposed site and surrounding area, description of alternate sites, and analysis of alternatives.
- Establishing baseline data of the study area.
- Identification of expected pollution load due to various activities during construction and operational phases of the project.
- Impact Assessment to predict the post-project scenario, including prediction of increase in levels of pollutants in the study area due to the proposed activity.
- Environmental Management Plan outlining the measures for improving the environment quality and scope for sustainable development in future.
- Risk Assessment and Disaster Management Plan, Occupational Health & Safety Plan and Green Belt Development Plan.

The baseline environmental scenario has been established through primary data generated in the study area and secondary data available at site/published in literature. The field monitoring was performed during the post-monsoon season from October, 2012 to December, 2012. To validate the ambient air quality data, the air quality survey was repeated for one full season, from March to May, 2016. The EIA Report is based on primary data for meteorology, air quality, water quality, ecology, soil & noise and simultaneously secondary data for all other environmental components from October to December, 2012. The baseline environmental scenario has been presented in **Chapter-4**.

2.4.5 Structure of EIA Report

The EIA report has been structured as per Appendix-III of the EIA Notification, 2006 (generic structure of environmental impact assessment document), the ToR prescribed by the MoEF&CC, and the nature of the proposed project. Structure of the present EIA report is presented in **Table-7**.

Table 7: Structure of EIA Report

Chapter	EIA Structure	Contents
1.	Executive Summary	Summary of the EIA report, giving prima facie idea of the goals, objectives, significance and other salient features of the project.
2.	Introduction	Purpose of the report Identification of project & project proponent Nature, size, and magnitude of operations Location (maps showing general location, specific location, project boundary & project site layout) Proposed schedule for approval and implementation Scope of the study – details of regulatory scoping carried out (as per Terms of Reference)
3.	Project Description	Type of project Need & Importance of the project Technology and process description, including drawings showing process flow charts, project layout, components of project etc. Description of control/ mitigation measures incorporated into the project to meet environmental standards, environmental operating conditions, or other EIA requirements. Raw materials – source, quantity and mode of transportation Employment and Project Cost
4.	Description of the Environment	Study area, period, components & methodology Establishment of baseline for valued environmental components, viz., land, air, water, noise, ecology and socio-economics, as identified in the scope
5.	Anticipated Environmental Impacts & Mitigation Measures	Details of environmental impacts due to project location, possible accidents, project design, project construction, regular operations, final decommissioning or rehabilitation of a completed project Measures for minimizing and / or offsetting adverse impacts identified Irreversible and Irretrievable commitments of environmental components

		Mitigation measures
6.	Analysis of Alternatives	In case, the scoping exercise results in need for alternatives: Description of each alternative Summary of adverse impacts of each alternative Mitigation measures proposed for each alternative and Selection of alternative
7.	Environmental Monitoring Program	Technical aspects of monitoring the effectiveness of mitigation measures (incl. Measurement methodologies, frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules)
8.	Additional Studies	Public hearing Risk assessment Social Impact Assessment, R&R Action Plans
9.	Project Benefits	Improvements in the physical infrastructure Improvements in the social infrastructure Employment potential –skilled; semi-skilled and unskilled Other tangible benefits
10.	Environmental Management Plan	Description of the administrative aspects of ensuring that mitigation measures are implemented and their effectiveness monitored, after approval of the EIA
11.	Disclosure of Consultants Engaged	The names of the Consultants engaged with their brief resume and nature of Consultancy rendered

2.5 PROPOSED SCHEDULE &COST

2.5.1 Project Schedule

The commercial operation of the 1st unit will be in 52 months from the date of investment approval. The 2nd unit will have a phase gap of 6 months.

The implementation schedule of Khurja Super Thermal Power Project (2 x 660 MW) is indicated in **Exhibit-9**, which shows optimum schedule for the project with different activities shown in bar chart. The date of investment approval has been reckoned as the zero date of the project execution.

2.5.2 Project Execution

The major phases of the project during its implementation and execution are classified as under:

- Design and engineering phase
- Tendering and award phase
- Manufacturing of machines & equipment
- Inspection and expediting
- Construction and erection
- Commissioning

2.5.3 Project Cost

The project cost, excluding IDC and WCM, has been estimated as Rs. 97475.10 Million. The same including IDC and WCM have been estimated as Rs. 11909.57 Million. Cost of energy during 1st full year operation works out 488 paisa/kwh. The levelized cost of energy works out to 463 paisa/kwh.

CHAPTER-3: PROJECT DESCRIPTION

3.1 GENERAL DESCRIPTION

3.1.1 Type of the Project

Coal-based power generation can provide the most cost effective solution to the overall energy deficit situation. The present and anticipated shortage of electricity can be effectively dealt with efficient power generation using modern clean combustion technologies. The current policy concerns provide favourable environment to the growth of thermal power generation in the country. The country in general and northern region in particular is facing the shortage of power supply, which is impeding growth in industrial and agricultural sectors. Therefore, this project is of prime importance for the region as well as for the country.

Khurja Super Thermal Power Project (2 x 660MW) shall be a pulverized coal fired thermal power project based on super critical boiler parameters. The main components of the proposed plant include:

- Steam Generator, Turbine Generator and Auxiliary Units
- Coal Handling System including Dust Extraction and Suppression System
- Closed Cycle Cooling System with Cooling Towers
- Water & Effluent Treatment System
- Fire Protection System
- Air Conditioning & Ventilation System
- Electrostatic Precipitators, FGD system and DeNOx system
- Chimney
- Ash Handling System with Dry Ash Extraction, Storage and Wet Slurry Disposal Facilities
- Electrical Systems: Generator Bus Duct, Transformers, Switch gears, Switch yard etc.

3.1.2 Salient Features of the Project

Salient features of the proposed Khurja Super Thermal Power Plant of M/s THDCIL are given below in **Table-8**:

Table 8: Salient Features of the Proposed Project

S. N.	Items	Details
1	Project Name	Khurja Super Thermal Power Project
2	Project roponent	THDC India Limited Limited
3	Type of Project	New Project
4	Location	Near Khurja in Bulandshahr District of Uttar Pradesh
5	Proposed Plant Capacity	2 x 660 MW
6	Area available for locating the project	Approx. 516 hectares
7	Main fuel	Coal, approx. 16,300 TPD THDCIL has been allocated Amelia Coal

		Block in Singrauli are.
8	Support (start-up) fuel	LDO, quality variable
9	Make-up water	Normal consumption: 78360 m^3/day Peak consumption: 105960 m^3/day Source: Upper Ganga canal
10	Major Plant Components a) Coal handling plant b) Steam generator (boiler) c) Turbine & generator d) Cooling water system e) Demineralization Plant f) RO system for zero discharge	 Rated: 2800 TPH Design: 3080 TPH Supercritical boilers, 2 x 2120 TPH rating (MCR) at 256 kg/cm^2 pressure and 568^{0}C temperature. 2 x 660 MW EMCR power output. 144000 m^3/hr (circulation rate) 3 x 90 m^3/hr 250 m^3/hr
11	Air Pollution Control Facilities	a) High efficiency ESPs b) FGD system for control of SO_2 c) LNB &SCR for control of NOx d) Dedusting system in CHP e) Twin flue stack of 275 m height
12	Watse Water Management	a) Neutralization pit b) Oil water separator c) Coal settling ponds d) Tube settlers e) RO ststem for zero discharge f) Quantitative recycle of waste water
13	Domestic Sewage	Sewage treatment plants, and utilization of treated sewage for green belt and plantation.
14	Solid Waste Management	Utilization by downstream users and storage in impermeable lined dykes.
15	Hazardous Waste Management	Spent oil, spent catalyst, ETP sludge and used containers will be disposed through approved recyclers/agencies.
16	Area Under Green Belt	76.5 ha.
17	Township	Township with 583 dwelling units of different types, barracks for CSR, Field Hostel, Trainees hostel, Guest house, Hospital, Shopping centre, Recreation club, Auditorium, Nursery and Higher Secondary School, etc. will be located within 40.5 hectare area.
18	Annual Stream Days	365 days
19	Manpower Requirement	Construction Phase: 2000 Operation Phase: 900
20	Project Commissioning Schedule	52 months from zero date
21	Project Cost	9747.5 Crore (excluding IDC & WCM)

3.1.3 Need of the Project

Demand Estimation (12th& 13thplan)

The demand scenario has been prepared as per latest publication of Electric Power Survey (EPS-18) published by CEA and is presented below in **Table-9**:

Table 9: Energy Requirement & Peak Demand in 12th & 13th Plan

Region	Energy Requirement As per 18th EPS (MU)		Peak Demand As per 18thEPS (MW)	
	2016-17	**2021-22**	**2016-17**	**2021-22**
NR	415220	576010	60676	82784
WR	389807	535851	60259	83268
SR	364443	506589	56388	78857
ER	163294	231646	24020	33747
NER	15751	22421	2834	3905
Andaman & Nicobar	366	505	67	89
Lakshadweep	47	60	10	16
All India	**1348515**	**1872517**	**196398**	**271795**

Demand & Supply Scenario at the End of 11thPlan

Demand & Supply Scenario at the end of 11th Plan taking into account the addition of 78, 700 MW and enhanced performance has been worked out based on the demands projected in 17th Electrical Power Survey published by CEA and is presented below in **Table-10**.

Table 10: Demand & Supply Scenario at the End of 11thPlan

Region	Peak (MW)			Energy (MU)		
	Availability	**Load/ Demand**	**Deficit/ Surplus (%)**	**Availability**	**Load/ Demand**	**Deficit/ Surplus (%)**
NR	41103	48137	-14.61	282905	294841	-4.05
WR	40926	47108	-13.12	281691	294860	-4.47
SR	36456	40367	-9.69	250918	253443	-1.00
ER	24334	19088	27.49	167490	111802	49.81
NER	4759	2537	87.57	32754	13329	145.73
I'LANDS	56	88	-35.95	388	384	1.03
Total	**147634**	**157325**	**- 6.16**	**1016146**	**968659**	**4.90**

From the above, it is observed that the peak deficit still exists in the country at the end of 11th Plan to the extent of 6.16% and peak deficit of 13.12% & 14.61% in Western Region and Northern Region respectively and Energy deficit of 4.47% & 4.05% in Western Region & Northern Region respectively. Further, CEA has scaled down the feasible capacity addition during XI-Plan from 78700MW to 62374MW which will result in increase in peak and energy deficits.

Demand & Supply Scenario at the End of 12thPlan

Demand & Supply Scenario at the end of 12th Plan based on Demand projections in 17th EPS considering capacity addition of 86500MW is presented below in **Table-11**:

Table- 11: Demand & Supply Scenario at the End of 12th Plan*

Region	Peak (MW)			Energy (MU)		
	Availability	Load/ Demand	Deficit/Surplus	Availability	Load/ Demand	Deficit/ Surplus (%)
All-India	195821	218209	-10.3%	1365379	1392066	- 1.9

From the above, it can be seen that there is overall peak deficit of 10.3% and energy deficit of 1.9% exist in the country at the end of 12th Plan. Further, there is likelihood of shortfall from the projected capacity addition in the 12th/13th plan periods and as a result the energy deficit is likely to increase.

Justification

Considering the demand/supply scenarios at the end of 11th and 12th Plan Period as mentioned above, and also the likelihood of short fall in the projected capacity addition in the 13th Plan, Khurja Super Thermal Power Project (2x 660 MW), planned to be commissioned during 13th Plan period, is justified from demand supply consideration.

3.2 RAW MATERIALS & INPUTS

3.2.1 Land Requirement

The project comprising of two units of 660 MW, with provision for another unit in future, is proposed to be accommodated in 1200.843 acres of land. The site is situated on either sides of the National Highway (NH-91) in between Khurja & Aligarh. Main plant, Switchyard, Coal Handling Plant, Water System facilities, Raw Water Reservoir & Township is proposed to be located on the east side of the highway. On Western side of the highway, Ash Dyke & Railway Siding Facilities are envisaged. About 123 acres land shall be required for railway & pipe corridors outside the plant boundary. The land is fairly flat with undulations in few pockets and is not prone to flooding. It is observed that land is made up of brownish grey soil.

The National Highway (NH-91) shall be required to be re-routed to accommodate the proposed 2 units of 660 MW & 1 unit of future provision. Proposition for re-routing of NH-91 has been taken up with National Highway Authority of India (NHAI) which has provided its in-principle consent for the re-routing. The land available due to re-routing of NH shall be utilized for project construction.

Letter by CEA for land requirement of 1362 acres for Khurja STPP (2x660 MW) has been enclosed as **Annexure-5A** and land breakup as per CEA Norms for Khurja STPP is given below in **Table-12.**

Table 12: Land Breakup for Khurja STPP as per CEA Norms in Acres

S. N.	Description	As per CEA for		Calculated value for 2x660 MW
		2x500MW	3x660MW	
1.	Main plant	20	44	29
2.	Coal handling system	220	240	220
3.	Water system with NDCT	45	90	60
	Water reservoir	30	60	100
4.	Switchyard	24	28	24
5.	Miscellaneous BOP facilities, stores, roads	66	83	74
6.	Total (1 to 5 above)	405	545	507
7.	Green Belt	130	170	170
8.	Ash disposal area	250	495	330
9.	Township	100	100	100
10.	Corridors for ash slurry, raw water and coal	220	245	255
	TOTAL	**1090**	**1520**	**1362**

In view of annual closure of Upper Ganga Canal (the identified source of water) for 21 days, land requirement for water reservoir has been arrived at considering storage requirement of 25 days.

3.2.2 Make-Up Water

Make-up water requirement for the plant shall be met from Upper-Ganga Canal at a distance of about 8.0 km. Quantity of make-up water required for 2 X 660 MW would be about 3265 m^3/hr (equivalent to 2.47 m^3/KWH) with ash water recirculation system and 4415 m^3/hr with once through ash water system. The water consumption values include losses in the reservoir as well as provision for potable water in plants and the township. Make-up water is proposed to be used for condenser cooling, ash sluicing, coal dust suppression, other plant processes, and for domestic uses in the plants and the township. Make up water shall be drawn from the canal by constructing suitable intake structures. A Raw Water Reservoir with a storage capacity of 25 days make up water is envisaged considering the fact that the Upper Ganga Canal is generally closed for 25 days every year for maintenance purpose. Depending upon analysis of water, suitable water treatment system will be provided.

3.2.3 Fuel Requirement and Availability

The basic fuel for this project is coal, with LDO as start up fuel. As per the MoEF&CC notification dated 02-01-2014, the ash content in the coal transported to and used by thermal power plants has been limited to 34% on quarterly average basis. Recently, Khurja STPP of THDCIL has been allotted Amelia Coal Block, where 42% of the total coal reserve belongs to Grade 'E' (34.1 to 40.0% ash content), 24% to Grade 'D' and 22% to Grade 'C'. Although the boilers will be designed to operate with worst quality coal, the project proponent shall make suitable arrangement at the pit head to ensure that the coal transported to and used in the proposed plants contains less than 34% ash on quarterly average basis. Considering the calorific value of 4200 kcal/kg and heat rate of

2247.97 kcal/kwh, the coal requirement shall be approximately 5.4 Million Tonne per annum (16, 280 TPD) corresponding to 90% PLF. Coal will be transported through Indian Railway Systems. The broad gauge rail route distance from nearest railway station at Danwar would be approximately 5km. The Coal quality parameters considered tentatively for the EIA are as follows:

- Ash : <34%
- GCV : > 4200 (kcal/kg)
- Total moisture (average) : <13.0%

Coal from the mine will be transported in rail wagons to the site, unloaded and stored in coal yard.

3.2.4 Other Inputs

Other inputs required for operation of the project are as follows:

a) Lime stone (80% purity) : 9 TPH or 216 TPD

b) Liquid ammonia : 0.33 TPH or 8 TPD

c) Chlorine : variable quantity

d) Catalyst (For SCR) : Quantity to be determined, life approx 2 years

e) Light diesel oil (LDO) : Quantity variable.

3.2.5 Power Evacuation

The power generated in the units will be evacuated through 400KV transmission lines by. THDCIL has requested both, UP Power Transmission Corporation Limited & Power Grid Corporation Limited, to determine power evacuation system for the project.

3.2.6 Construction Power

The requirement of the construction power supply would be met from existing power supply network of UPPTCL (220kV/33kV substation located at Khurja, which is approximately 13 km from the plant site). Necessary 11 kV ring main/LT sub-station shall be provided.

3.3 TECHNOLOGY AND PROCESS DESCRIPTION

3.3.1 Process Technology

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

- The coal is transferred from the coal handling plant by conveyor belt to the coal bunkers, from where it is fed to the pulverizing mills, which grind it to fine powder. The finely powdered coal, mixed with air is then blown into the boiler by a fan where it burns like a gas.

- The process of combustion releases thermal energy from coal. The boiler walls are lined with boiler tubes containing high quality demineralized water (known as boiler feed water).

The combustion heat is absorbed by the boiler tubes and the heat converts the boiler feed water into steam at high pressure and temperature. The steam, discharged through nozzles on the turbine blades, makes the turbine to rotate, which in turn rotates the generator coupled to the end of the turbine. Rotation of generator produces electricity, which is passed to the step-up transformer to increase its voltage so that it can be transmitted efficiently. The power is evacuated via switchyard through a Transmission System.

- The Steam Generators (SG) shall be super-critical, once through type, water tube, direct pulverized coal fired, top supported balanced draft furnace, single reheat, radiant, dry bottom type, suitable for outdoor installation. The gas path arrangement shall be single pass (tower type) or two pass type having 256 kg/cm^2 pressure at super heater outlet and 568°C/ 596°C temperature at SH/RH outlet.

- During combustion, the non-combustible part of coal is converted into ash. A small part of ash (about 20%) binds together to form lumps, which fall into the ash pits at the bottom of the furnace. This part of ash, known as bottom ash is water quenched, ground and then conveyed to pits for subsequent disposal to ash disposal area or sale.

- Major part of the ash (about 80%) is in fine powder form, known as Fly Ash, and is carried out of the boiler along with the flue gas. The flue gas, after heat recovery, is passed through the electrostatic precipitators, where the ash is trapped by electrodes charged with high voltage electricity.

- For control of SO_2 and NOx, the FGD system and SCR in combination with LNB has been provided. The flue gases are finally discharged through a tall chimney for wider dispersal of remaining ash particles and gases.

- The ash collected in the ESP hoppers is extracted in dry form and conveyed to dry ash storage silos from where it is supplied to user industries. Unused part of fly ash is mixed with water and conveyed to ash disposal area.

- The steam after passing through the turbines is condensed back into water in condensers and the same is re-used as a boiler feed water for making steam. The reasons for condensing and re-using the steam are following: -
  - The cost of boiler feed water is very high as it is very pure demineralised water hence reuse is economical.
  - The use of condenser lowers the temperature at the exit end and hence increases the efficiency of the turbine.

- The condenser contains tubes through which cold water is constantly pumped. The steam passing around the tubes of condenser looses heat and condenses as water. During this process, the steam gets cooled while cooling water gets heated up (by about 10°C). This hot water is cooled in a cooling tower and recycled for cooling. However, in order to control dissolved solids, a certain amount of blowdown is required from the cooling towers, which is used in the plant for other usages such as service water, coal dust suppression etc.

Schematic diagram of the process is shown below in **Figure-3**.

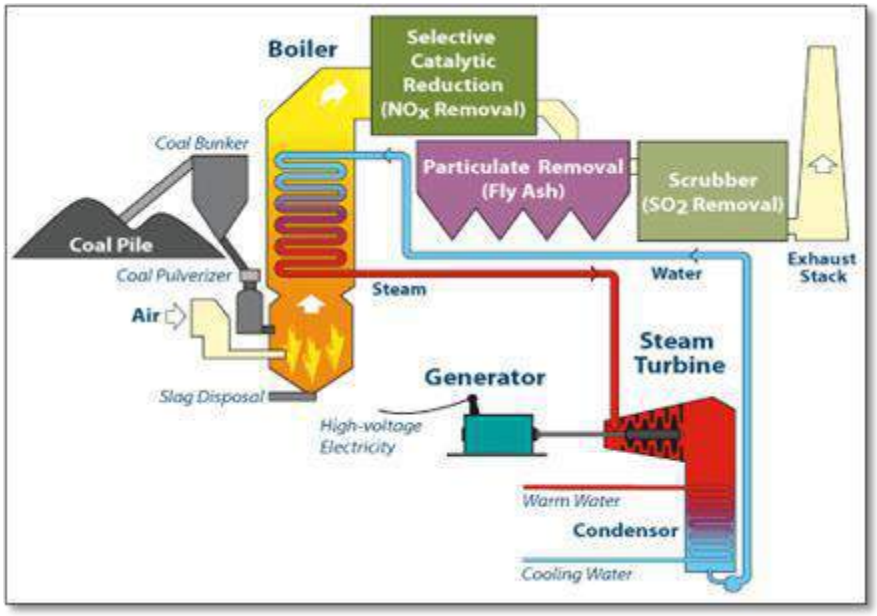


Figure 3: Schematic Diagram for Coal Based Thermal Power Plant

3.3.2 Process Description

The process flow chart of power generation in a coal based thermal power plant is shown below in **Figure-4**. It has the following steps:

- Coal is unloaded from railway wagons with wagon tipplers.
- The coal is transferred by conveyor belt to the coal bunkers, from where it is fed to the pulverizing mills, which grind it to fine powder.
- The finely powdered coal, mixed with air is then blown into the boiler by a fan where it burns like a gas. The process of combustion releases thermal energy from coal.
- The boiler walls are lined with boiler tubes containing high quality demineralized water (known as boiler feed water). The combustion heat is absorbed by the boiler tubes and the heat converts the boiler feed water into steam at high pressure and temperature.
- The steam, discharged through nozzles on the turbine blades, makes the turbine to rotate, which in turn rotates the generator coupled to the end of the turbine.
- Rotation of generator produces electricity, which is passed to the step-up transformer to increase its voltage so that it can be transmitted efficiently.
- The power is evacuated via switchyard through a Transmission System.
- The used steam from the turbines is condensed in Condensers, and recycled to the boiler feed water system.
- Hot water from the condenser cooling system is cooled in cooling towers and recycled to the system.
- Sensible heat of the flue gas is recovered and the flue gas.
- During combustion, the non-combustible part of coal is converted into ash. A small part of ash (about 20%) binds together to form lumps, which fall into the ash pits at the bottom of

the furnace. This part of ash, known as bottom ash is water quenched at ground and then conveyed to pits for subsequent disposal to ash disposal area or sale.

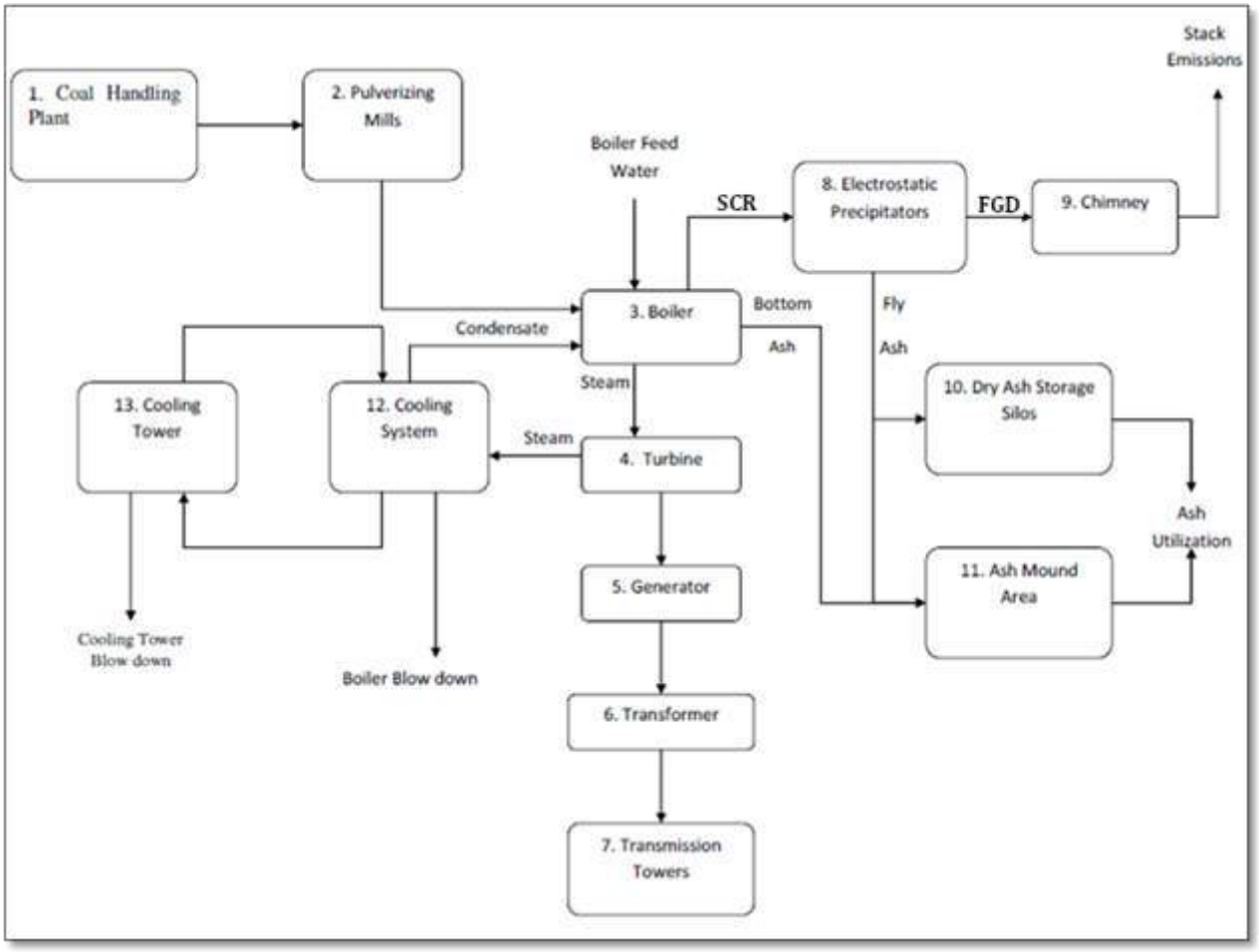


Figure 4: Process Flowchart of Coal Based Thermal Power Plant

3.4 PROPOSED PLANT SYSTEMS

3.4.1 Plant Layout

The general layout plan for the project has been developed taking various aspects into consideration like available land and shape, ground features and terrain, corridor for outgoing transmission lines, road/rail approaches, prevailing wind direction, the water drawl and the associated pipe corridor. GLP has been prepared providing facilities/structures for proposed 2 units of 660 MW and space provisions for future expansion by one unit of 660 MW.

The switchyard orientation has been planned taking into consideration the requirement of power evacuation with space provision for third unit. The main power house is along East-West direction with space provision for third unit. Permanent facilities like Workshop, Permanent stores etc. are located close to the main plant facilities. The Chimney is towards West of main plant. The ash slurry/ash water pump house is kept near chimney. The intake/discharge ducts have been routed in the corridor between transformer yard and switchyard and location of CWPH is chosen, so as to

minimize the length of CW ducts. The FGD system shall be kept towards West of main plant beyond chimney. The cooling towers have been located considering the safe distances from the switchyard and the main plant. The water treatment plant and the DM water facilities are located close to main plant. Coal handling plant and the coal stockyard are located towards south of the main plant considering the railway siding from west side. Raw Water Reservoir has been provided on southern side of the main plant. Ash dyke has been provided on the western plot with lagoons for Bottom Ash & HCSD.

Adequate space provision has been kept in the layout for future third unit, lay-down & pre-assembly activities, open stores, contractor's offices and stores etc. Construction offices and storage sheds are located conveniently. Administration Building is proposed to be located outside the plant boundary with separate access.

50-100 m wide green belt has been provided all along the periphery of the plant boundary.

The plant layout has been enclosed as **Exhibit-2** in the report.

The equipment layout plan (at EL 0.00M) & (at EL 8.5M/17.0M/24.0M/32.8M/38.4M/41.0M), main plant cross-section for the proposed project is enclosed as **Exhibit-3, 4, 5** respectively.

Break-up of land use in the proposed plant layout is presented in **Table-13.**

Table- 13: Break-up of Land Required for Different Facilities

S. N.	Facility	Area, hectare
1.	Plant Facilities	53.8
2.	Ash Disposal	111.7
3.	Storage (Fuel)	40.9
4.	Storage (Water)	45.3
5.	Storage (Hazardous Waste)	Nil
6.	Storage (Hazardous Chemicals)	Nil
7.	Railway siding	55.8
8.	CT, WTP, etc area	50.6
9.	Township	40.5
10.	Green Belt	76.5
11.	Misc. facilities & roads	41.7
	Total Plant area	***516.4***
	Corridor for railway siding	34.3
	Corridor for make-up water pipe	15.3
	Total, outside plant area	***49.6***
	Total land area	**566.0**

3.4.2 Foundation System

- All major foundations of equipment and structure shall be supported on pile foundations.
- Turbo Generator (TG), ID, PA & FD Fans shall be supported on a RCC top deck, which shall rest on steel helical spring units and viscous dampers.

- For TG foundation, steel helical spring units & viscous dampers shall be supported on an RCC, framed sub-structure. The sub-structure shall be supported on a base-mat. Steel helical spring units & viscous dampers for ID, PA, & FD Fans shall be supported on RCC sub-structure which in turn shall be supported on base raft.
- Turbine driven Boiler Feed pump (TDBFP) and Motor driven Boiler Feed pump (MDBFP) shall be supported on RCC deck, which shall rest on steel helical springs and viscous dampers, which in turn shall be supported on steel beams resting on main power house columns and auxiliary columns.
- The mill foundation shall consist of RCC block supported on pile foundation.

3.4.3 Structural System

- The building shall be multi-span framed structures consisting of structural steel columns, beams and trusses. This shall be braced in longitudinal direction and moment resistant in transverse direction.
- Main power house building shall comprise of turbo generator (AB) bay and multi-level heater (BC) bay. All platforms and floors shall be supported on structural steel.
- Service Building cum Control tower shall be of RCC structural framing. It shall be a separate building near gable end of the main power house.
- Mill/bunker building shall be single span multi-storey framed structure consisting of structural steel beams, columns and bunkers. The bunker shall be of Mild Steel.
- Overhead conveyor galleries in the main plant (boiler area) shall be of structural steel frame with cladding and roofing. Transfer points and intermediate supporting trestles shall be made of braced steel framed structures.
- Structural steel trestles and galleries with provision of walkway with grating shall be provided for supporting overhead cables and pipes in the main plant and outlying areas. However, for below ground routing, RCC trench with removable pre-cast concrete covers / box culverts shall be provided.
- Pipes and cables running along the boiler structure, mill & bunker buildings and ESP structures etc shall be supported on steel girders resting on the steel bracket fixed to the boiler/ ESP / mill & bunker building structures.

3.4.4 Coal Handling & Transportation System

Coal Transportation

The daily coal requirement for 2 X 660 MW units shall be about 16, 300 tonnes based on less than 34% ash, with average gross calorific value of 4200 Kcal/kg, 90% plant load factor and 2248 Kcal/kwh unit heat rate. The envisaged mode of coal transportation from the coal mines to the power plant is by Indian Railways rakes. The rakes shall be unloaded at the wagon tippler terminal.

Coal Handling

- It is proposed to have one coal handling plant of 2800 MTPH rated capacity to cater to ultimate plant capacity of 3 X 660 MW.

- Coal stockyards proposed shall have crushed coal storage capacity equivalent to about 30 days coal consumption for 3 x 660 MW units.
- Coal Handling Plant shall be parallel double stream (one working and one standby) of belt conveyors along with facilities for receiving, unloading, crushing and conveying the crushed coal to boiler bunkers and stacking/ reclaiming the coal to/ from crushed coal stockyards. Two numbers of uni-directional, rail mounted, travelling stacker-reclaimers, and bucket wheel type are proposed for coal stockyard management.
- Coal handling plant shall have a dedicated coal unloading terminal. For unloading BOX-N wagon rakes four (4 no's) Wagon Tipplers shall be provided.
- The overall operating hours of the coal handling plant shall be 16 hours spread over two shifts per day leaving third shift exclusively for routine inspection and maintenance.

Wagon Tippler

The wagon tippler hopper shall be of RCC construction and adequately sized to accommodate the coal load for at least four (4) nos. 4-axle bogie wagon of latest RDSO design guidelines G33 (rev-1) used by Indian Railways. Water proofing treatment shall comprise of chemical injection grouting & polymer modified cementious coating.

Crusher House

Crusher house shall be of structural steel with permanently color coated steel sheet cladding. Floor slabs shall be of RCC. Crushers shall be supported on RCC deck slab which in turn will rest on vibration isolation system consisting of springs & dampers.

Pent House, CHP Control Room, Wagon Tripler Hopper Control Room & MCC Rooms, these buildings shall have framed structure.

3.4.5 Fuel Oil Handling & Transportation System

- Fuel Oil unloading and storage system shall be designed to handle light Diesel oil (LDO). Light oil (LDO) shall be used for initial start up, coal flame stabilization and low load operation of the steam generator while firing coal.
- Fuel oil (LDO) will be brought to the power plant by road tankers. The oil will be unloaded from road tankers and will be pumped by unloading pumps to the storage tanks. Fuel oil pressurizing pumps shall draw the oil from the storage tanks.
- Six (6) numbers of LDO unloading pump, each of 100 m^3/hr capacity, shall be provided to unload 10 nos. road tankers at a time. The unloading header with 80 NB x 5 nos. neoprene rubber flexible hose connection shall be provided for unloading of light diesel oil.
- Two (2) numbers of 2000 m^3 capacity fixed roof type LDO storage tanks shall be provided for storage of LDO.
- One (1) number of 100 m^3 capacity fixed roof type LDO day oil tank shall be provided for auxiliary boiler. Two (2) numbers of LDO transfer pumps, each of 25 m^3/hr capacity, shall be provided for transfer of LDO from main storage tank today oil tank.
- Oil-water separator pit shall be provided.
- Control of FO Handling Plant shall be through DDCMIS.

3.4.6 Water System & Plant Utilities

Source of Water: The source of water for the project is the Upper Ganga Canal at a distance of about 8.0 km from the plant site. Government of UP vide letter dated 12.06.2014 have accorded confirmation of water availability from Upper-Ganga Canal.

Raw Water: The raw water reservoir is proposed in western plot area. The required storage capacity of the proposed raw water reservoir is 25 days with drawl capacity of 43 cusecs including evaporation loses. The estimated capacity of the reservoir is about 26 Lac cum. For the raw water reservoir about 112 acres of land is proposed. Five numbers of raw water pumps {Three (2W+1S) for PT plant, two (1W+1S) for AHP} shall be provided in the raw water pump house.

Water Consumption: Make up water requirement for this project would be about 3265m^3/hr with ash water recirculation system and about 4415m^3/hr with once through ash water system. This project is planned on zero discharge of water concept.

Water Pre-Treatment: The pre-treatment plant would be designed to remove suspended/colloidal matter in the raw water. Separate pre-treatment plant shall be provided for meeting the CW system and Demineralization (DM) plant. A common chemical house shall be provided to store chemicals such as chlorine, lime, alum & coagulant aid and respective lime, alum and coagulant dosing equipments such as tanks, pumps etc for all the PT systems. Independent chemical preparation tanks and chemical dosing pumps shall be provided for each PT system. The Water PT plant for CW system shall consist of three (3) clarifiers of reactor type, of 1700 m^3/hr capacity, one number of aerator and one number of stilling chambers (common for all three clarifiers).

Water De-mineralization Plant: The DM plant shall be sized to meet the make-up water requirement of the steam cycle, make up to closed circuit auxiliary system, hydrogen generation plant, and stator water cooling system. Considering the quality of water, it is proposed to adopt a service cycle of 12 hrs for DM Plant. The D.M. plant shall consist of three (3) streams of 90 m^3/hr capacities and each stream shall comprise of Activated Carbon Filter, Cation Exchangers, Degasser System (comprising of Degasser Tower, Degassed Water Tank, Degassed Water Pumps and Degasser Blowers etc), Anion Exchangers and Mixed Bed Exchanger.

Make-up Water System: It is envisaged to provide three (3) make-up water pumps inside the make-up water pump house to be located at Upper Ganga Canal, from where water shall be pumped to the raw water reservoir /storage in the plant. It is proposed to provide one numbers of pipelines from makeup water pump house to raw water reservoir in the plant.

Circulating Water System:

- For the re-circulating type CW system, it is proposed to supply clarified water as make-up. Clarified water shall be pumped from the Water pre-treatment plant to the cold water channel. Water from cold water channel will enter the CW pump house through bar screens/trash racks at low velocity to filter out debris.

- The total water requirement for the condenser and auxiliary cooling is estimated to be about 72,000 m^3/hr per unit. The temperature rise of re-circulating water in the condenser shall be about 10-11^{0}C.
- It is proposed to provide one Circulating Water pump house each unit of 660 MW. Two numbers of working pumps shall be provided for each unit. One common stand pump has been envisaged as per the prevailing practice.
- Accordingly five (5) numbers of CW pumps (each 50% capacity for one unit) shall be provided. CW System blow-down would be drawn from the discharge of CW pumps.
- For carrying circulating water from CW pump house to TG area and from TG area to cooling tower, steel lined concrete duct would be provided.
- One (1) number of cooling towers with splash type fill is proposed for each unit. The cooling water system shall be operated with more than 5 COC.

Equipment Cooling Water System:

- Closed circuit cooling water system would be adopted for unit auxiliaries of steam generator and turbine generator. DM water would be used in primary cooling water circuit for cooling of various auxiliaries which in turn shall be cooled in a secondary circuit by circulating water through a set of plate type heat exchangers.
- Make up to the primary side closed loop would be from unit DM make up system through overhead tanks.
- For cooling of station auxiliaries such as Air compressors, compressors of ash handling plant and condensing water requirement of AC plant, an independent cooling water circuit shall be provided through a set of station auxiliary cooling water pumps, piping network and an induced draft cooling tower. These pumps shall draw water from the channel of main CW system and the cold water from the station auxiliary cooling tower shall be led back to the CW channel. The Station Auxiliary cooling tower shall be of Induced Draft type.

RO System for ZERO Discharge Concept: The Reverse Osmosis (RO) plant is proposed to produce 240 cum/hr per metre. Cooling tower blow down (CTBD) water shall be used as feed water to RO plant. The purpose of RO system is to remove the dissolved solids from the water to produce specified quantity of CW make up and DM plant feed. Reject water from RO trains shall be led to CHP dust suppression tank.

The water balance diagram is enclosed as **Exhibit-6.**

3.4.7 Steam Generator & Auxiliaries

The steam generators (SG) shall be Super-Critical, once through, water tube, direct pulverized coal fired, top supported, balanced draft furnace, single reheat, radiant, dry bottom type, suitable for outdoor installation. The gas path arrangements shall be single pass (tower type) or two pass type.

Boiler design shall also be suitable for variable pressure operation from 30% to 100% BMCR with and without 20% throttle margin.

The main parameters at 100% BMCR will be as given in following **Table-14**:

Table- 14: Parameters at 100% BMCR

1	**Main stream flow at super-heater outlet**	2120 t/hr
2	**Pressure at super-heater outlet**	256 kg/cm^2(a)
3	**Temperature at SH outlet**	568 °C
4	**RH steam flow**	1708 t/hr
5	**Steam temperature at re-heater outlet**	596 °C
6	**Feed water temperature at economizer inlet**	293.7 °C

- The furnace will be radiant, dry bottom type with tangential or opposed wall firing and enclosed by water cooled and all welded membrane walls.
- There will be two (2) axial type FD fans and two (2) axial type ID fans and two (2) pairs of regenerative rotary type air pre-heaters. One pair of air pre-heater will be used for primary air system & second pair for secondary air system.
- Four (4) numbers of steam coil air pre-heaters- two on primary and two on secondary air system will be provided for start-up, low load operation or abnormal conditions when an increased air inlet temperature is considered desirable to minimize the cold end corrosion of regenerative air pre-heaters.
- Start-up, warm up and low load (upto 30%) carrying shall be done by Light Diesel Oil (LDO). Boiler will be so designed that oil firing for flame stabilization will not be required beyond 30% MCR.
- The coal burning system will comprise of coal mills of vertical spindle type which include
    - Bowl Mills
    - Roller Mills and
    - Balls & Race Mills or any approved equivalent.
- One (1) number passenger cum goods elevator of capacity 3000 kg & one (1) number passenger elevator of capacity 1088 kg shall be provided for each steam generator.

Steam Generator Circulator System: The steam generator start up system envisages boiler start up drain system with boiler start up drain circulation pump. Separator(s) will be used during start up for separating the steam water mixture upto a load of 40% BMCR, above which it will be running dry. Lower part of furnace / water wall will consist of vertical plain/rifle tubes or wrap around /helical tubes.

Auxiliary Steam System: Each of the unit will be provided with two auxiliary PRD stations i.e., high capacity and low capacity PRDS taking their steam tap-offs from MS line and CRH line respectively. The high capacity auxiliary PRDS will be designed for a minimum capacity of 150 T/hr and steam parameters 16 ksc (g) and 310^{0}C. Low capacity auxiliary PRDS will be sized for a minimum capacity

of 25 T/hr and steam parameters 16 ksc (g) and 210^{0}C and will be operated during the normal operation of the unit.

3.4.8 Turbine & Its Auxiliaries

The steam turbine shall conform to the following design & duty conditions mentioned in **Table-15**:

Table- 15: Steam Turbine Specifications

1.	Output under Economic Maximum Continuous Rating (EMCR) at Generator terminals with Cycle make up of 3% of throttle steam flow and design condenser pressure.	660 MW (In case of static excitation system, the EMCR output at generator terminals shall be 660 MW plus excitation power requirement at EMCR)
2.	Turbine throttle steam pressure	247 kg/cm^2 (abs)
3.	Turbine throttle Main Steam/ Reheat Steam temperature.	565^{0}C/593^{0}C
4.	Variations in rated Steam temperature & pressure	As per IEC-45
5.	Pressure drop in reheat circuit i.e. between HPT Exhaust & IPT inlet.	10% of HPT exhaust pressure
6.	Condenser pressure with CW temperature of 33^{0}C	77 mm of Hg
7.	Turbine speed	3000 rpm
8.	Frequency variation range from rated frequency of 50 Hz	(+) 3% to (-5%) (47.5HZ to 51.5HZ)
9.	DM Water make up to thermal cycle under EMCR condition	3% of throttle steam flow
10.	Final feed water temperature at 100 % TMCR & at EMCR condition	287.5 (+/-) 2.5^{0}C
11.	Turbine protection against water induction	As per ASME-TDP-1(latest)
12.	No. of extractions for regenerative feed water heating	As per cycle optimization by the bidder.

Turbine Control Fluid System: For the governing and control system of the turbine, a complete self contained control fluid system shall be provided. Fire resistant fluid shall be employed to minimize fire hazards. The system will comprise of:

i) A control fluid reservoir of adequate capacity to ensure fluid supply of acceptable purity.
ii) 2 x 100% AC motor driven pumps to pump the fire resistant fluid from the fluid reservoir through the system.
iii) 2 x 100% capacity control fluid coolers designed for service with DM water (condensate quality).

Turbine Hall EOT Cranes: Two (2) number of electrically operated overhead travelling cranes with associated auxiliaries, along with electrical equipment, control & instrumentation as required and specified shall be provided in the turbine hall for erection and maintenance of turbo-generators and their auxiliaries. Each crane shall be capable of lifting at least 105% of the weight of single heaviest component/equipment, including lifting beam and slings etc. (as applicable) to be handled

in TG hall for erection as well as maintenance of the equipment provided in AB bay. The auxiliary hook capacity shall not be less than 20 Ton.

3.4.9 Chimney

One twin flue steel lined reinforced concrete chimney shall be provided for the two 660 MW units of the project. The flue gas emission point shall be 275 meters above the plant grade level. The RCC for the chimney shell and other super structure shall be of M-35 grade and for foundation & grade level slab it shall be of M-30 grade.

3.4.10 Ash Handling System

Bottom Ash Handling System

- Bottom ash is extracted either by using a continuously operating submerged scraper chain conveyor system or by using intermittently operating jet pumps in conjunction with a water impounded hopper. Dry type bottom ash hoppers shall be used in case of the submerged scraper chain conveyor system.
- In case of continuous BA extraction system involving submerged scrapper conveyors, the bottom ash from both units is pumped to the common Bottom ash slurry disposal pump house via water impounded bottom ash hopper incase of jet pump system or by BA slurry transportation pump in case of SSC System.
- In case of the intermittently operating jet pump system, the jet pumps would convey the bottom ash slurry from water impounded BA hoppers to the slurry sump of the common Bottom ash slurry disposal pump house.
- Economizer ash shall be handled in wet form. Coarse ash slurry from economizer hoppers shall also be led to the slurry sump of the common Bottom ash slurry disposal pump house.
- From the Bottom ash slurry disposal pump house, BA and Coarse ash slurry shall be pumped to the ash dyke by BA slurry duty pumps. No pits will be permitted in the boiler bottom area to accommodate the water impound hoppers.

Fly Ash and Air Pre-heater Ash Handling System

- Pneumatic conveying system (either vacuum system or pressure system) shall be employed for conveying of fly ash and air pre-heater ash from the electrostatic precipitator hoppers and air pre-heater hoppers in dry form.
- This dry ash shall be taken to buffer hoppers in each unit. The dry ash buffer hoppers shall be located adjacent to the ESP. Dry ash from buffer hoppers shall be transported to the main storage silos near the plant boundary. Provision has been made for transfer of any un-utilized fly ash to the HCSD ash silos.
- The transportation system shall be provided for each unit for transportation from buffer hoppers to the either set of silos. The user industries shall take the dry fly ash from the main storage silos either in closed tankers or in open tankers. These silos shall also have rail loading facility.

3.4.11 Electrical System

The basic electrical scheme is indicated in the Single Line Diagram enclosed as **Exhibit-7 & 8.**

Power Evacuation/ Start up Power: The power generated in the units will be evacuated through 400kv transmission lines by Uttar Pradesh Power Corporation Ltd/Power Grid Corporation Limited. Unit start-up power requirement shall be met by back charging of one of 400kV transmission line.

Generator: The main parameters of Generator would be as follows:

- Nominal rating : 660 MW
- Rated output : 776.5 MVA
- Power factor : 0.85 (lag)-0.95 (leading)
- Rated voltage : as per manufacturer's Standard (in the range of 21-24 kV)
- Speed : 3000 rpm
- Short circuit ratio : Not less than 0.48

Bus duct: The connection between the generator and generator transformers shall be through isolated phase bus ducts. The bus duct shall be continuous enclosure, self cooled type and shall be equipped with air pressurization system. The tap off and neutral connection shall also be of isolated phase construction. The bus duct will have on all aluminum construction. The tentative parameters of the generator bus duct are:

• Voltage rating	: **21 kV**	**24 kV**
• Current rating (main run)	: 23,500 Amps	20,500 Amps
• Current rating (delta run)	: 14,000 Amps	12,000 Amps
• Current rating (tap off)	: 2,000 Amps	2,000 Amps

Generator Transformer: Each 660 MW unit shall have three (3) single phase transformers with combined rating of 780 MVA, for the Generator Transformer. These would be OFAF cooled; with an OFF circuit tap changer.

Auxiliary Power Supply System: The voltages adopted for the AC auxiliary system are: 415 V for motors rated upto 200 kW. (Energy Efficient Motors have been envisaged upto 160 KW) 3.3 kV for motors above 200 kW and upto 1500 kW. 11 kV for motors rated above 1500 kW.

Unit Transformer: Two winding unit transformers with ONAN/ONAF cooling shall be provided with each unit.

Station Transformer: The rating and details of these transformers are shown in the single line diagram shown in **Exhibit-7 & 8**. The Station Transformer will be ONAN/ONAF/OFAF cooled & provided with on load tap changer.

Auxiliary Transformers: For meeting the demand of various systems i.e. unit auxiliaries, CHP, station auxiliaries, ash handling, ash water re-circulation system, make up water system etc. suitable ratings of 2 x 100% transformer/feeders shall be provided.

LT Transformers: Power distribution at 415 Volts will be catered by 2 x 100% or 3 x 50% LT transformers. All these transformers will be delta connected on the HT side and star connected on the LT side. The LT star point will be solidly earthed. The transformers rated 1000 kVA and above will be connected with the respective switchgears by the LT bus ducts.

3.5 CONTROL & MITIGATION MEASURES

3.5.1 Air Pollution Control

As per the Environment (Protection) Amendment Rules, 2015, published in The Gazette of India on 7th December, 2015, all thermal power plants to be installed from 1st January, 2017 shall have to comply with the following emission limits.

Particulate Matter	30 mg/Nm^3
Sulphur Dioxide (SO_2)	100 mg/Nm^3
Oxides of Nitrogen (NOx)	100 mg/Nm^3
Mercury (Hg)	0.3 mg/Nm^3

To meet these stringent limits, the following control systems shall be installed.

Electrostatic Precipitators for control of particulate matter:

It is proposed to install high efficiency electrostatic precipitator having an efficiency that limits the outlet emission to 30 mg/Nm^3 with one field out of service in all passes while the boiler is operating at its MCR, firing worst coal having maximum ash content. The electrostatic precipitators will have six 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.

ESP specific collection area shall not be less than 250 m^2/m^3/sec at 100% TMCR. Electrostatic precipitator will be provided with microprocessor based programmable type rapper control system and ESP management system to ensure safe and optimum operation of ESP. ESP transformer rectifier sets will use high flash point oil as the cooling medium. The dust collection hoppers at all strategic locations will have a minimum storage capacity of eight hours. The hoppers will have heating arrangements to prevent ash sticking to the sloping sides and down pipes. Level indicators to indicate ash levels in the hoppers and trip the ESP in case of high ash levels in the ash hoppers are also envisaged to ensure safety of ESP.

FGD System for control of SO_2:

The common methods used for desulphurization of flue gases are as follows.

- Wet scrubbing using a slurry of alkaline sorbent,
- Spray-dry scrubbing using similar sorbent slurries;

- Wet sulfuric acid process recovering sulfur in the form of commercial quality sulfuric acid;
- Dry sorbent injection systems.

Scrubbers are capable of reduction efficiency in the range of 50% to 98%. The highest removal efficiencies are achieved by wet scrubbers (greater than 90%), and the lowest by dry scrubbers. The most common sorbants used in wet scrubbers are lime and lime stone. After fly ash removal, the flue gas is bubbled through the scrubber and the slurry is added from top. The limestone reacts with the SO_2 in the flue gas to form insoluble calcium sulfite, which may further be reacted with oxygen to form gypsum, as shown in the following reaction.

$$CaCO_3 + SO_2 \longrightarrow CaSO_3 + CO_2$$
$$CaSO_3 + ½\ O_2 + 2H_2O \longrightarrow CaSO_4.2H_2O$$

Schematic diagram of a typical wet scrubbing system for SO_2 removal is shown in Figure-5.

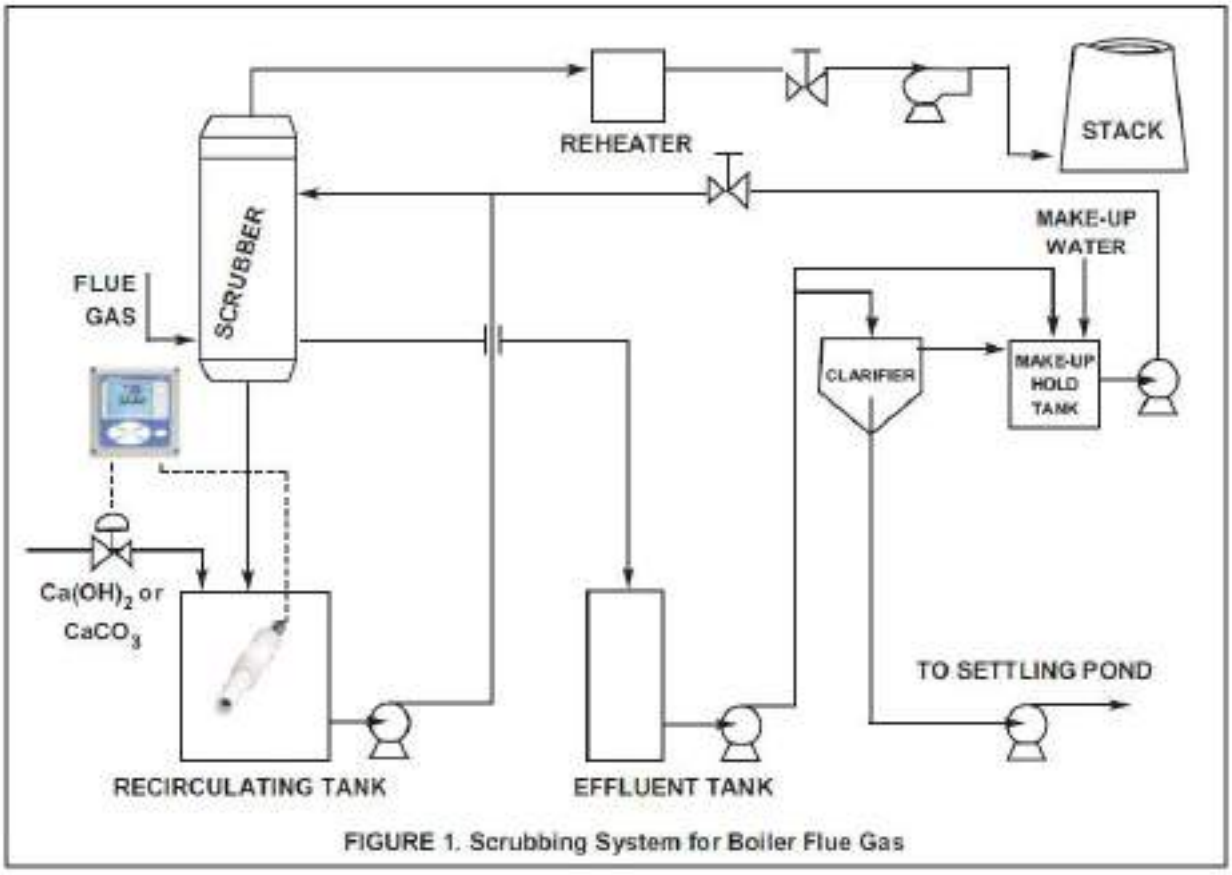


Figure 5: Schematic Diagram of Wet Scrubbing FGD System

The scrubbed gas requires to be re-heated, to prevent condensation and to facilitate buoyancy rise, and then discharged through a stack. Spent scrubbing liquids are sent to a clarifier, where most of the recovered water is recycled.

Flue Gas Desulphurization system and its auxiliaries for two (2) number steam generators of 660 MW nominal rating shall be installed. The FGD system shall be necessarily based on Lime Stone Forced oxidation process technology to reduce the emission of Sulphur Dioxide in flue gas

produced by coal being fired in boiler to the limits specified. The FGD system shall have an independent absorber for each unit, common limestone milling system for two units and common gypsum dewatering system for the two units. An auxiliary absorbent tank common for the two units for storage of absorber slurry of two units shall be installed. The absorbers, limestone grinding system and gypsum dewatering system shall be installed. All ducting, dampers, pumps, valves, supports etc as required for completeness of system of absorbers, common limestone grinding system and common gypsum dewatering system shall also install. Clean gas from the absorber shall be taken to the GGH through two stage mist eliminators. Treated and reheated flue gas from the absorber shall be discharged through a 275 m high stack. Necessary lining in duct and chimney from low temperature acidic corrosion. Provision shall be made for isolation of the flue gas flow through the absorber also for bypass of the absorber, to allow maintenance of the absorber with the unit in operation. Limestone to the absorber of the two (no's) unit shall be supplied by a wet limestone grinding, common for the two units. Each wet limestone mill shall be fed from an independent bunker through a gravimetric feeder. The classified limestone slurry from the mills shall be stored in two (2 no) limestone slurry storage tank, from where the slurry shall be pumped to the individual absorbers by dedicated limestone slurry pumps. The gypsum from the two (2 no's) absorbers shall be pumped by dedicated gypsum bleed pumps to common Gypsum Dewatering system equipments. The water removed from the absorber shall be recycled to the absorbers. The waste water from the system shall be collected and neutralized using lime and neutralizing effluent shall be pumped to ash slurry sump. Washed and dewatered gypsum from the dewatering system shall be fed to a belt conveyer. Common gypsum dewatering system for the two units shall be installed. The common gypsum dewatering system shall receive the gypsum slurry from each absorber through slurry feed pipes and shall comprise of dewatering equipments. The filtrate water from belt filter dewatering and washing system and the over flow from the secondary hydro-cyclone shall be taken to a common filtrate water tank and further to absorber tank. The FGD system, with lime stone slurry as the absorbing media, shall effectively reduce the SO_2 concentration below 100 mg/Nm^3.

Control of NOx:

Two general techniques are used to reduce NOx emissions. The first type involves modification of the combustion process (staged combustion) and includes low-NOx burners (with and without overfire air) and fuel re-burning. The second type of NOx reduction strategy involves post combustion removal and includes selective non-catalytic NOx reduction (SNCR), selective catalytic reduction (SCR), and combined SO_2/NOx removal.

Low-NOx burners (LNBs) are designed to "stage" combustion (Figure-6). In this technology, a fuel-rich combustion zone is created by forcing additional air to the outside of the firing zone (auxiliary air) and by delaying the combustion of coal. Reduction of 30 to 55 percent of NOx can be achieved with low-NOx burners. Advanced stage combustion technologies use overfire air and gas or coal re-burning to achieve even greater reductions of NOx.

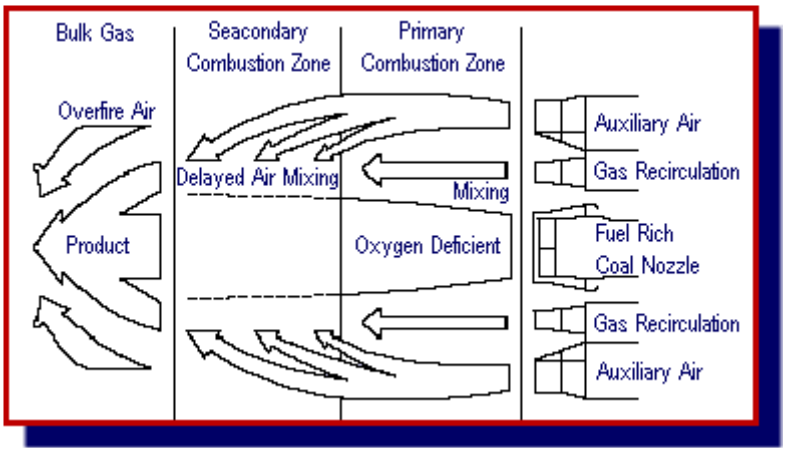


Figure 6 "Staged" Combustion in a Low-NOx Burner

Post-combustion deNOx methods include selective catalytic reduction (SCR) or selective non-catalytic reduction (SNCR). These deNOx methods are injection of chemical agents (i.e. ammonia, urea) to the hot exhaus gases. In general practice, the SCR process (Selective Catalytic Reduction) works by injecting ammonia water which is vaporised and fed into the flue gas. The evaporated ammonia water will then pass the catalyst elements, whereby NOx in the exhaust gas is transformed into nitrogen and water. The chemical reaction resulting into NOx reduction is as follows.

$$4\ NO + 4\ NH_3 + O_2 \rightarrow 4\ N_2 + 6\ H_2O$$

$$NO + NO_2 + 2\ NH_3 \rightarrow 2\ N_2 + 3\ H_2O$$

Selective catalytic achieves a significant reduction of NOx, generally up to 80–90%. In the case of selective catalytic reduction deNOx system a treatment of flue gas is carrried out with ammonia within a heterogeneous catalytic bed. The most popular catalyst types (with operating temperatures) used in SCR method are Platinum (240–290^{0}C), Titanium/ Vanadium Oxide (245–400^{0}C) and aluminium silicate (400–600^{0}C). The catalyst in form of metal plate extruded as a honeycomb monolith sections is installed in vertical downward flow between economizer and air heaters. Advantages of the SCR system are its high efficiency, i.e., NOx reduction by up to 98% and low ammonia slippage. However, capital and operating costs of the SCR systems are high and require bulky installation. In clean gas service, the flue gas flow can be horizontal or vertical. However, in dirty gas service, the flow is vertical downward and assisted by soot blowers between the catalyst layers to keep the catalyst clean. A typical schematic diagram of the SCR system in conventional coal fired boilers is shown in Figure-7. It can be seen that the system is located between the economizer and the air pre-heater.

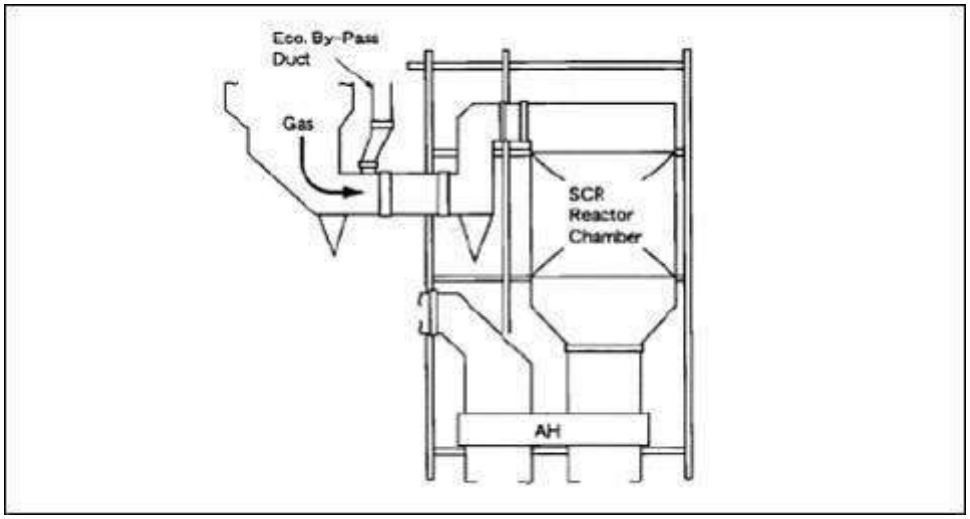


Figure 7: SCR in conventional boilers

Control of NOx in the proposed plant will be achieved through provision of Low NOx Burners (LNB), which will be followed by provision of selective catalytic reduction (DeNOx) system in the path of the flue gas. The SCR systems will be provided with auxiliaries for two number steam generators of 660 MW nominal rating. For both units NOx emission limit will be below to 100 mg/m^3 (norm) dry. The SCR system shall be planned, performed and documented to meet the environmental norms of MoEF & CC. In the SCR reactor, the flue gas shall be flown through from the top to the bottom and arranged in the flue gas pass of the steam generator between economizer and air pre-heater. The reagent will be ammonia/ air mixture. The overall design of the SCR shall be done under consideration of all operating conditions (e.g. higher and lower temperature), minimization of ammonia consumption and slip, prevention of formation of ammonium hydrogen sulphate and other ammonia components, which deactivate or plug up the catalysts, minimization of SO_3 conversation, prevention of disturbances in downstream equipment, prevention of plugging by ash particles, especially 'popcorn ash'. The catalyst layers shall be installed in maximum two layers on horizontally arranged support frames. Further one more reserve layer (without catalysts) shall be designed. The SCR reactor considerably consisting of Reactor housing, inlet and outlet hood with guiding vanes, connecting nozzles for media (e.g. flue gas, steam, pressurized air, etc), grid measurement with adapters, and fixture for soot blower shall be installed for three catalyst levels are filled with catalyst. Soot blowers shall be installed for three catalyst layers for removal of ash deposits on the catalyst. Initially only 2 catalyst levels are filled with catalyst. A third catalyst layer serves as spare for future filling (already quipped with soot blowing system). The entire SCR plant e.g. reactor, ammonia injection shall be equipped with adequate number and size of platforms for inspection, maintenance and sampling. Storage and supply of ammonia shall be delivered by truck tanks as liquid- pressurized form to the power plant. The storage capacity of the ammonia shall be sufficient to accommodate 14 days demand for Power Plant at maximum consumption corresponding to SCR worst case. Ammonia injection system considerably consisting of Nozzle lances, one control fitting with lockable flow rate gauge, complete piping for the distribution of the ammonia/air mixture, connection to ammonia piping from ammonia supply system, protection for the control fittings mixer in the flue gas duct. Soot blowing shall be carried out with steam. The SCR DeNOx shall effectively reduce the NOx concentration below 100 mg/Nm^3.

Mercury abatement as co-benefit of reduction of NOx, SO_2 and dust:

Mercury content in Indian coal ranges between 0.01 ppm to 1.1 ppm. Average mercury content in coal found in India to be 0.272 ppm as per CPCB. A typical power plant emits 90% of its mercury into air and 10% to land. The main reason for such high rate of emissions is that mercury boils at operating temperatures of power plant.

Mercury exists in three forms in coal fired thermal power plants flue gas:

- Elemental Hg (O)
- Oxidized Hg (2+)
- Particle bound Hg (P)

Hg (2+) and Hg (P) are relatively easy to remove from flue gas using typical air pollution control devices such as ESP and wet FGD.

Mercury emission from coal-fired boilers can be controlled through proposed measures for removing particulate matter (PM), Sulphur dioxide (SO_2), and Nitrogen Oxides (NOx). The Hg (P) fraction is typically removed by ESP, particulate control device. The Hg (2+) portion is water soluble and therefore a relatively high percentage can be captured by wet flue gas desulphurization (FGD) system. The Hg (O) fraction is generally not captured by proposed NOx control device. However, the proposed SCR for controlling NOx emission will promote oxidation of Hg (O) to Hg (2+) and enhance Hg capture in downstream FGD.

Control of Fugitive emission:

For control of fugitive dust emissions within and around the coal handling plant, dust extraction and suppression systems would be provided. Dust suppression system shall also be provided in the coal stockyard.

3.5.2 Water Pollution Control

As per the Environment (Protection) Amendment Rules, 2015, published in The Gazette of India on 7th December, 2015, all thermal power plants to be installed from 1st January, 2017, shall have to limit water consumption below 2.5 m^3/MWH, and shall operate with zero effluent discharge.

The circulating cooling water system shall be optimized and operated at more than 5 cycles of concentration to conserve water. An effluent management scheme, consisting of collection, treatment, and recirculation of effluents shall be implemented in order to optimize the makeup water requirement as well as to maintain zero effluent discharge. This will result into operation of the plants with specific water consumption of 2.47 m^3/KWH.

The liquid effluents shall be collected and treated/ recycled as per the following design philosophy:

- The filter backwash water of PT Plant shall be collected and recycled back to the inlet of clarifiers.
- The sludge from clarifiers of Water PT Plant shall be collected in a sump/ pit and shall be pumped to bottom ash slurry sump for disposal to bottom ash dyke.

- The waste effluents from neutralization pits of DM Plant and Condensate Polishing Plant shall be collected in the respective neutralization pits and neutralized before pumping to the Ash water tank.
- Re-Circulating type Cooling Water (C.W.) system with cooling towers, with C. W. blow down from cold water side to ensure no thermal pollution.
- CW system blow down shall be utilized quantitatively for FGD system, service water system, fly ash handling, bottom ash handling and coal dust suppression.
- The sludge from clarifier/ tube settler shall be disposed off in bottom ash dyke along with bottom ash slurry.
- A coal particle settling pond shall be provided to remove coal particles from coal handling plant waste. Decanted water shall be pumped back to the coal dust suppression system.
- Service water effluent collected from plant drains shall be led to a sump. From the sump the service water shall be pumped upto tube settler/ clarifier/OWS for treatment of suspended solids. Treated service water shall be sent back to service water tank to the extent possible for re-use.
- The plant shall have two different systems for ash disposal – conventional wet slurry disposal with ash water re-circulation for bottom ash and High Concentration Slurry Disposal (HCSD) for fly ash. HCSD system will require less quantity of water and there will be no effluent from the fly ash disposal site.
- RO system for ZERO discharge concept: Reverse Osmosis (RO) plant is proposed to produce 220 cum/hr permeate. Any unutilized cooling tower blow down (CTBD) water shall be used as feed water to RO plant. The purpose of RO system is to remove the dissolved solids from the water to produce specified quantity of CW make up and DM plant feed. Reject water from RO trains shall be led to CHP dust suppression tank.

An independent plant effluent drainage system would be constructed to ensure that plant effluents do not mix with storm water drainage. Efficient operation of various treatment schemes shall be ensured so that the quality of treated effluent from CMB conforms to relevant standards, prescribed by regulatory agencies.

The sewage from plant and township shall be treated in a common sewage treatment plant. The treated sewage conforming to prescribed standards shall be utilized for plantation to the extent possible. The balance effluent, if any, shall be utilized for dust suppression.

3.5.3 Noise Pollution

The major noise generating sources are the turbines, turbo-generators, compressors, pumps, fans, coal handling plant etc. from where noise is continuously generated. Acoustic treatment/ equipment design shall be done to control the noise level below 90 dB (A). Wherever required, the workers shall be provided with protective equipment such as ear plugs/ ear muffs.

3.5.4 Solid Waste Management

Ash will be the major solid waste generated from the power project. An ash management scheme shall be implemented consisting of dry collection of fly ash, supply of ash to entrepreneurs for utilization and promoting ash utilization to maximum extent and safe disposal of unused ash. The

plant shall have two different systems for ash disposal – conventional wet slurry disposal with ash water re-circulation for bottom ash and High Concentration Slurry Disposal (HCSD) for un-utilized fly ash during first 4 years of operation. HCSD system will require less quantity of water.

Gypsum recovered from the FGD System shall be recovered and disposed through sale.

3.5.5 Clean Development Mechanism

Sustainable power generation has been one of the prime objectives of THDC Limited India. Towards achieving this objective, various measures have been introduced to ensure minimum degradation of the environment due to the operation of the power stations. There is growing concern world over and THDC Ltd. is no exception towards contribution of green house gases released due to fossil fuel firing towards global warming. As a part of agreement under Kyoto Protocol the CDM has been introduced to enable trading of Certified Emission Reduction (CER) between the developed countries and the developing countries. It is envisaged to take up THDCIL's proposed 2 x 660 MW; coal based Khurja Project having higher steam cycle supercritical parameters as a CDM project. Adoption of higher cycle parameters will improve power plant efficiency and thereby reduce coal consumption per unit of electricity generation with consequent reduction in CO_2 emissions.

CDM revenue is one of the prime considerations for the project. It is likely to ameliorate the Internal Rate of Return & will help overcoming the various barriers related to the project. The project is an ideal case for CDM benefits, being environmentally benign with less emission of green house gases (GHG).

CHAPTER-4: DESCRIPTION OF THE ENVIRONMENT

4.1 GENERAL

4.1.1 Environmental Aspects

Collection of baseline environmental data of the project influenced area helps to predict the magnitude of impacts that are likely to be caused due to proposed activity of project. It also helps to identify critical environmental attributes required to be monitored during and after the proposed improvements.

This chapter presents a regional background to the baseline data at the very onset, which will help in better appreciation of micro-level field data, generated on several environmental and ecological attributes of the study area. The baseline status of the project on environment is described section wise for better understanding of the broad spectrum conditions.

Field monitoring studies to evaluate the baseline status of the project site were carried out covering October, November and December 2012, with CPCB guidelines. However, additional baseline data with respect to Air, Water & Soil were also collected for pre-monsoon season (Mar-May 2016). Environmental data has been collected with reference to proposed project for:-

a) Land Environment
b) Soil Environment
c) Water Environment
d) Air Environment
e) Noise Environment
f) Biological Environment
g) Socio-economic Environment

4.1.2 Study Area

Study area for proposed project's baseline study covers the total area within 10 km radius from the project site periphery. Further the study area has been divided into two zones namely, "Core Zone" and "Buffer Zone". Core zone comprises of the project area within the project boundary while the area around the project periphery covering 10 km radius area constitutes the Buffer Zone.

4.1.3 General methodology

The methodology for conducting the baseline environmental survey considered the guidelines given in the EIA Manual of the MoEF&CC. Baseline information with respect to Land, Water, Air, Noise, Biological and Socio-economic quality status in the study area were collected by conducting primary sampling / field studies during post-monsoon season October 2012 to December 2012. Also additional baseline data with respect to Air, Water & Soil were collected for pre-monsoon season (March-May 2016). Secondary data has been obtained from published sources, and various government agencies like Water Resource Department, India Meteorological Department (IMD),

Ground Water Board etc. The characteristics of baseline status of study area with respect to the parameters are then discussed.

4.2 LAND ENVIRONMENT

4.2.1 Geology

Regional Geology

The description of the geology of the study area is based on the Records of Geological Survey of India (Vol. 128, Part 8), published by Geological Survey of India (1995). The study is fairly plain and sub-soil strata are alluviums deposited by watercourses. Neither the rocky outcrop is visible on ground surface nor does the site records rock profile even upto depth of 30m.

The study area is covered by post-Siwalik Quaternary Sediments uncomfortably overlying Siwalik sequence, which in turn uncomfortably overlies Vindhyan with an intervening 14 m thick bed to conglomerate.

The post Siwalik Quaternary sediments have been classified into:-

- Older Alluvium termed Varanasi Older Alluvium (VOA) and
- Newer Alluvium, which is further classified as
    - Behat Fan Alluvium (BFA)
    - Terrace Alluvium (TA) and
    - Recent Alluvium (RA)

Varanasi Older Alluvium (VOA), the oldest unit covering major part of the area is multiple fill polycyclic sequence of oxidized silt, clay and sand with occasional kankar, surficial sediments of VOA have been further sub divided into extensively developed silt-clay facies and subordinate sandy facies occurring in patches. VOA also constitutes Erosional Terraces of Yamuna and other rivers.

Terrace Alluvium disconformably overlying VOA occurs along Yamuna and Ganga as a narrow linear zone in their Older Flood Plain. It mainly comprises alternate sequence of fine to medium, grey micaceous sand and light khaki silt. In the northern reaches of Yamuna few coarser classics of pebble and cobble size are also present. It also developed in the Older Flood Plain of Hindon, downstream of its confluence with river Krishna.

Geomorphologically, the area has been classified into an upland comprising Varanasi Alluvial Plain (VAP), Behat Alluvial Fan (BAF) and Lowland, the Flood Plain. The Flood Plain has been further classified into Older Flood Plain (OFP) comprising Erosional and Depositional Terraces and Active Flood Plain (AFP). VAP is the oldest geomorphic unit and its elevation varies from 278 m in the north to 189 m. in the south above MSL with a general southward slope of 0.386: 1000. This surface presents a flat topography occasionally broken by relief variations. It has been subdivided into a silt clay surface covering a major part and sandy surface occurring in patches as sandy mounds, ridges and flats. The characteristic features of this plain are fluvial signature of palaeo-drainage system in the form of palaeochannels, tals, oxbow lakes, palaeolevees, etc.

Older Flood Plain occurs within the limits of the valley walls of Yamuna, Ganga, Hindon and other rivers. An erosional scrap 1-3 m high generally defines its contact with VOA. This flat to moderately undulating surface includes fluvial features such as abandoned channels, meander scrolls, oxbows lakes, etc. It comprises both Erosional and Depositional Terraces in Yamuna and Hindon whereas in Ganga it is represented by Depositional Terrace only. Other rivers namely Kali, Krishna etc. have developed only narrow Erosional Terraces. The Active Flood Plain of Yamuna, Ganga, Hindon and other rivers is confined to their present bank lines characterized by active landform elements viz. point bars, channel bars and lateral bars.

Recent Alluvium occurs in the active aggradational zone of Yamuna, Ganga, Hindon and other rivers within their present bank lines. It is composed of fine to coarse grained, grey micaceous sand with pebbles and cobbles in the form of point bars, lateral bars and as channel deposits.

The environmental problems mainly include folds, water logging, reh infestation, soil erosion and land degradation due to human activity. The economic resources mainly include agricultural land, brick clay, masonry sand, besides surface and ground water resources.

Local Geology

Based on limited bore log data obtained from Preliminary Geotechnical Investigation, the top soil consists predominantly of fine grained soils (sandy silt of low plasticity & clayey silt of low plasticity) of thickness 1.5m to 5.5 m followed by predominantly coarse grained soils (silty sand – SPT 6 to 29) of thickness 1.5 to 9m. From 9.0m to 20.0m depth consists of silty sand having SPT 24 to 59 showing medium compact strata to very dense compact strata. From depth 20.0m to 30m silty sand having SPT 48 to 96 has been observed. At depths more than 30.0m, coarse grained soils having SPT in the range of 81 to more than 100 has been observed.

4.2.2 Topography & Drainage

The topography of the area is more or less flat. The general average slope for every kilometre is around 0.29 m. The average elevation of the study area is approx. 201m above MSL. The depth of groundwater in the town varies from 3.65 to 5.20. The town is located in the catchment area of the Yamuna River. As Bulandshahr district forms part of the Gangetic plain and the sediments belongs to the Quaternary Age, which attain significant thickness in the central Ganga basin. The storm water flows into Yamuna River. The general nature of the soil is alluvium with a mixture of sand, sandy clay and silt.

4.2.3 Land Use

Land use / Land cover map preparation, Base map creation; Geometric and Radiometric correction of satellite image has been processed using ERDAS Imagine 9.2 and ArcGIS 9.3 Software. The methodology used for present LU/LC of study area is shown in **Figure-8** and is detailed below:

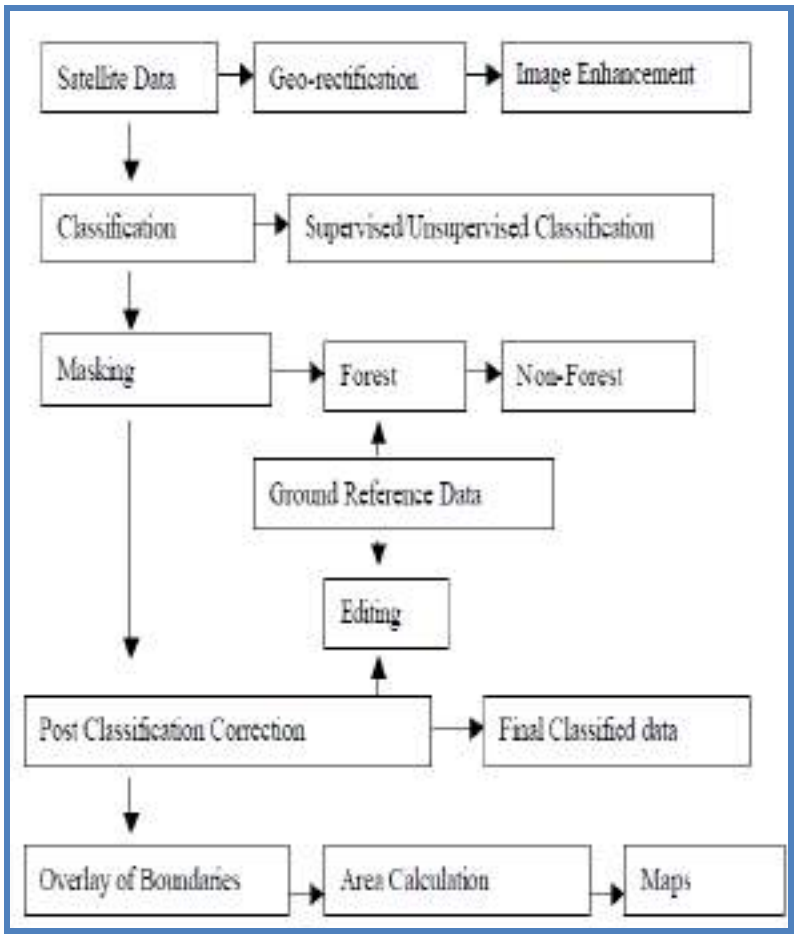


Figure 8: Methodology Use for Land use Classification & Mapping

ERDAS image processing software and ArcGIS Software were used for the project. Erdas 9.2 Image Processing Software was used for digital processing of the spatial data. Digital image processing techniques were applied for the mapping of the land use/land cover classes of the provided area from the satellite data. The methodology applied comes under following steps:

- **Image Extraction: S**atellite imageries were obtained and a sub set for the Area of Interest was created through ERDAS image processing software.
- **Geo-Rectification:** Geometric correction includes correction for geometric distortions due to sensor, earth geometry variations and conversion of the data to real world coordinates (e.g. Latitude and Longitude) on the Earth's surface. The satellite imagery was geometrically rectified with reference to the geo-referenced toposheets and vector data,
- **Image Enhancement:** Image enhancement is one of the important image processing functions primarily done to improve the appearance of the imagery to assist in visual interpretation and analysis. Various options of image enhancement techniques were tried out to get the best image for visual interpretation. Histogram equalized stretch enhancement techniques was applied to the imagery of the study area for better interpretation of different features in the satellite imagery.

- **Classification:** Satellites images are composed of array of grid, each grid have a numeric value that is known as digital number. Smallest unit of this grid is known as a pixel that captures reflectance of ground features represented in terms of Digital number, which represent a specific land features. Using image classification technique, the satellite data is converted into thematic information map based on the user's knowledge about the ground area.

  Hybrid technique has been used i.e. visual interpretation and digital image processing for identification of different land use and vegetation cover classes based on spectral signature of geographic feature. Spectral signature represents various land use classes. Image interpretation keys are developed based on image characteristics like color, tone, size, shape, texture, pattern, shadow, association etc which enables interpretation of satellite images for ground feature. Training sites are then assigned based on their spectral signature and interpretation elements.

  Land use/Land cover Map has been broadly classified into five classes namely Agriculture, Forest Land, Built-up Area, Water Bodies and Waste Land and all other land uses have been categorized in others class. Using image classification algorithm land use map is then generated.

Land-Use/ Land Cover Pattern of Study Area

The land use/ land cover map has been prepared based on Satellite Imagery for the year 2011. Land-Use classification of the study area with respect to major land use categories are presented in **Table-16** and **Figure-9**.

Table- 16: Land Use Pattern of the Study Area

S.N0.	Class	Area in Ha.	Area (%)
1	Agriculture Land	25947.13	82.56
	a. Cropped Area	15623.00	49.71
	b. Un-cropped Area	10324.13	32.85
2	Settlement(Residential)	1612.65	5.13
3	Forest Plantation	2669.27	8.49
4	Waste Land	874.30	2.78
5	Water Bodies	325.31	1.04
Total		**31428.66**	**100.00**

An analysis of the land-use pattern of the study area is as follows:

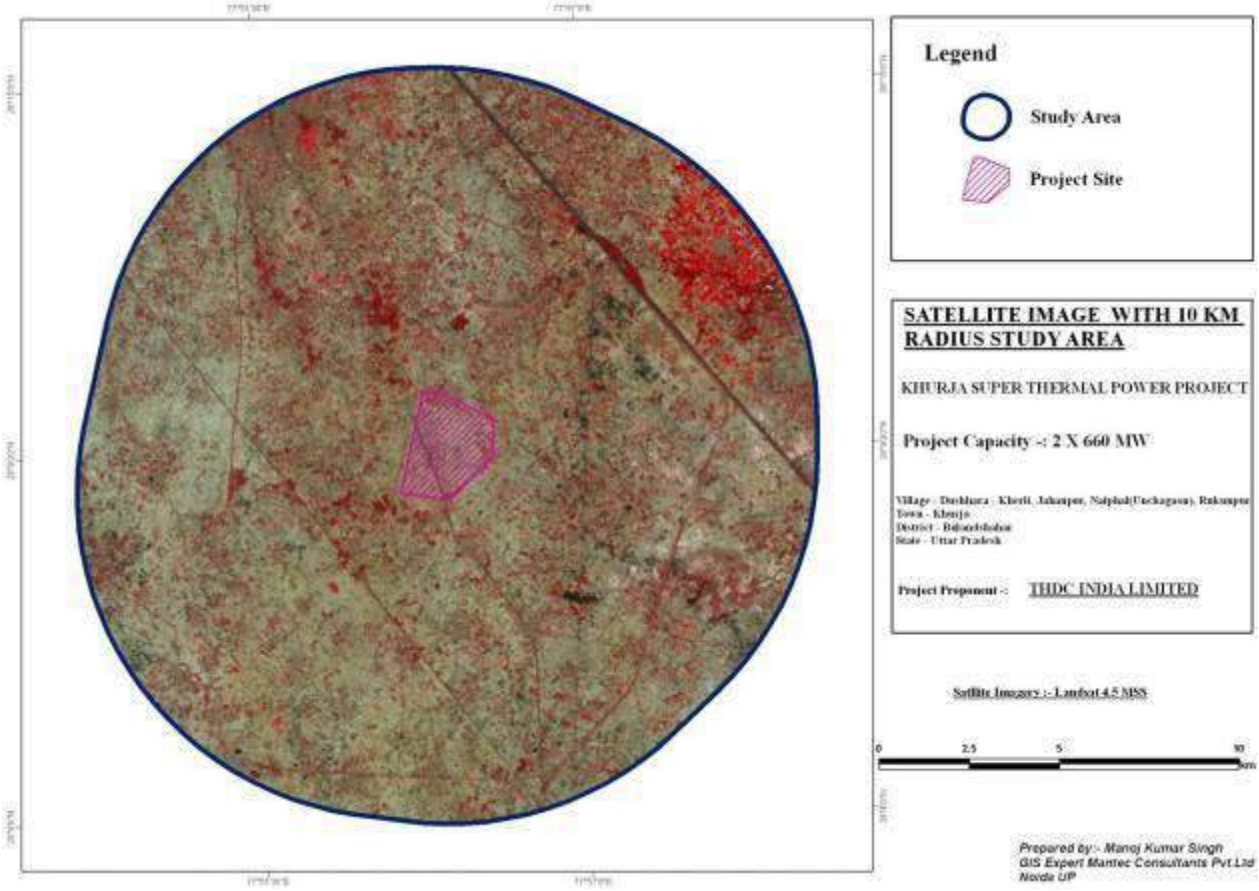
- **Settlement (Residential):** All the residential settlements mainly villages covering about 1612.65 ha of area are included in this category. This settlement is scattered in the study area. The built up comprises of about 5.13% of the study area.
- **Agricultural Land:** Agricultural land is the major constituent of the study area i.e. 82.56 % which indicates considerable agricultural practices in the area. The cropped land (as on the data of satellite imagery) comprises of about 15623.00 ha (about 49.71%) of the study area. The lands without crop comprise of 10324.13 ha i.e. almost 32.85 % of the study area.
- **Forest Plantation:** About 2669.27 ha (8.49%) of the study area is covered with plantation.

- **Waste Lands:** The study area has a wasteland comprising of 874.30 ha i.e. 2.78% of the study area. There are distinguished patches of marshy land stretching at places in the river side.
- **Water Bodies:** A small portion of the study area is covered with water bodies. This comprises are of pond/drain/distributaries etc. Area under water bodies is 325.31 ha (1.04%). There are a few dry ponds that are mostly rain fed.

Land use of the Project Area

Although the land identified for siting of the proposed project has been acquired by UPSIDC, the land is still in possession of the individual owners. The current land use of the project area is as follows:

S. No.	Land use	Area, Ha.	% of total area
1.	Agricultural use	471.63	97.04
2.	Settlements	0.90	0.18
3.	Plantation	4.49	0.92
4.	Waste land	8.98	1.85
5.	Water bodies	0.40	0.07



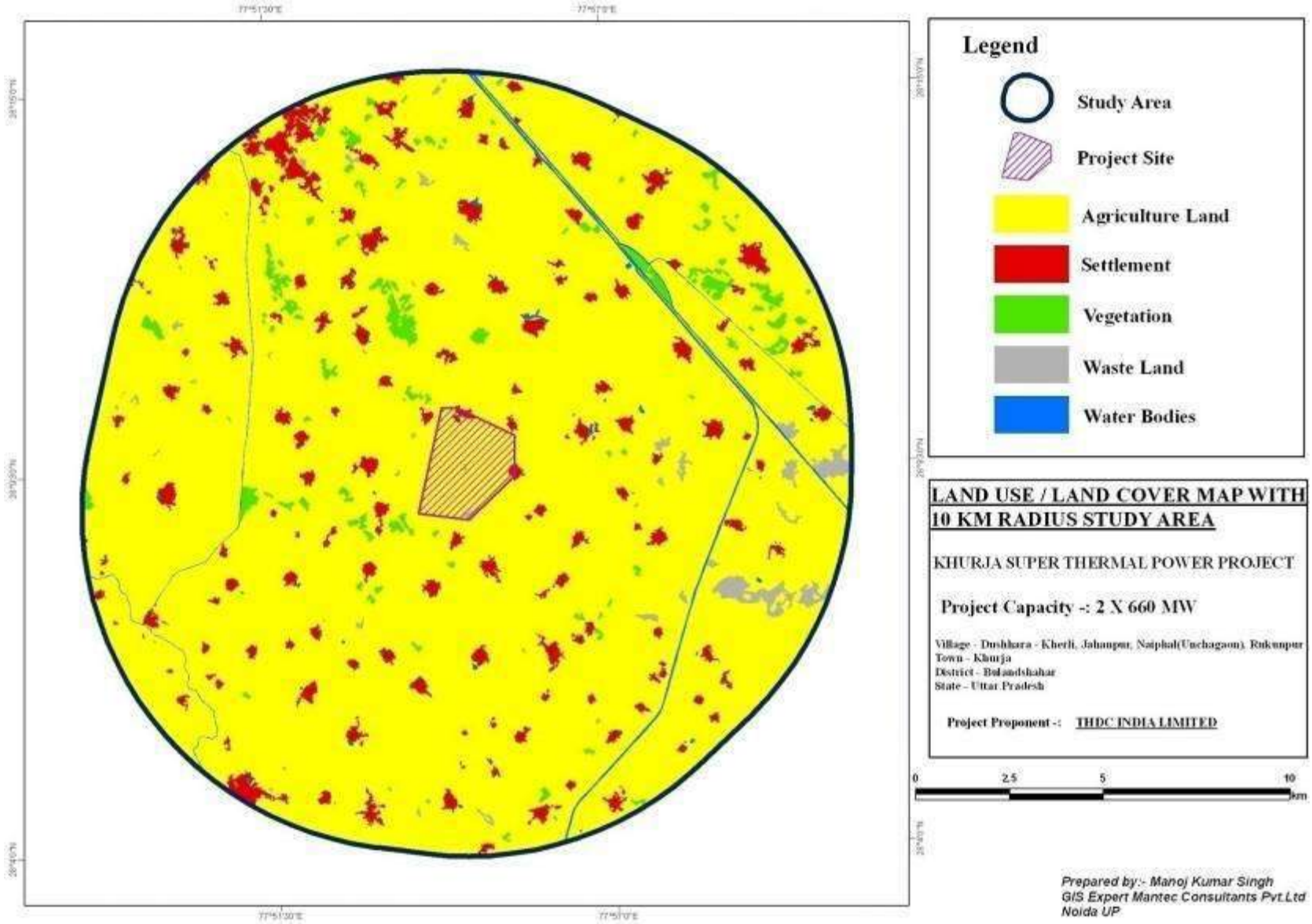


Figure 9: Land Use Classification based on Satellite Imagery 2011

4.2.4 Soil Quality

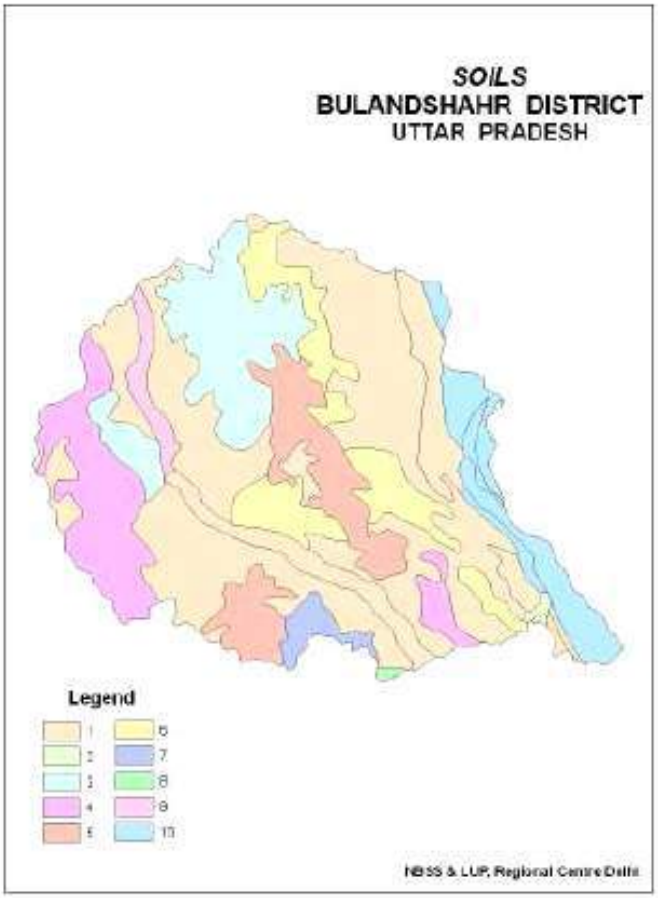
The study area falls in Indo-Gangetic alluvial plains and most of the soil in this area has been deposited by the tributaries of rivers Ganga and Yamuna. The major types of soil are domat (clay), balui domat (sandy clay), bhoor (sandy) and reh (alkaline). The project area is low lying and prone to water logging conditions due to excessive canalization, induced seepage from canals and lack of well defined drainage. Ground water table is shallow, at less than a meter in monsoon season.

In the study area, in-situ soil can be seen in small patches only, which is poorly developed, immature, often gritty, with a yellowish to greyish colour. These soils have low water holding capacity and are extremely infertile.

The alluvial soils cap the major part of the study area. With few exceptions of clay and sandy loams, the soils in this area are mostly silt loams/ sandy loams at the top and grades to sandy soils at the bottom. These soils are well graded, mature and mostly non-plastic. Sub-soil strata consist of fine-grained soil, silty clay of low plasticity and silt mixed with sand up to depths of 10-15 m below ground surface. This fine-grained soil is overlaid on coarse-grained strata of silt sand/ fine to medium sand, which extends up to a depth of 30 m below ground surface. Some kankars are found mixed with fine and coarse-grained strata.

The pH of the soil is slightly high (alkaline) due to presence of excess Na_2CO_3. Alkali patches of various concentration levels are seen in different sites. Some part of the study area is severely affected by salt peter and do not support vegetation. Due to low density vegetal cover in the salt affected areas; the organic matter content is extremely low. In other areas where regular agricultural activity is carried out the organic matter content is moderate.

Soil map of Bulandshahr District is given in **Figure-10**.



Legend	Description
1& 9	Deep, loamy soils
2	Deep, loamy soils and silty soils
3	Deep, fine soils(moderately saline and sodic) and loamy soils
4	Deep, silty soils and loamy soils (slightly saline and slightly sodic
5	Deep, loamy soils (moderate saline and sodic)
6	Deep, loamy soils and loamy soils (moderate salinity and sodicity).
7	Deep, loamy soils (slightly saline and moderately sodici) and silty soils
8	Deep, silty soils and fine soils
10	Deep, sandy soils (moderate flooding) and loamy soils (slight flooding)

Figure 10: Map of Bulandshahar District Showing Soil Type in the area

Methodology Adopted For Soil Quality Survey

The soil survey was carried out to assess the soil characteristics of the area. The soil sampling locations were identified primarily based on the local distribution of vegetation and the agricultural practices. The sampling locations are mainly selected from agricultural field. However few samples in the vicinity of ash disposal area and main plant areas of site were also selected.

For studying soil quality of the region, 10 samples were collected from 10 different locations in the study area (in and around the project boundary area) to assess the existing soil conditions. Distance and direction of soil sampling stations from the project site have been given below in **Table-17**.

The samples were collected by driving an auger into the soil up to the depth of 30cm. It was uniformly mixed before homogenizing the soil samples. The samples were then packed in polythene plastic bags and sealed. Main test methodologies used for analysis of soil are given below in **Table-18**. Map showing monitoring locations of soil samples for physio-chemical analysis of soil is shown below in **Figure-11**:

Table- 17: Soil Sampling Location of the Study Area

Station Code	Location	Locations with respect to	
		Distance (km)	Direction
S1	Jawal	2.5	W
S2	Jahanpur	0.5	NE
S3	Naiphal	0.2	E
S4	Baragaon	03	NE
S5	Gwarauli	2.5	E
S6	Bhogpur RF	09	SE
S7	Arnia Khurd	02	S
S8	Korola	03	S
S9	Rohinda	05	NW
S10	Main Plant	00	-

Table- 18: Methodologies Used for Soil Analysis

Sampling Parameters		Analytical Equipment	Methodology
Texture	Manual samples were collected by driving an auger. Soil samples collected once in a season	Hygrometer and measuring cylinder	IS: 2720 Part 4
Porosity		As per IS: 2720	IS: 2720 Part VII
Moisture		Electronic Balance	IS: 2720 Part 2
Cation Exchange Capacity		As per IS: 2720	IS: 2720 part 24
Electrical Conductivity		As per IS: 14767-2000	IS: 14767-2000
pH		pH Meter	4500 H+B
Calcium		EDTA Titration	3500 Ca B
Magnesium		EDTA Titration	3500 Mg B
Sodium (Na)		Flame Photometer	3500 Na B
Potassium		Flame Photometer	3500 K B

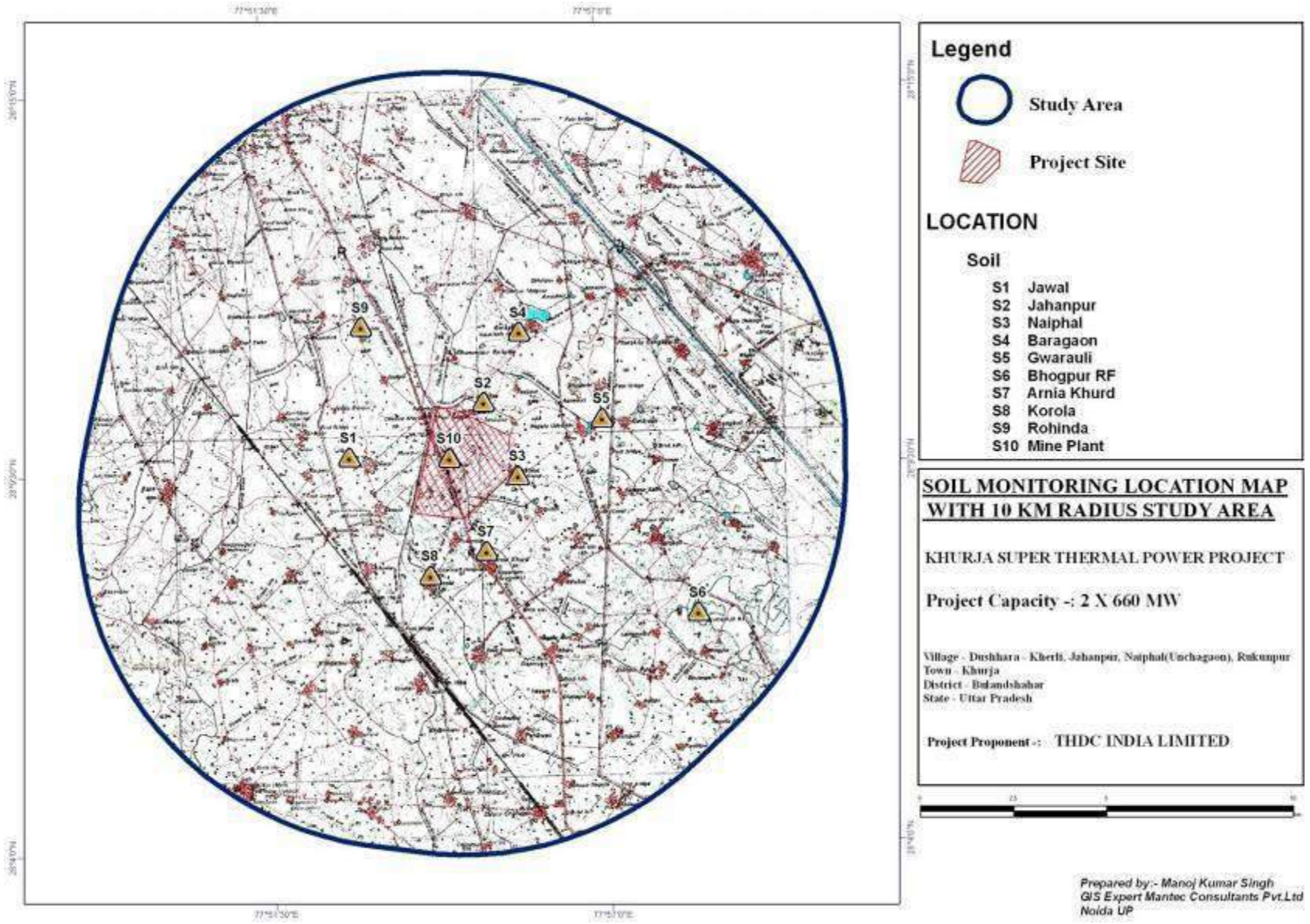


Figure 11: Soil Monitoring Location Map

Soil Quality Result

The results of analysis of soil samples collected from ten different locations during the two seasons are given below in **Table-19.**

Table- 19: Soil Quality Analysis Results

Sr. No.	Parameters	Units	Post-monsoon season (October to December, 2012)										Pre-monsoon season (March to May, 2016)									
			Jawal	Jahanpur	Nighal	Baragaon	Gwarauli	Bhogpur RF	Arnia Khurd	Korola	Rohinda	Main Plant	Jawal	Jahanpur	Nighal	Baragaon	Gwarauli	Bhogpur RF	Arnia Khurd	Korola	Rohinda	Main Plant
1	pH	-	7.17	7.1	6.8	7.27	7.28	7.26	7.18	7.21	7.41	7.21	8.02	7.36	7.28	6.82	7.84	7.39	7.61	7.56	7.86	7.93
2	Conductivity	Micro mhos/cm	218	192	210	116	191	176	216	172	192	226	198	176	218	209	174	189	234	253	184	216
3	Texture	-	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
4	Sand	%	70	70	72	66	68	68	66	68	70	70	68	72	70	68	70	68	72	68	72	70
5	Clay	%	10	8	14	10	10	12	12	10	12	12	12	8	12	10	10	8	10	12	12	10
6	Silt	%	20	22	14	24	22	20	22	22	18	18	20	20	18	22	20	24	18	20	16	20
7	Potassium	mg/100gm	0.8	0.8	0.7	0.8	0.8	0.7	0.8	0.9	0.7	0.8	0.7	0.9	0.8	0.6	0.7	0.8	0.6	0.7	0.9	0.8
8	CEC	meq/100gm	6.16	4.88	7.72	5.84	6.34	6.98	7.04	5.76	7.16	7.24	6.92	5.24	6.68	6.12	4.96	5.16	5.88	6.72	6.84	6.34
9	Nitrogen	mg/100gm	11.6	8.8	7.2	8.4	13.4	9.8	10.4	7.6	11.6	12.4	9.2	12.4	6.8	11.2	9.6	11.6	8.8	7.2	8.4	13.4
10	Phosphorous	mg/100gm	0.72	0.58	0.67	0.52	0.94	0.62	0.68	0.53	0.76	0.84	0.72	0.89	0.57	0.81	0.75	0.84	0.66	0.62	0.64	0.93
11	Mg	meq/100gm	1.92	2.18	0.92	1.82	2.06	1.92	1.92	0.98	1.26	2.01	0.98	1.88	0.68	1.87	2.02	1.94	1.86	0.72	0.78	2.08

Analysis

Monitoring data shows that the texture of soil at all locations is Sandy Loam. The monitoring sites have sand ranging from 66% to 72% in soil samples. Silt content varies from 14% to 24%, while Clay content varies from 8% to 14% in the soil samples.

- The data shows that value of pH ranges from 6.80 at Naiphal to 7.41 at Rohinda indicating that all soil samples are neutral.
- Main plant area shows maximum conductivity of 226µmhos/cm, while Baragaon shows minimum conductivity of 116µmhos/cm.
- Value of CEC ranges from 1.71meq/100g as lowest at Baragaon and 2.86meq/100g as maximum at Rohinda.
- Magnesium values ranges from 0.92meq/100g as lowest at Naiphal and 2.18meq/100g as highest at Jahanpur.
- The average concentration of Nitrogen, Phosphorus and Potassium in the soil samples varies from 26.1 to 69.1 mg/100gm, 72.2 to 110.4 mg/100gm and 0.7 to 0.9 mg/100gm.

Conclusion

The study area has deep, well drained, coarse loamy soils on nearly level to level plain with loamy surface useful for farming. Soil is fertile and apt for agriculture purpose. It is observed that data collected for both the seasons i.e. Oct-Dec 2012 and March- May 2016 is comparable with each other.

4.3 WATER ENVIRONMENT

4.3.1 Hydrogeology

Optimum economic development of water resources in an area requires an integrated approach that coordinates the use of both surface water and ground water resources. After evaluation of total water resources and preparation of alternative management plans, action decisions can then be made by the bodies that are going to utilize the water resources of the area in future.

The River Ganga passes through the North Eastern side of the plant at 42km from the side. River Ganga rate of flow is slow but constant throughout the year. It has been revered from the earliest times and today is regarded as the holiest of rivers by Hindus. Yamuna River lies at 40km from the site towards North West direction. Water of both rivers is used for irrigation, either when the river is in flood or by means of gravity canals is common in the area. A system of irrigation canals has increased the production of cash crops such as sugarcane, cotton, and oilseeds. The current system of irrigation is based on both gravity canals and electrically powered lifting devices.

For ground water extraction, water wells are drilled and it is presumed that production of water will continue indefinitely with time. There exist a balance between water recharged to the aquifers from the surface sources and water pumped from the aquifers by wells. Typically, the development of water supplies from groundwater begins with a few pumping wells scattered all over the area. With the passage of time, more wells are drilled and the rate of extraction increases, as a result the

aquifer discharge increases to its recharging capability. Continued water extraction without a management plan could eventually deplete the ground water resource. Hence, use of water resources judiciously is essential for sustainable development. The ground water table varies from 3.65 m to 5.20m below existing ground level.

4.3.2 Water Quality

The assessment of present status of water quality within the study area was conducted by collecting water sample from ground water sources and surface water sources during the period of October to December 2012. The sampling locations were identified on the basis of their importance within the study area. Four ground water samples and three surface water sample were collected during the monitoring period. The details of locations of sampling stations for ground water and surface water are given below in **Table-20** and shown in **Figure-12.**

Table- 20: Location of Water Monitoring Stations

Station Code	Stations	Distance (Km)	Direction	Type
SW1	Baragaon village	3.0	NE	Surface Water
SW2	Upper Ganga canal	7.5	E	Surface Water
SW3	Dushehra Kheri	0.5	N	Surface Water
GW1	Jawal	2.5	W	Ground water
GW2	Arnia Khurd	2.0	S	Ground water
GW3	Jhanpur	0.5	E	Ground water
GW4	Gwarauli	2.5	E	Ground water

Water samples were collected and analyzed for relevant physical, chemical and bacteriological parameters. Collection and analysis of the samples was carried out as per established standard methods and procedures, prescribed by CPCB, relevant IS-Codes and Standard Methods of Examination of Water. Analysis of the parameters likes temperature; pH, dissolved oxygen and alkalinity were carried out at the sampling stations immediately after collection of samples with the help of Field Analysis Kits. For analysis of other parameters, the samples were preserved and brought to laboratory at Noida. The metallic constituents like arsenic, mercury, lead, cadmium, chromium, copper, zinc, selenium, iron and manganese were analyzed with AAS.

The observed characteristics of water samples have been assessed with Water Quality Standards which are the foundation of the water quality-based pollution control program. Water Quality Standards define the goals for a water-body by designating its uses, setting criteria to protect those uses, and establishing provisions such as anti-degradation policies to protect water-bodies from pollutants. The observed values of ground water and surface water characteristics are presented in tables 20 and 21. Results of characterization are discussed below separately.

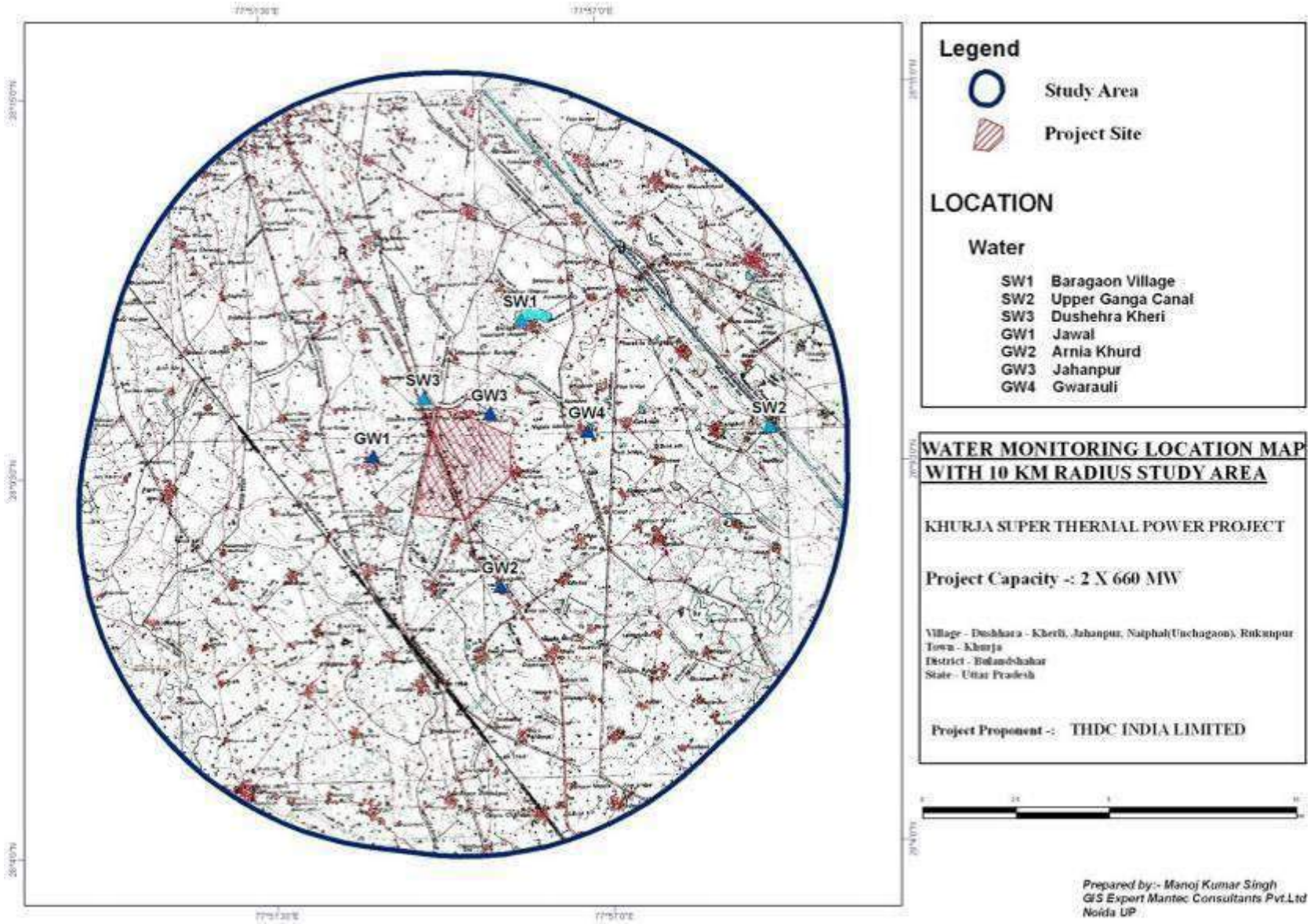


Figure 12: Ground Water Monitoring Location Map

Groundwater

Groundwater is the water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations. Since groundwater moves through rocks and subsurface soil, it has a lot of opportunity to dissolve substances as it moves. Ground water quality comprises the physical, chemical and biological qualities of ground water. Temperature, colour, turbidity, odour and taste make up the list of physical water quality parameters. Mostly, groundwater is colourless, odourless and without specific taste so quality of groundwater is mostly concerned with chemical and biological qualities.

The physico-chemical characteristics of groundwater were analyzed with the drinking water standards, prescribed in IS:10500. The groundwater analysis data for the monitoring period i.e. October-December, 2012 along with additional data collected during March-May 2016, is presented in **Table-20.** Summary of the observations is as follows:

- pH: range of pH varies from 7.19 to 7.43.
- Conductivity (µmho/cm): ranges from 452 to 1326.
- Total Hardness as CaCO3 (mg/L): ranges from 126 to 426.
- Chloride as Cl (mg/L): ranges from 24 to 103.
- Nitrate as NO3 (mg/L): ranges from 0.31 to 0.90.
- Total coliform (MPN/100mL): Absent in all samples.

It is, therefore, concluded that Water Quality results for all the four sites (in both the seasons i.e. post monsoon & pre- monsoon) show that water quality falls under Class-A of Water Quality Criteria under drinking water source without conventional treatment but after disinfection. The physico-chemical characteristics of ground water samples, including heavy metal content are good, conforming to drinking water quality standards, prescribed in IS:10500 (Test Characteristics for Drinking Water).

Surface Water

Surface water is any source of water that is open to the atmosphere and is subject to runoff from the land. This includes lakes, streams, rivers, ponds, springs, marine bays, estuaries, and oceans.

The samples of surface water have been collected from one surface water bodies and analyzed for parameters prescribed as per IS-10500. The result of surface water analysis data for the monitoring period i.e. October-December, 2012, is presented below in **Table-21** along with additional data collected for water (surface & ground) during March- May 2016.

Table- 2: Ground Water Quality Analysis Results

S.No.	Parameters	Units	Desirable Limits (IS: 10500)	Post-monsoon season (October to December, 2012)												Pre-monsoon season (March to May, 2016)											
				Oct-12				Nov-12				Dec-12				Mar-16				Apr-16				May-16			
				GW1	GW2	GW3	GW4	GW1	GW2	GW3	GW4	GW1	GW2	GW3	GW4	GW1	GW2	GW3	GW4	GW1	GW2	GW3	GW4	GW1	GW2	GW3	GW4
1	pH	-	6.5-8.5	7.32	7.31	7.19	7.19	7.32	7.33	7.24	7.23	7.39	7.43	7.24	7.27	7.43	7.38	7.23	7.46	7.53	7.36	7.29	7.41	7.44	7.43	7.53	7.61
2	Total Suspended Solids	mg/L	-	<4	<4	<4	<4	4	<4	6	<4	6	<4	6	<4	<4	<4	<4	<4	4	<4	<4	<4	<4	<4	<4	<4
3	Conductivity	µmhos/ cm	-	1304	452	682	780	1309	459	681	785	1326	472	678	795	1226	452	678	782	1256	462	663	776	1262	461	678	784
4	Alkalinity as CaCO3	mg/l	200	128	146	206	228	129	151	210	231	144	102	218	238	136	146	192	184	134	156	208	228	148	144	218	232
5	Total Dissolved Solids	mg/l	500	840	290	436	500	839	294	436	502	848	302	434	510	776	273	452	512	810	296	448	498	812	302	434	502
6	Total Hardness as CaCO3	mg/l	300	410	126	272	310	420	131	279	312	426	139	283	318	382	132	278	312	392	138	272	314	404	142	282	308
7	Calcium as CaCO3	mg/l	75	292	76	198	248	295	78	201	243	295	80	203	245	92	31.6	72.8	85.6	94.4	34.4	67.2	83.2	98.4	34.4	76.8	81.6
8	Magnesium as CaCO3	mg/l	30		50	74	62	125	53	78	69	131	58	80	73	37	13	23.3	23.8	38	12.6	25.2	25.7	38.3	13.6	21.8	25.2
9	Chloride as Cl	mg/l	250	98	24	38	44	101	26	41	47	103	28	44	49	94	34	42	48	96	28	46	54	98	36	44	52
10	Phosphate as PO4	mg/l	-	0.61	0.18	0.66	0.21	0.55	0.21	0.64	0.24	0.49	0.19	0.61	0.23	0.52	0.21	0.46	0.52	0.51	0.24	0.56	0.48	0.53	0.22	0.6	0.52
11	Nitrate as NO3	mg/l	45	0.31	0.48	0.9	0.81	0.36	0.51	0.88	0.84	0.31	0.5	0.78	0.81	0.82	0.74	0.92	0.82	0.62	0.56	0.78	0.78	0.73	0.66	0.77	0.72
12	Oil &Grease	mg/l	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
13	Sulphate as SO4	mg/l	200	74	44	72	76	75	49	75	81	78	51	78	83	68	42	68	74	76	54	72	82	70	48	74	84
14	Sodium as Na	mg/l	-	112	36	48	56	117	41	54	59	113	40	59	60	104	36	46	55	106	44	58	58	108	40	62	63
15	Potassium as K	mg/l	-	7	6	5	11	6	7	6	10	6	6	8	11	10	4	5	7	11	5	6	6	12	5	8	8
16	Chemical Oxygen Demand	mg/l	-	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
17	Biochemical Oxygen Demand	mg/l	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
18	Phenolic Compound	mg/l	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
19	Copper as Cu	mg/l	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20	Cadmium as Cd	mg/l	0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
21	Selenium	mg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
22	Arsenic	mg/l	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Manganese	mg/l	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Lead as Pb	mg/l	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Zinc as Zn	mg/l	5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Total Chromium as Cr^{+6}	mg/l	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Iron as Fe	mg/l	0.3	0.11	0.15	0.16	0.12	0.11	0.15	0.16	0.12	0.1	0.13	0.14	0.1	0.12	0.16	0.18	0.12	0.11	0.16	0.17	0.14	0.15	0.13	0.14	0.12
28	Total Coliform	MPN/100ml	-	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

Table- 22: Surface Water Quality Analysis Results

				Post-monsoon season (October to December, 2012)									Pre-monsoon season (March to May, 2016)								
				Oct-12			Nov-12			Dec-12			Mar-16			Apr-16			May-16		
S.No.	Parameters	Units	Desirable Limits (IS: 10500)	SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3
1	pH	-	6.5-8.5	6.91	7.12	7.16	7.1	7.14	7.18	7.18	7.21	7.27	6.93	7.45	7.62	7.35	7.41	7.34	7.28	7.33	7.4
2	Total Suspended Solids	mg/L	-	6	6	4	8	6	<4	6	6	<4	16	6	14	18	5	15	16	4	15
3	Conductivity	µmhos/ cm	-	822	610	472	818	614	465	827	629	477	836	616	482	824	612	457	831	634	481
4	Alkalinity as CaCO3	mg/L	200	216	202	146	211	200	149	218	210	152	218	208	154	218	212	152	224	208	158
5	Total Dissolved Solids	mg/L	500	526	390	302	524	393	298	530	402	306	534	388	314	516	386	287	536	412	313
6	Total Hardness as CaCO3	mg/L	300	308	242	122	317	251	131	321	258	136	296	248	132	324	256	138	328	262	144
7	Calcium as CaCO3	mg/L	75	256	186	72	255	189	74	259	186	78	206	174	92	226	166	90	234	186	86
8	Magnesium as CaCO3	mg/L	30	52	56	52	62	62	57	62	72	58	90	74	40	98	90	48	94	76	58
9	Chloride as Cl	mg/L	250	48	28	22	49	31	26	52	33	28	52	32	28	54	36	30	56	38	34
10	Phosphate as PO4	mg/L	-	0.11	0.14	0.18	0.08	0.17	0.15	0.06	0.15	0.13	0.16	0.18	0.17	0.12	0.16	0.15	0.11	0.18	0.14
11	Nitrate as NO3	mg/L	45	0.61	0.48	0.48	0.63	0.45	0.47	0.61	0.41	0.42	0.68	0.54	0.52	0.64	0.48	0.53	0.62	0.64	0.58
12	Oil &Grease	mg/L	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
13	Sulphate as SO4	mg/L	200	72	58	38	75	61	36	78	63	38	74	62	44	76	64	38	78	66	42
14	Sodium as Na	mg/L	-	62	42	34	71	47	39	68	46	33	61	44	38	74	54	44	70	48	37
15	Potassium as K	mg/L	-	10	8	6	12	7	8	10	9	7	6	4	4	7	5	5	7	5	4
16	Chemical Oxygen Demand	mg/L	-	56	56	<4	59	59	<4	52	52	<2	12	6	10	10	5	12	12	6	12
17	Biological Oxygen Demand	mg/L	-	<2	<2	<2	29	29	<2	25	25	<2	4.4	<2	3.6	3.8	<2	3.4	3.6	<2	4.2
18	Phenolic Compound	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
19	Copper as Cu	mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20	Cadmium as Cd	mg/L	0.003	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
21	Selenium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
22	Arsenic	mg/L	0.05	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
23	Manganese	mg/L	0.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
24	Lead as Pb	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
25	Zinc as Zn	mg/L	5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
26	Total Chromium as Cr^{+6}	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
27	Iron as Fe	mg/L	0.3	0.06	0.08	0.11	0.06	0.08	0.11	0.07	0.06	0.12	0.06	0.08	0.12	0.06	0.08	0.1	0.07	0.06	0.11
28	Total Coliform	MPN/100mL	-	146	146	98	149	141	102	102	139	98	146	116	98	144	114	96	136	112	94

Summary of the observed characteristics of surface water samples is as follows:

- pH: range of pH varies from 6.91-7.27.
- Conductivity (µmho/cm): ranges from 465 to 827.
- Total Hardness as CaCO3 (mg/L): ranges from 122 to 321.
- Chloride as Cl (mg/L): ranges from 22 to 52.
- Nitrate as NO3 (mg/L): ranges from 0.41 to 0.63.
- Total coliform (MPN/100mL): ranges from 98 to 149.

It is, therefore, concluded that characteristics of surface water samples from all the three sites are well within the limits during both the seasons i.e. Oct-Dec 2012 and March-May 2016, prescribed by CPCB.

4.4 CLIMATE & METEOROLOGY

4.4.1 Climate

The climate of the study area is influenced by its inland position and the prevalence of air of the continental type during the major part of the year. Extreme dryness with an intensely hot summer and cold winter are the characteristics of the climate. Only during the three monsoon months July, August and September does air of oceanic origin penetrate to the area and causes increased humidity, cloudiness and precipitation. The year can broadly be divided into four seasons. The cold season starts in December and extends to about the beginning of March. This is followed by the hot season, which lasts till about the end of June when the monsoon arrives. The monsoon continues to the last week of September. The two post monsoon months October and November constitute a transition period from monsoon to winter conditions.

4.4.2 Long-term Meteorology

The nearest meteorological observatory of Indian Meteorological Department is located at Aligarh, approximately 36 km from the proposed site. Climatological normal data for Aligarh Observatory for the period 1961-1990 have been considered as the long-term meteorology of the study area, and a summary of the same has been provided in **Table-23.**

Temperature

The monthly mean values of daily maximum and minimum temperatures are reported as 40.0^{0}C and 20.8^{0}C, respectively. Mean values of monthly highest and lowest temperatures are reported as 44.2^{0}C and 3.2^{0}C. The lowest temperature recorded was 0.6^{0}C and the highest recorded was 47.7°C The annual mean of maximum and minimum temperature was 31.1°C and 18.2 °C, respectively.

Table- 23: Climatological Normal Data for Aligarh Observatory (1961-1990)

Month	Air Temperature, ^{0}C						Rainfall		Mean wind speed, kmph
	Mean				Extremes		Monthly total, mm	No. of rainy days	
	Daily Max	Daily Min	Highest in the month	Lowest in the month	Highest	Lowest			
Jan	20.8	7.2	24.7	3.8	30.6	0.6	14.1	1.4	4.6
Feb	23.9	9.4	29.0	5.0	33.3	1.7	14.4	1.4	5.3
Mar	30.2	14.1	35.6	8.8	41.7	3.9	8.2	1.0	6.0
Apr	36.9	20.3	41.4	14.7	44.4	10.9	7.2	0.8	6.6
May	40.0	24.6	43.9	19.8	47.2	15.5	19.7	1.7	7.0
Jun	39.5	27.1	44.0	22.7	46.3	18.6	62.2	3.7	7.6
Jul	34.4	26.2	39.4	23.2	44.5	19.9	222.6	10.4	7.1
Aug	33.0	25.6	36.9	23.0	42.1	20.1	239.9	10.7	5.9
Sep	33.7	24.0	37.0	20.9	40.2	15.4	136.8	5.6	5.6
Oct	33.2	19.0	36.2	14.7	41.7	11.0	23.1	1.1	3.9
Nov	28.4	12.8	32.2	9.1	36.1	5.0	3.6	0.3	3.6
Dec	22.4	18.3	26.8	4.8	32.8	1.2	10.8	0.9	4.2
Total/ Mean	31.1	18.2	44.2	3.2	47.2	0.6	762.6	39.0	5.6

Wind Speed and Direction

Analysis of wind records during 1961 – 1990 shows that the winds are generally light to moderate in this area. It can be seen that the monthly mean values of wind speed varies from 3.6 to 7.7 Km/h, with the mean value at 5.6 km/h. The higher wind speeds are observed during April to July. The dominant wind directions are western and north western during the non-monsoon months. However, during monsoon months, the dominant wind direction is eastern. Calm wind conditions are more frequent during the months of October to February.

Rainfall

Normal annual total rainfall reported for the station is 762.6 mm. Approx. 79% (599 mm) of the total annual rain fall is received during the months of July to September, august being the wettest month of the year. On an average, there are 39 days in a year with rainfall.

4.4.3 Site Meteorology

To determine the meteorological data in the project area during the study period, the meteorological parameters were at the station located near the site. The recorded during the study period is used for interpretation of the baseline information as well as input for air quality simulation models. Meteorological data was collected during post-monsoon season (October – December) and pre-monsoon (March – May) of 2016.

A fully instrumented continuous recording meteorological observatory was established and operated near the project site during the 2 study periods. A brief description of instruments, parameters and frequency are presented in **Table-24**. The summary of met-data observed during October to December, 2012 and March to May, 2016 is presented in **Table-25**. The following parameters were measured: -

- Temperature at 2m and 10m level
- Relative humidity
- Wind speed and direction
- Rainfall
- Storm

Table- 24: Instruments, Parameters and Frequency of Meteorological Monitoring at Site

S. No.	Parameters	Instruments	Frequency
1	Wind Speed	Automatic Weather Station (Envirotech WM 251)	Continuous Automatic 1 hourly Average
2	Wind Direction		
3	Ambient Temperature at two heights of 2m & 10m		
4	Max. & Min Temperature	Wet & Dry Bulb Thermometer	Daily at 08:30 & 17:30 IST
5	Humidity	Hygrometer	Daily at 08:30 & 17:30 IST
6	Atmospheric Pressure	Aneroid Barometer	Daily at 08:30 & 17:30 IST
7	Rainfall	Rain Gauge	Daily
8	Storm	Visual observation	Daily

Table- 25: Meteorological Data Recorded at Site

Month	Temperature (°C)			Relative Humidity (%)		Rainfall (mm)		Wind Speed (km/hr)
	Min	Max	Monthly average	At 08:30	At 17:30	Rainy Days	Monthly Total, mm	Mean
October'12	15.0	36.0	25.6	68	50	2	36.0	4.39
November'12	09.5	33.0	21.5	65	47	1	14.0	4.00
December'12	7.2	22.4	18.5	73	56	0	0.0	4.58
March'16	15.0	39.0	27.0	77	38	5	15.9	8.4
April'16	19.0	44.0	31.5	68	20	4	34.0	11.2
May'16	21.0	46.0	33.5	78	38	3	18.0	10.4

The analysis of the field observation is given below:

Ambient Temperature: The observed seasonal minimum and maximum were 7.2ºC and 36ºC, respectively during Oct to Dec 2012, whereas the minimum and maximum temperature observed during March to May 2016 were 15ºC and 46ºC respectively.

Relative Humidity: The seasonal average relative humidity varies from 65% to 73% at 08:30 hrs and 47% to 56% at 17:30 hrs during Oct to Dec 2012, while during March to May 2016 it varies from 68% to 78% at 08:30 hrs and 17:30 respectively.

Rainfall: During October to December season 3 rainy days were observed while during March to May 2016 a sum of 12 rainy days were observed.

Wind Speed: Analysis of hourly wind speed shows that the winds are generally light to moderate in this area. The monthly mean wind speed varies from 4.0 to 4.58 km/hr during Oct to Dec 2012 whereas it varies from 8.4 to 11.2 km/hr during March to May 2016.

Wind Pattern: The wind-rose diagram for the study period has been drawn on the basis of hourly wind speed and direction data. The seasonal wind rose diagram at site is presented in **Figure-13**.

The windrose diagram shows that the dominant direction of wind flow is from West. Hence, dispersion of pollutants will be in East direction for both the seasons.

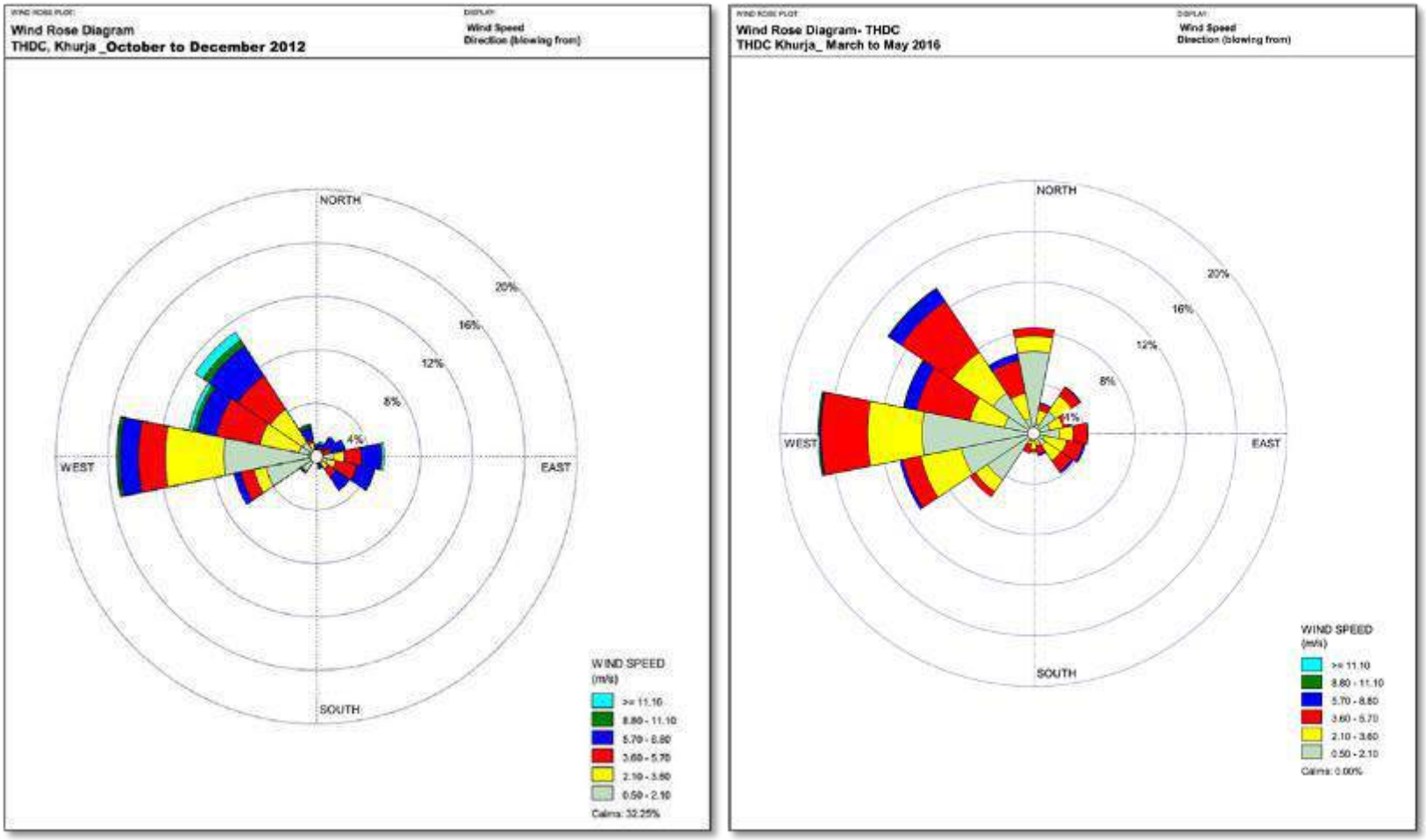


Figure 13: Windrose Diagram - October to December, 2012& March to May, 2016

4.5 AIR ENVIRONMENT

4.5.1 Sampling Period, Frequency, Location and Methodology

Air borne contaminants can present a significant threat to worker health and safety. Thus, identification and quantification of these contaminants through air monitoring is an essential component of a health and safety program at a hazardous waste site. The basic mission of the Air Quality monitoring is to preserve and improve the quality of nation's air. To accomplish this, evaluate the status of the atmosphere as compared to clean air standards and historical information.

The studies to establish baseline ambient air quality were performed during two full seasons, viz., Post-monsoon season (October to December) of 2012 and pre-monsoon season (March to May) of 2016. During these periods, 24-hr average samples were collected with a frequency of twice per week. On each sampling day, sampling was started at 8 AM, and terminated at 8 AM on the next day. The sampling was performed at a height of 3.5 m (approximately) from the ground level. Standard methods specified under "National Ambient Air Quality Standards" notification G.S.R. 176(E) were adopted for sampling and analysis.

No major industry is located within or in vicinity of the study area. Therefore, to establish the baseline status of ambient air quality, four sampling locations were scientifically selected within the study area, based on the following considerations:

- Meteorological conditions;
- Topography of the study area;
- The direction of the wind;
- Representation of the region for establishing baseline status; and
- Representation with respect to likely impact areas.

The location of the monitoring stations with reference to the proposed plant site is given below in **Table-26** and shown in **Figure-14.**

Table- 26: Ambient Air Quality Monitoring Locations

Station Code	Stations	Distance (Km)	Direction
AQ1	Gwarauli Village	4.0	E
AQ2	Jawal Village	2.5	W
AQ3	Nagla Shakhu	6.5	N
AQ4	Bhogpur RF	09	SE

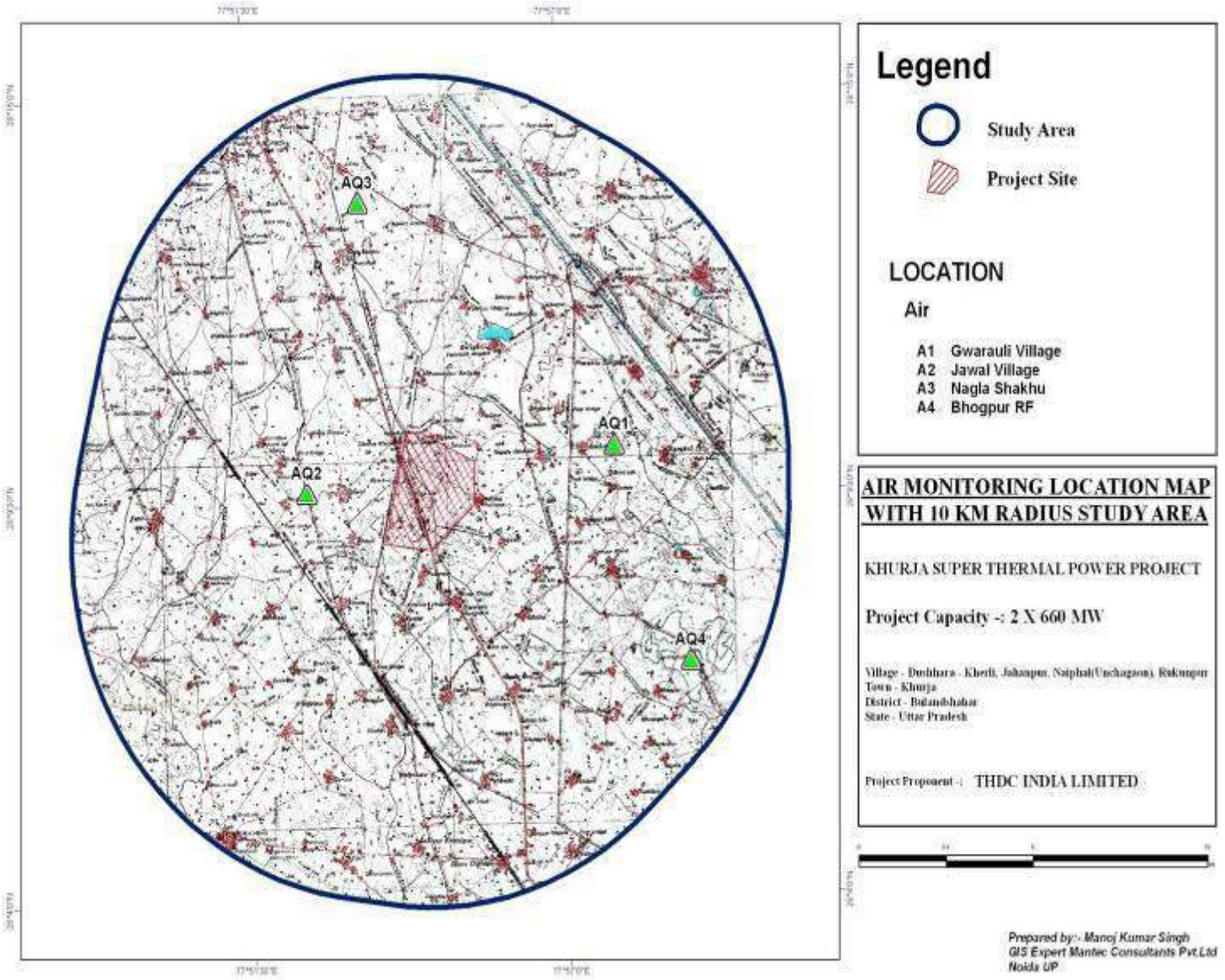


Figure 10: Air Monitoring Location Map

The sampling and analytical techniques and procedure adopted for sampling and analysis of air pollutants are summarized in **Table-27**.

Table- 27: Techniques Used for Ambient Air Quality Monitoring

Parameters	Technique	Technical Protocol
Sulphur Dioxide	West and Gaeke	IS-5182 (Part-II)
Nitrogen Oxide	Jacob & Hochheiser	IS-5182 (Part-VI)
Suspended Particulate Matter	Gravimetric method	IS-5182 (Part-IV)
Particulate Matter, PM_{10}	Gravimetric method	IS-5182 (Part-XXIII)
Particulate Matter, $PM_{2.5}$	Gravimetric method	EPA 40CFR part-50
Ozone	Chemical method	IS-5182 (Part-IX)
Mercury	Mercury Analyzer	-

4.5.2 Air Quality Standards

National Ambient Air quality standards (18 June 2009) along with the prescribed method of measurement is given below in **Table-28.**

Table- 28: National Ambient Air Quality Standards

Pollutants	Time-weighted Average	Concentration in Ambient Air		Method of Measurement
		Industrial Areas, residential, rural and other area	Ecologically Sensitive Areas (notified by Central Govt.)	
Sulphur Dioxide (SO_2)	Annual Average*	50 µg/m^3	20 µg/m^3	• Improved West & Geake Method • Ultraviolet fluorescence
	24 hours**	80 µg/m^3	80 µg/m^3	
Oxides of Nitrogen as (NO_2)	Annual Average*	40 µg/m^3	30 µg/m^3	• Modified Jacob & Hochheiser (Na-Arsenite) Method • Gas Phase Chemiluminescence
	24 hours**	80 µg/m^3	80 µg/m^3	
Particulate Matter (PM_{10}) (µg/m^3)	Annual Average*	60 µg/m^3	60 µg/m^3	• Gravimetric • TOEM • Beta attenuation
	24 hours**	100 µg/m^3	100 µg/m^3	
Particulate Matter ($PM_{2.5}$) (µg/m^3)	Annual Average*	40 µg/m^3	40 µg/m^3	• Gravimetric • TOEM • Beta attenuation
	24 hours**	60 µg/m^3	60 µg/m^3	
Ozone	8 Hours*	100 µg/m^3	100 µg/m^3	UV Photomtric Chemiluminescence Chemical method
	1 Hour **	180 µg/m^3	180 µg/m^3	

**Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.*

***24 hourly or 8 hourly or 1 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.*

4.5.3 Result of Air Quality Survey

The results of ambient air quality monitoring for the period of October-December, 2012 as well as for March to May, 2016 have been presented against each other in **Tables- 29 to 32.**

Table- 29: Ambient Air quality Data at Gwarauli Village

Post-monsoon season (October to December, 2012)								Pre-monsoon season (March to May, 2016)							
Date	**SPM**	**RPM**	**PM2.5**	**SO2**	**NO2**	**O3**	**HG**	**Date**	**SPM**	**RPM**	**PM2.5**	**SO2**	**NO2**	**O3**	**HG**
01.10.2012	163	65	32.8	10	21	21.4	BDL	01.03.2016	179	72	35	11	23	24	BDL
02.10.2012	196	81	40.2	17.2	24	24.6	BDL	04.03.2016	197	81	42	19	26	27	BDL
06.10.2012	164	67	33.6	14.8	28	23.1	BDL	08.03.2016	180	74	37	16	31	25	BDL
07.10.2012	167	78	39.0	11.7	30	25.9	BDL	11.03.2016	184	86	42	13	33	28	BDL
12.10.2012	185	70	35.0	10.1	31	28.4	BDL	15.03.2016	198	77	40	11	34	31	BDL
13.10.2012	188	68	34.0	10	21	26.2	BDL	18.03.2016	190	75	36	13	23	29	BDL
18.10.2012	175	69	34.8	12	22	30.7	BDL	22.03.2016	182	76	35	15	24	34	BDL
19.10.2012	179	69	34.2	14	30	21.9	BDL	25.03.2016	197	78	32	12	33	24	BDL
03.11.2012	163	65	36.4	10	21	29.5	BDL	01.04.2016	179	72	35	10	23	32	BDL
04.11.2012	196	81	40.2	17	22	26.1	BDL	04.04.2016	194	89	45	16	24	29	BDL
09.11.2012	165	67	33.6	15	22	27.4	BDL	08.04.2016	182	74	38	17	26	30	BDL
10.11.2012	164	78	39.0	11.7	30	25.9	BDL	11.04.2016	180	84	45	13	33	28	BDL
15.11.2012	185	70	35.0	10.1	28	21.4	BDL	15.04.2016	192	77	40	11	31	24	BDL
16.11.2012	186	68	34.0	10	32	24.6	BDL	18.04.2016	188	75	34	13	35	27	BDL
21.11.2012	175	69	34.8	12	23	23.1	BDL	22.04.2016	182	78	41	15	25	25	BDL
22.11.2012	180	69	34.2	14	22	25.9	BDL	25.04.2016	192	76	38	12	24	28	BDL
02.12.2012	163	66	33.0	10	21	29.8	BDL	01.05.2016	179	72	36	14	23	33	BDL
03.12.2012	196	81	40.2	16	24	26.4	BDL	04.05.2016	198	89	43	18	26	29	BDL
08.12.2012	166	66	33.0	14.8	28	22.1	BDL	08.05.2016	183	73	33	16	31	24	BDL
09.12.2012	167	78	39.0	11.7	30	29.6	BDL	11.05.2016	184	86	44	13	33	33	BDL
14.12.2012	185	70	35.0	10.1	31	29.2	BDL	15.05.2016	186	77	39	11	34	32	BDL
15.12.2012	188	68	34.0	11	22	30.5	BDL	18.05.2016	194	75	40	12	24	34	BDL
20.12.2012	175	69	34.6	12	24	24.4	BDL	22.05.2016	195	79	41	14	26	27	BDL
21.12.2012	180	70	35.0	14	27	21.9	BDL	25.05.2016	192	77	35	15	30	24	BDL
Min	**163**	**65**	**32.8**	**10**	**21**	**21.4**	**BDL**	**Min**	**179**	**72**	**32**	**10**	**23**	**24**	**BDL**
Max	**196**	**81**	**40.2**	**17.2**	**32**	**30.7**	**BDL**	**Max**	**198**	**89**	**45**	**19**	**35**	**34**	**BDL**
Average	**177.1**	**70.9**	**35.6**	**12.5**	**25.6**	**25.8**	**BDL**	**Average**	**187.8**	**78.0**	**38.6**	**13.8**	**28.1**	**28.4**	**BDL**
98th %ile	**196.0**	**81.0**	**40.2**	**17.1**	**31.5**	**30.6**	**BDL**	**98th %ile**	**198**	**89**	**45**	**18.5**	**34.5**	**34**	**BDL**

Table- 30: Ambient Air quality Data at Jawal Village

Post-monsoon season (October to December, 2012)								Pre-monsoon season (March to May, 2016)							
Date	**SPM**	**RPM**	**PM2.5**	**SO2**	**NO2**	**O3**	**HG**	**Date**	**SPM**	**RPM**	**PM2.5**	**SO2**	**NO2**	**O3**	**HG**
01.10.2012	163	61	30.2	10	21	22.8	BDL	01.03.2016	179	67	32	11	23	25	BDL
02.10.2012	162	63	31.5	14	24	26.3	BDL	04.03.2016	178	69	37	15	26	29	BDL
06.10.2012	165	76	38.0	14	28	23.8	BDL	08.03.2016	182	84	43	13	31	26	BDL
07.10.2012	168	66	33.0	12	30	21.9	BDL	11.03.2016	185	73	37	14	33	24	BDL
12.10.2012	193	73	36.8	10	31	29.5	BDL	15.03.2016	196	80	39	11	34	32	BDL
13.10.2012	196	69	34.2	10	21	26.1	BDL	18.03.2016	193	76	41	13	23	29	BDL
18.10.2012	164	70	35.0	12	20	27.4	BDL	22.03.2016	180	77	40	15	22	30	BDL
19.10.2012	178	69	34.6	11	27	25.9	BDL	25.03.2016	196	78	38	12	30	28	BDL
03.11.2012	163	63	31.6	10	21	28.4	BDL	01.04.2016	179	67	34	14	23	31	BDL
04.11.2012	162	63	31.2	13	20	26.2	BDL	04.04.2016	178	69	35	11	22	29	BDL
09.11.2012	163	76	38.0	12	22	30.7	BDL	08.04.2016	176	84	47	13	24	34	BDL
10.11.2012	168	66	33.0	11	30	21.9	BDL	11.04.2016	185	73	35	12	33	24	BDL
15.11.2012	186	73	36.8	10	32	22.8	BDL	15.04.2016	193	80	42	11	35	25	BDL
16.11.2012	196	69	34.4	10	21	26.3	BDL	18.04.2016	197	76	37	15	23	29	BDL
21.11.2012	175	70	35.0	12	20	23.8	BDL	22.04.2016	192	77	39	13	22	26	BDL
22.11.2012	180	69	34.8	13	26	21.9	BDL	25.04.2016	196	76	34	11	29	24	BDL
02.12.2012	164	61	30.8	12	20	29.8	BDL	01.05.2016	182	67	36	14	22	33	BDL
03.12.2012	164	65	32.4	15	21	26.4	BDL	04.05.2016	180	72	39	17	23	29	BDL
08.12.2012	182	76	38.0	10	22	22.1	BDL	08.05.2016	193	84	44	11	24	24	BDL
09.12.2012	170	66	33.0	12	25	29.6	BDL	11.05.2016	187	72	38	13	28	33	BDL
14.12.2012	195	72	36.0	10	29	28.5	BDL	15.05.2016	194	79	43	11	32	31	BDL
15.12.2012	196	69	34.2	10	21	31.8	BDL	18.05.2016	198	76	36	14	23	35	BDL
20.12.2012	165	70	35.0	12	20	21.3	BDL	22.05.2016	182	79	35	12	22	23	BDL
21.12.2012	180	70	35.8	12	32	26.7	BDL	25.05.2016	180	77	42	11	35	29	BDL
Min	**162**	**61**	**30.2**	**10**	**20**	**21.3**	**BDL**	**Min**	**176**	**67**	**32**	**11**	**22**	**23**	**BDL**
Max	**196**	**76**	**38**	**15**	**32**	**31.8**	**BDL**	**Max**	**198**	**84**	**47**	**17**	**35**	**35**	**BDL**
Average	**174.9**	**68.5**	**34.3**	**11.5**	**24.3**	**25.9**	**BDL**	**Average**	**186.7**	**75.5**	**38.5**	**12.8**	**26.8**	**28.4**	**BDL**
98th %ile	**196.0**	**76.0**	**38.0**	**14.5**	**32.0**	**31.3**	**BDL**	**98th %ile**	**197.5**	**84**	**45.6**	**16.1**	**35**	**34.5**	**BDL**

Table- 31: Ambient Air quality Data at Nagla Shakhu Village

Post-monsoon season (October to December, 2012)								Pre-monsoon season (March to May, 2016)							
Date	**SPM**	**RPM**	**PM2.5**	**SO2**	**NO2**	**O3**	**HG**	**Date**	**SPM**	**RPM**	**PM2.5**	**SO2**	**NO2**	**O3**	**HG**
04.10.2012	163	62	31.0	10	21	26.2	BDL	02.03.2016	179	68	35	11	23	29	BDL
05.10.2012	188	67	33.4	15	24	28.9	BDL	05.03.2016	192	74	33	17	26	32	BDL
09.10.2012	162	81	40.8	14	28	23.6	BDL	09.03.2016	178	89	43	15	31	26	BDL
10.10.2012	167	77	38.2	12	30	27.1	BDL	12.03.2016	184	85	44	13	33	30	BDL
15.10.2012	188	70	35.6	10	26	28.5	BDL	16.03.2016	196	77	36	11	29	31	BDL
16.10.2012	190	68	34.8	13	21	26.2	BDL	19.03.2016	194	75	39	14	23	29	BDL
21.10.2012	175	69	34.2	12	20	21.3	BDL	23.03.2016	195	76	41	13	22	23	BDL
22.10.2012	180	69	34.4	14	30	26.7	BDL	26.03.2016	198	72	38	15	33	29	BDL
06.11.2012	163	65	32.5	10	25	29.8	BDL	02.04.2016	179	78	42	11	18	33	BDL
07.11.2012	187	67	33.5	16	24	26.4	BDL	05.04.2016	193	74	38	18	26	29	BDL
12.11.2012	164	72	36.0	15	28	22.1	BDL	09.04.2016	180	79	43	17	31	24	BDL
13.11.2012	166	78	39.0	11	30	29.6	BDL	12.04.2016	183	86	44	12	33	33	BDL
18.11.2012	180	66	33.0	12	29	26.2	BDL	16.04.2016	198	73	39	13	32	29	BDL
19.11.2012	192	62	31.0	12	21	28.9	BDL	19.04.2016	196	68	36	15	23	32	BDL
24.11.2012	176	68	34.0	14	26	26.4	BDL	23.04.2016	194	75	39	13	29	29	BDL
25.11.2012	180	64	32.0	13	30	27.1	BDL	26.04.2016	196	70	33	14	33	30	BDL
05.12.2012	168	65	32.6	13	25	26.2	BDL	02.05.2016	185	72	38	16	28	29	BDL
06.12.2012	187	67	33.8	14	23	28.9	BDL	05.05.2016	197	74	41	13	25	32	BDL
11.12.2012	162	81	40.4	16	28	26.4	BDL	09.05.2016	178	89	46	18	31	29	BDL
12.12.2012	167	73	36.2	12	30	27.1	BDL	12.05.2016	184	80	42	13	33	30	BDL
17.12.2012	185	70	35.0	10	28	28.4	BDL	16.05.2016	192	77	43	11	31	31	BDL
18.12.2012	191	69	34.8	10	22	26.2	BDL	19.05.2016	195	76	39	10	24	29	BDL
24.12.2012	175	69	34.2	12	20	30.7	BDL	23.05.2016	193	79	42	13	22	34	BDL
25.12.2012	180	69	34.6	14	30	21.9	BDL	26.05.2016	188	77	40	15	33	24	BDL
Min	**162**	**62**	**31**	**10**	**20**	**21.3**	**BDL**	**Min**	**178**	**68**	**33**	**10**	**18**	**23**	**BDL**
Max	**192**	**81**	**40.8**	**16**	**30**	**30.7**	**BDL**	**Max**	**198**	**89**	**46**	**18**	**33**	**34**	**BDL**
Average	**176.5**	**69.5**	**34.8**	**12.7**	**25.8**	**26.7**	**BDL**	**Average**	**189.5**	**76.8**	**39.8**	**13.8**	**28.0**	**29.4**	**BDL**
98th %ile	**191.5**	**81.0**	**40.6**	**16.0**	**30.0**	**30.3**	**BDL**	**98th %ile**	**198**	**89**	**45.1**	**18**	**33**	**33.51**	**BDL**

Table- 32: Ambient Air quality Data at Bhogpur RF

Post-monsoon season (October to December, 2012)								Pre-monsoon season (March to May, 2016)							
Date	**SPM**	**RPM**	**PM2.5**	**SO2**	**NO2**	**O3**	**HG**	**Date**	**SPM**	**RPM**	**PM2.5**	**SO2**	**NO2**	**O3**	BDL
04.10.2012	161	65	32.8	10	21	29.8	BDL	02.03.2016	177	72	37	11	23	33	BDL
05.10.2012	188	67	33.2	13	24	26.4	BDL	05.03.2016	194	74	36	14	26	29	BDL
09.10.2012	162	81	40.6	15	28	22.1	BDL	09.03.2016	178	89	40	17	31	24	BDL
10.10.2012	169	78	39	12	30	29.6	BDL	12.03.2016	186	86	45	13	33	33	BDL
15.10.2012	185	70	35	12	31	22.4	BDL	16.03.2016	192	77	42	15	34	25	BDL
16.10.2012	162	68	34	10	25	21.9	BDL	19.03.2016	178	75	38	11	28	24	BDL
21.10.2012	175	69	34.6	11	21	28.8	BDL	23.03.2016	193	76	36	12	23	32	BDL
22.10.2012	180	65	32.5	14	30	23.4	BDL	26.03.2016	198	72	39	15	33	26	BDL
06.11.2012	163	66	33.0	10	23	28.5	BDL	02.04.2016	179	74	38	11	25	31	BDL
07.11.2012	180	67	33.5	16	24	26.2	BDL	05.04.2016	194	70	34	18	26	29	BDL
12.11.2012	162	84	42.0	15	30	21.3	BDL	09.04.2016	178	92	48	17	33	23	BDL
13.11.2012	167	78	39.0	12	30	26.7	BDL	12.04.2016	184	86	43	13	31	29	BDL
18.11.2012	185	70	35.0	11	31	29.2	BDL	16.04.2016	193	77	37	12	34	32	BDL
19.11.2012	174	67	33.6	10	24	26.8	BDL	19.04.2016	195	74	40	11	26	29	BDL
24.11.2012	175	69	34.8	14	26	24.4	BDL	23.04.2016	190	76	41	15	29	27	BDL
25.11.2012	190	66	33.0	14	30	21.9	BDL	26.04.2016	186	73	35	13	35	24	BDL
05.12.2012	165	66	33.0	10	21	25.9	BDL	02.05.2016	182	75	39	11	23	28	BDL
06.12.2012	188	67	33.7	16	24	21.4	BDL	05.05.2016	194	71	38	18	26	24	BDL
11.12.2012	165	84	42.0	15	29	24.6	BDL	09.05.2016	182	92	47	17	32	27	BDL
12.12.2012	164	72	36.0	12	30	28.4	BDL	12.05.2016	180	79	42	13	34	31	BDL
17.12.2012	163	74	37.0	14	30	25.9	BDL	16.05.2016	176	81	39	15	31	28	BDL
18.12.2012	190	69	36.4	13	27	29.6	BDL	19.05.2016	193	76	41	14	30	33	BDL
24.12.2012	176	69	32.8	12	24	26.2	BDL	23.05.2016	194	74	42	13	26	29	BDL
25.12.2012	180	69	34.6	14	30	28.9	BDL	26.05.2016	196	78	36	15	33	32	BDL
Min	**161**	**65**	**32.5**	**10**	**21**	**21.3**	**BDL**	**Min**	**176**	**70**	**34**	**11**	**23**	**23**	**BDL**
Max	**190**	**84**	**42**	**16**	**31**	**29.8**	**BDL**	**Max**	**198**	**92**	**48**	**18**	**35**	**33**	**BDL**
Average	**173.7**	**70.8**	**35.5**	**12.7**	**26.8**	**25.8**	**BDL**	**Average**	**187.2**	**77.9**	**39.7**	**13.9**	**29.4**	**28.4**	**BDL**
98th %ile	**190.0**	**84.0**	**42.0**	**16.0**	**31.0**	**29.7**	**BDL**	**98th %tile**	**197.1**	**92**	**47.5**	**18**	**34.5**	**33**	**BDL**

4.5.4 Data Analysis& Conclusion

Suspended Particulate Matter (SPM): During post-monsoon season of 2012, the maximum observed SPM concentration was 196µg/m^3 at Jawal village, while the same during pre-monsoon season of 2016 was 198µg/m^3 at all the four locations. Average values of SPM concentrations were in the range 173.7-177.1µg/m^3 during post-monsoon season of 2012 and 186.7-189.5µg/m^3 during pre-monsoon season of 2016. During both seasons, the lowest concentrations were observed at Bhogpur RF.

Respirable Particulate Matter (PM_{10}): During post-monsoon season of 2012, the maximum observed PM_{10} concentration was 84µg/m^3 at Bhogpur RF, while the same during pre-monsoon season of 2016 was 92µg/m^3 at Bhogpur RF. These concentrations are well within the applicable limit of 100µg/m^3 for industrial, residential, rural and other areas. Average values of PM_{10} concentrations were in the range 68.5-70.9µg/m^3 during 2012 and 75.5-77.9µg/m^3 during 2016.

Particulate Matter 2.5 ($PM_{2.5}$): During post-monsoon season of 2012, the maximum observed $PM_{2.5}$ concentration was 42µg/m^3 at Bhogpur RF, while the same during pre-monsoon season of 2016 was 24 hours 48 µg/m^3 at Bhogpur RF. These concentrations are well within the applicable limit of 60 µg/m^3 for industrial, residential, rural and other areas. Average values of PM_{10} concentrations were in the range 34.3-35.6 µg/m^3 during 2012 and 38.5-39.8 µg/m^3 during 2016.

Sulphur Dioxide (SO_2): During post-monsoon season of 2012, the maximum observed SO_2 concentration was 17.2µg/m^3 at Gwarauli village, while the same during pre-monsoon season of 2016 was 19 µg/m^3 at Gwarauli village. These concentrations are well within the applicable limit of 80 µg/m^3 for industrial, residential, rural and other areas. Average values of SO_2 concentrations were in the range 11.5 to 12.71 µg/m^3 during 2012 and 12.8-13.9 µg/m^3 during 2016.

Nitrogen Oxides (NO_X): During post-monsoon season of 2012, the maximum observed NOx concentration was 32 µg/m^3 at Gwarauli village, while the same during pre-monsoon season of 2016 was 35 µg/m^3 at Bhogpur RF, Gwarauli & Jawal villages. These concentrations are well within the applicable limit of 80 µg/m^3 for industrial, residential, rural and other areas. Average values of SO_2 concentrations were in the range 24.3 to 26.8 µg/m^3 during 2012 and 26.8-29.4 µg/m^3 during 2016.

Ozone (O_3): During post-monsoon season of 2012, the maximum observed NOx concentration was 31.8µg/m^3 at Jawal village, while the same during pre-monsoon season of 2016 was 31.8µg/m^3 at Jawal village. These concentrations are well within the applicable limit of 100 µg/m^3 for industrial, residential, rural and other areas. Average values of SO_2 concentrations were in the range of 25.8 to 26.7µg/m^3 µg/m^3 during 2012 and 28.4-29.4µg/m^3 during 2016.

Mercury (Hg): The value of mercury was found to be below detectable limit (bdl) at all 4 monitoring locations during the two seasons of survey.

Conclusion

The existing levels of monitored air pollutants in the study area are well within the prescribed limits and the area can accommodate further development with controlled emissions.

4.6 NOISE ENVIRONMENT

Noise is said to be defined as an unwanted sound. It is, therefore, necessary to measure both the quality as well as the quantity of environment noise in and around the mining site.

Type of Sound Fields

Based on the distance from the source of sound generation, the types of sound field are identified. They are of three type's viz. (i) Free Field (ii) Near Field and (iii) Far Field.

- **Free Field**
  The sound waves that propagate without obstruction from source to the receiver are free field. The sound waves obey the inverse square law so that sound pressure level decreases by 6 dB (A) as the distance is doubled. Such a field is known as free field.
- **Near Field**
  This field is located within a few wavelengths of the source and it is also influenced by the dimensions of the source. The inverse square law does not apply in this field.
- **Far Field**
  The far field has two parts one is known as free part and the other as reverberation part. In the free part of the far field, the sound pressures level obeys the inverse square law and propagate without obstruction from source to the receiver. The reverberant part of the field exists for enclosed situation where the reflected sound waves are superimposed on the incident sound waves. If there are many reflected waves from all possible direction, a diffuse sound field exists.

The intensity of sound energy in the environment is measured in a logarithmic scale and is expressed in a decibel (dB) scale. Ordinary sound level meter measures the sound energy that reaches the microphone by converting it into electrical energy and then measures the magnitude in dB. In a sophisticated type of sound level meter, an additional circuit (filters) is provided, which modifies the received signal in such a way that it replicates the sound signal as received by the human ear and the magnitude of sound level in this scale is denoted as dB (A). The sound levels are expressed in dB (A) scale for the purpose of comparison of noise levels, which is universally accepted by the international community.

4.6.1 Methodology for Baseline Data Generation

Noise levels were measured using an Integrating sound level meter manufactured by Cygnet (Model No. 2031). It has an indicating mode of Lp and Leq. Keeping the mode in Lp for few minutes and setting the corresponding range and the weighting network in "A" weighting set the sound level meter was run for one hour time and Leq was measured at all locations.

The sampling locations for noise are confined to residential, commercial and sensitive areas; however, no industrial area is present within the 10km radius of the project site. 10 sampling locations were selected for the sampling of noise and are shown in **Figure-15** and also given in **Table-33.**

Table- 33: Details of Noise Monitoring Locations

Station Code	Stations Name	Distance(km)	Direction
NQ1	Baragaon	03	NE
NQ2	Dushehra Kheri	0.5	N
NQ3	Jawal	2.5	W
NQ4	Bhogpur RF	09	SE
NQ5	Gwarauli	2.5	E
NQ6	Jhanpur	0.5	NE
NQ7	Arnia Khurd	02	S
NQ8	Main site	00	-
NQ9	Nagla Shakhu	6.5	N
NQ10	Rohinda	05	NW

The day noise levels have been monitored during 6.00 am to 10.00 pm and night noise levels during 10.00 pm to 6.00 am, at all the ten locations covered in 10 km radius of the study area.

The L10, L50, L90, Leq, Ld and Ln were computed based on the sound pressure level recorded.

- Leq - 24 Hourly equivalent continuous noise levels
- Ld - Daytime Leq that has computed from 6.00 am to 10.00 pm
- Ln - Night-time Leq that is computed from10.00 pm to 6.00 am

Noise Level Survey

A preliminary reconnaissance survey was undertaken to identify major noise generating sources in the area. The noise survey was conducted in the month of October, 2012 to assess background noise levels in different zones viz. industrial, commercial, and residential and silence zones.

Noise Quality Standards

Ministry of Environment & Forests (MoEF) has notified the noise standards vide gazette notification dated February 14, 2000 for different zones under the Environment Protection Act (1986). These standards are given in **Table-34.**

Table- 34: Ambient Noise Quality Standards in respect of Noise

Area Code	Category of Area	Noise dB (A) L_{eq}	
		Daytime*	Night time*
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

1. *Daytime from 6.00am to 10.00 pm and Night time from 10.0 0pm to 6.00 am.*
2. *Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicle hours, loud speakers and bursting of crackers are banned in these zones.*

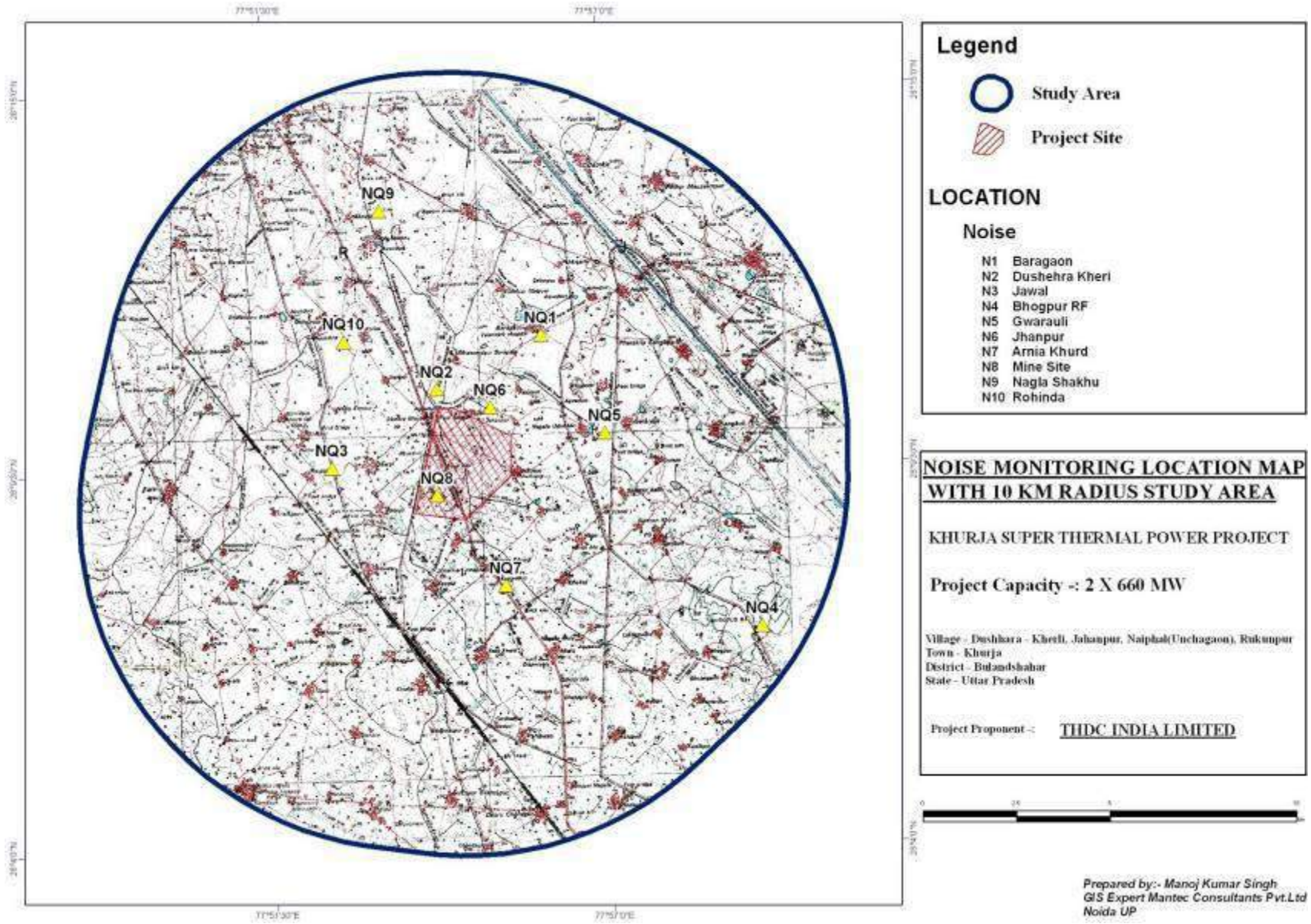


Figure 11: Noise Level Monitoring Location Map

4.6.2 Noise Quality

Result

The ambient noise quality result compiled on noise levels for the period of October, 2012 is presented in **Table-35** respectively. It can be observed from the table that the hourly noise levels ranges from 41.8 to 59.6 dB (A) during daytime and 32.6 to 50.2 dB (A) during night time.

Table- 35: Ambient Noise Quality of the Study Area

Location Code	Category	Minimum dB(A)	Maximum dB(A)	Leq (Day)	Minimum dB(A)	Maximum dB(A)	Leq (Night)
NQ1	Residential	40.2	52.8	49.3	30.4	41.1	39.4
NQ2	Residential	38	51.1	47.7	32.5	40.4	38.5
NQ3	Residential	42.6	50.2	46.8	29.7	42.4	40.1
NQ4	Sensitive	35.2	45.4	41.8	25.5	36.3	34.5
NQ5	Residential	41.6	48.2	46.3	31.1	43.4	40.4
NQ6	Residential	44.2	50.8	48.4	34.9	42.4	39.6
NQ7	Commercial	52.1	63.2	59.6	41.5	52.2	50.2
NQ8	Residential	45.1	51.4	50.5	34.5	43.2	41.8
NQ9	Sensitive	37.5	46.3	42.1	23.8	35.1	32.6
NQ10	Residential	39.8	52.7	48.6	33.5	43.6	40.5

Analysis

Residential Area: In residential area, noise level are ranging between 38 dB(A) recorded in Dushehra Kheri to 52 dB(A) recorded at Baragaon during day time and 29.7 dB(A) recorded at Jawal to 43.6 dB(A) recorded at Rohinda during night time. During day time and night time noise level within the residential area are well within the prescribed limit.

Commercial Area: The noise level are ranging between 52.1 dB(A) to 63.2dB(A) during the day time and 41.5 dB(A) to 52.2 dB(A) during night time recorded at Arnia Khurd. In commercial area noise level is less than the prescribed limit.

Sensitive Area: The noise level are ranging between 35.2 dB(A) to 45.4 dB(A) during the day time and 23.8 dB(A) to 36.3 dB(A) during night time recorded at Bhogpur RF and Nagla Shakhu.

Conclusion

It can be observed from the results that the noise levels range during day time and during night time are within prescribed limits. Hence there will be no noise pollution.

4.7 BIOLOGICAL ENVIRONMENT

Ecology is the study of the relation and interactions between organisms and their environment. It comprises the floral and faunal communities of an area. With changes in environmental conditions, structure, density and composition of plants, animals also undergo changes.

4.7.1 Methodology for Baseline Data Generation

The ecological information has been collected through field studies, consultation with various government departments and collection of available literature with relevant institutions/ organizations.

Objective

The ecological study of the area has been conducted in order to understand the existing status of flora and fauna to generate baseline information and evaluate the possible impacts on biological environment. The present study highlights the various issues pertaining to floristic diversity and faunal wealth in the surrounding area upto 10 km radius of the proposed project site.

Methodology of the Study

The baseline study for existing ecological environment was carried out during October to December, 2012. A participatory and consultative approach was followed. Field visits were undertaken for survey of the vegetation and animals in the study area. The study area has been divided in to two parts as core area consisting of project site and the buffer area as the 10 km radius of the project site.

For the purpose of surveying the vegetation quadrates were laid to record phyto-sociological features of the vegetation. Detailed notes on ecological features, including the habitat types were also taken along the selected locations. The flora and fauna in the study area were inventorised.

Besides measuring these parameters, other biodiversity aspects in the form of endemic status, conservation status and life form have been enumerated. For all the plant species found in the area during ecological survey, Red Data Books of the Botanical survey of India have been screened to verify their conservation status. For wild animal species schedule 1 of the Wildlife Protection Act (1972) has been screened. The information was also collected from secondary sources for authentication of the data from district forest office, Bulandshahr.

Terrestrial Ecology

The proposed project lies in the upper-Gangetic plain of Uttar Pradesh in district Bulandshahr. The area enjoys tropical monsoonal condition; elevation from sea level varies from 200-205 m and thus supports dry deciduous vegetation. The study area comprises many water channels distributed from Upper Ganga canal.

The terrestrial ecological study of the area can be categorized into two groups based on the ecological components i.e. Flora and Fauna. Therefore, to assess the exact ecological status of area inventory of flora & fauna is prepared during the study period on the basis of primary data as well as secondary data collected. The sampling locations for the terrestrial ecology is given in **Table-36** and shown in **Figure-16**. The floral and faunal components of the study area are described as follows.

Table- 36: Sampling Locations of Terrestrial Ecology

Station code	Location	Location w.r.t. Site		Description
		Distance (km)	Direction	
TE1	Naiphal	0.2	E	Village
TE2	Near Bhogpur RF	9.0	SE	Reserve Forest area
TE3	Danwar	3.5	SW	Village
TE4	Mirpur	5.0	NW	Village

Aquatic Ecology

The biological species like Fishes, Phytoplankton, Zooplankton, etc. are specifically denotes particular environmental conditions that are the best indicators of environment. Aquatic sampling locations have been given in **Table-37** and depicted in **Figure-12**. Information on the impact of environmental stress on the community structure serves as inexpensive and efficient early warning and control system to check the effectiveness of the measures to prevent damage to a particular eco-system.

Table- 37: Sampling Locations of Aquatic Ecology

Station Code	Station Name	Location w.r.t. Site		Description
		Distance (km)	Direction	
AE1	Baragaon village	3	NE	Surface Water
AE2	Nagla Shakhu	6.5	N	Surface Water

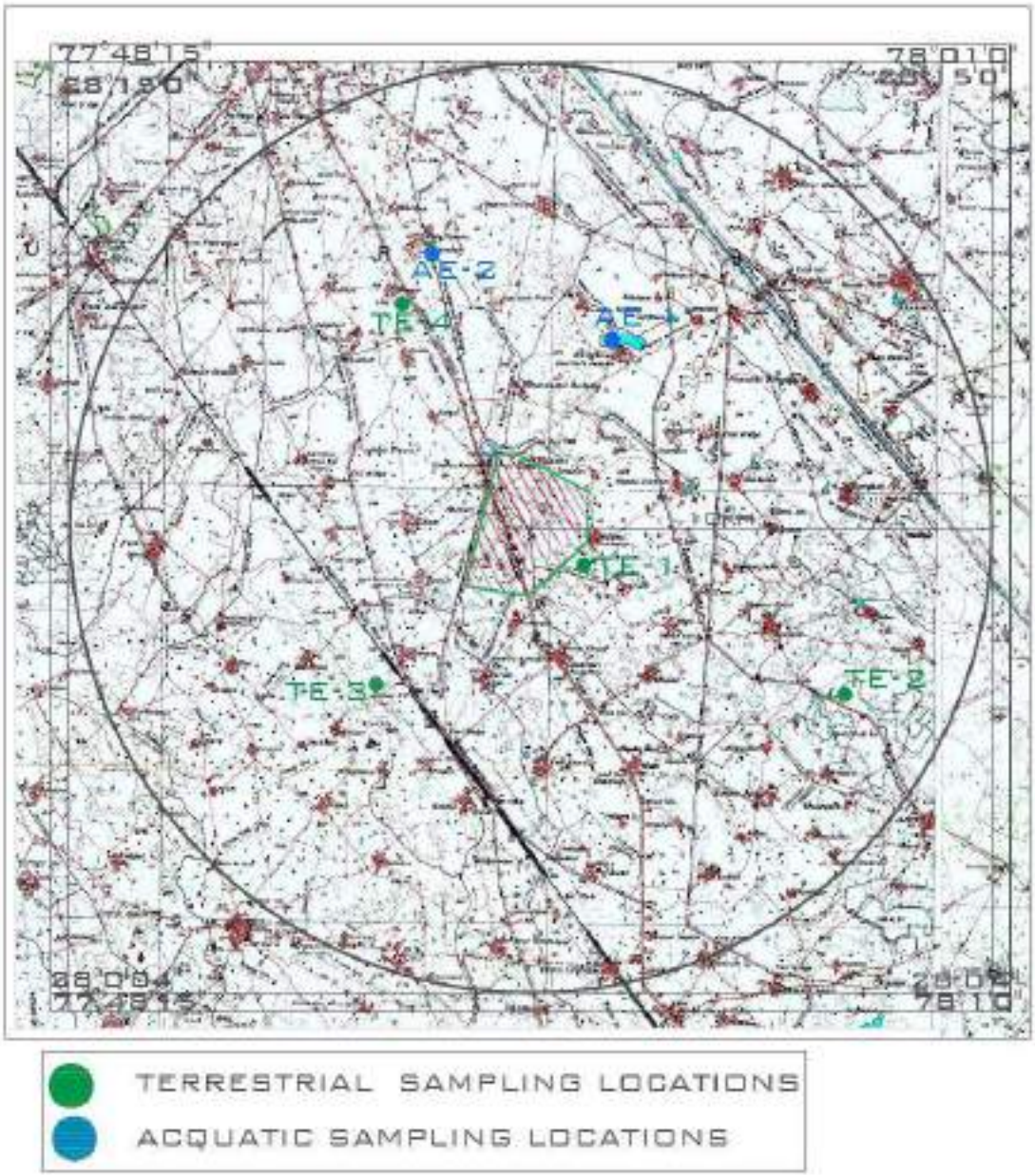


Figure 12: Aquatic and Terrestrial Ecology Monitoring Location Map

4.7.2 Ecological Quality

Result& Analysis

- ***Floral Community***

Vegetation in core area: During the ecological survey only shrubby vegetation was found in dominance at the project site like *Zyziphus sp.*, *Acacia* Sp., *Lantana camara, Sacchrum munja Calotropis procera* etc. besides some tree species like *Azadirachta indica, Acacia catechu, Acacia nilotica, Mangifera indica* etc. were also seen growing in the area. The project site is surrounded by agricultural fields where various crops like wheat, rice, maize, sugarcane, etc. are cultivated.

Vegetation in surrounding area including agricultural land: The buffer area of the proposed project consists of villages, agricultural land, orchards, ponds and waste land. Mostly tree species found in the area are cultivated due to their economic and food values. Some dominant tree species of the area are *Mangifera indica, Azadirachta indica, Acacia nilotica, Ficus benghalensis, Ficus religiosa, Delbergia sissoo*, etc. Most of the land is under cultivation by the villagers. Wheat, maize, rice, sugar cane, pulses, cotton, turmeric, etc. are cultivated in these fields. In the waste land many weeds like *Parthenium sp.***,** *Lantana sp*, *Croton sp., Calotropis sp., Argemone* sp. etc. are found. Details of these plants are presented in the **Table-37.**

Flora of the Study Area:

The vegetation of study area of the 2 x 660MW Khurja STPP was surveyed according to above given methodology. The observations made in the flora of the study area reveal that the diversity and affinities of the flora of the region has a sum of 93 taxa of plants belonging to 39 families. It is evident from the study that, the study area is showing dry deciduous vegetation. According to the growth habit these species are distributed as: 15 tree species (16%), 16 shrub species (17%) and 62 herb species (67%) which is summarized in **Table-38** & **Figure-13.** The commonly occurring species are *Acacia nilotica, Ageratum conyzoides, Amaranthus viridis*, *Azadirachta indica, Datura stramonium, Lantana camara, Launaea aspleniifolia, Mangifera indica, Ricinus communis, Tridax procumbens* etc. **Table-39** represents the list of flora recorded from the study area.

Table- 38: List of Important Plants Found in the Study Region

Sl. No.	Botanical Name	Family	Common Name	Habit
1.	*Abutilon indicum* (L) Sweet	Malvaceae	Kanghi	Shrub
2.	*Acacia catechu*	Mimosaceae	Khair	Tree
3.	*Acacia nilotica*	Mimosaceae	Babool	Tree
4.	*Achyranthes aspera*	Amaranthaceae	Chirchita	Shrub
5.	*Ageratum conyzoides* L.	Asteraceae	-	Herb
6.	*Alternanthera polygonoides* L.	Amaranthaceae	-	Herb
7.	*Alternanthera pungens* Humb.	Amaranthaceae	-	Herb
8.	*Alternanthera sessilis* (L) DC.	Amaranthaceae	-	Herb
9.	*Amaranthus spinosus* L.	Amaranthaceae	-	Herb
10.	*Amaranthus viridis* L.	Amaranthaceae	-	Herb
11.	*Anagallis arvensis* L.	Primulaceae	-	Herb
12.	*Anisomeles indica* (L) Kuntze	Lamiaceae	-	Herb
13.	*Argemone mexicana* L.	Papaveraceae	-	Herb
14.	*Azadirachta indica*	Meliaceae	Neem	Tree
15.	*Blumea laceera* (Burm. F.) DC	Asteraceae	-	Herb
16.	*Boerhaavia diffusa* L.	Nyctaginaceae	-	Shrub
17.	*Bryophyllum pinnatum* (Lamk).	Crassulaceae	Oken	Herb
18.	*Calotropis gigantea* (L) Dryander	Asclepediaceae	-	Shrub
19.	*Calotropis procera* Dryander	Asclepediaceae	Akwan	Shrub

20.	*Cannabis sativa* L.	Cannabaceae	Bhang	Shrub
21.	*Cassia fistula*	Caesalpinaceae	Amaltas	Herb
22.	*Cassia obtusifolia* L	Caesalpinaceae	-	Herb
23.	*Cassia occidentalis* L.	Caesalpinaceae	-	Shrub
24.	*Chenopodium album* L.	Chenopodiaceae	-	Herb
25.	*Chenopodium ambrosioides* L	Chenopodiaceae	-	Herb
26.	*Cleome gynandra* L.	Cleomaceae	-	Herb
27.	*Commelina benghalensis*	Commelinaceae	-	Herb
28.	*Convolvulus arvensis* L.	Convolvulaceae	-	Herb
29.	*Corchorus aestuans* L.	Tiliaceae	-	Herb
30.	*Corchorus olitorius*. L.	Tiliaceae	-	Herb
31.	*Crataeva nurvala*	Capparaceae	-	Herb
32.	*Croton bonplandianum* Baillon	Euphorbiaceae	Mirch Grass	Herb
33.	*Cynodon dactylon* (L.) Persoon	Poaceae	Dub	Grass
34.	*Cyperus iris* L.	Cyperaceae	-	Herb
35.	*Cyperus kyllinga* Endl.	Cyperaceae	-	Herb
36.	*Cyperus rotundus* L.	Cyperaceae	Motha	Herb
37.	*Dactyloctenium aegyptium*	Poaceae	-	Grass
38.	*Dalbergia sissoo*	Dipterocarpaceae	Shisham	Tree
39.	*Datura stramonium* L.	Solanaceae	Dhatura	Shrub
40.	*Delonix regia*	Caesalpinaceae	Gulmohar	Tree
41.	*Digera muricata* (L) Martius	Amaranthaceae	-	Herb
42.	*Digitaria adscendens*	Poaceae	-	Grass
43.	*Digitaria biformis* Willd	Poaceae	-	Grass
44.	*Eleusine coracana* (L) Gaertner	Poaceae	-	Grass
45.	*Equisetum debile* Roxb.	Equisetaceae	Jode tode ki ghas	Herb
46.	*Eragrostis ciliaris* (L.) R.Br	Poaceae	-	Grass
47.	*Eucalyptus sp.*	Myrtaceae	Safeda	Tree
48.	*Euphorbia hirta* L.	Euphorbiaceae	-	Herb
49.	*Euphorbia thymifolia* L.	Euphorbiaceae	-	Herb
50.	*Ficus benghalensis* L.	Moraceae	Bargad	Tree
51.	*Ficus religiosa*	Moraceae	Pepal	Tree
52.	*Fumaria indica* Pugsley	Fumariaceae	-	Herb
53.	*Gnaphalium luteo-album* L.	Asteraceae	-	Herb
54.	*Gomphrena celosioides*	Amaranthaceae	-	Herb
55.	*Ipomoea pes-tigridis* L.	Convolvulaceae	-	Herb
56.	*Lantana camara* L.	Verbenaceae	-	Shrub
57.	*Launaea aspleniifolia* Hook.F.	Asteraceae	-	Herb
58.	*Malvastrum tricuspidatum*(R.Br.)	Malvaceae	-	Shrub
59.	*Mangifera indica*	Anacardiaceae	Aam	Tree
60.	*Medicago sativa* L.	Fabaceae	Alfa-alfa	Herb

61.	*Melochia corchorifolia* L.	Sterculiaceae	-	Herb
62.	*Musa balbisiana* Colla	Musaceae	Kela	Tree
63.	*Ocimum odorum* L.	Lamiaceae	-	Herb
64.	*Oxalis corniculata* L.	Oxalidaceae	-	Herb
65.	*Parthenium hysterophorus* L.	Asteraceae	Congress Grass	Herb
66.	*Paspalidium flavidum* Retz.	Poaceae	-	Grass
67.	*Peristrophe bicalyculata* (Retz.)	Acanthaceae	-	Herb
68.	*Phalaris minor* Retz.	Poaceae	-	Grass
69.	*Phyllanthus fraternus* Webster	Euphorbiaceae	-	Herb
70.	*Polygonum plebium* R.Br.	Polygonaceae	-	Herb
71.	*Prosopis julifera*	Mimosaceae	Vilayati Babool	Shrub
72.	*Prosopis juliflora* (Swartz) DC.	Mimocaseae	-	Tree
73.	*Psidium guayava*	Myrtaceae	Amrud	Tree
74.	*Ricinus communis*	Euphorbiaceae	Arandi, Chian	Tree
75.	*Rumex dentatus* L.	Polygonaceae	-	Herb
76.	*Saccharum munja* Roxb.	Poaceae	Munj grass	Grass
77.	*Setaria glauca*	Poaceae	-	Grass
78.	*Sida acuta* Burm f.	Malvaceae	-	Herb
79.	*Sida cordifolia* L.	Malvaceae	-	Herb
80.	*Solanum nigrum* L.	Solanaceae	-	Herb
81.	*Solanum xanthocarpum*	Solanaceae	Neeli Kateli	Shrub
82.	*Sonchus asper* (L) Hill	Asteraceae	-	Herb
83.	*Tamarindus indica*	Fabaceae	Imli	Tree
84.	*Terminalia bellerica*	Fabaceae	Bahera	Tree
85.	*Trianthema portulacastrum* L.	Aizoaceae	-	Herb
86.	*Tribulus terrestris* L.	Zygophyllaceae	-	Herb
87.	*Tridax procumbens* L.	Asteraceae	-	Herb
88.	*Triumfetta rhomboidea* Jacquin	Tiliaceae	-	Herb
89.	*Urena lobata* L.	Malvaceae	-	Shrub
90.	*Veronica officinalis* (L)	Asteraceae	-	Herb
91.	*Withania somnifera* (L) Dunal	Solanaceae	Ashwagandha	Shrub
92.	*Xanthium strumarium* L.	Asteraceae	-	Shrub
93.	*Ziziphus* Sp.	Rhamnaceae	Ber	Shrub

Table- 39: Analysis of the Flora of the Study Area

S.No.	Habitat	No. of Species	Family	% in vegetation
1.	Trees	15	10	16
2.	Shrubs	16	11	17
3.	Herbs/Grasses	62	28	67
	Total	**93**	**39**	**100**

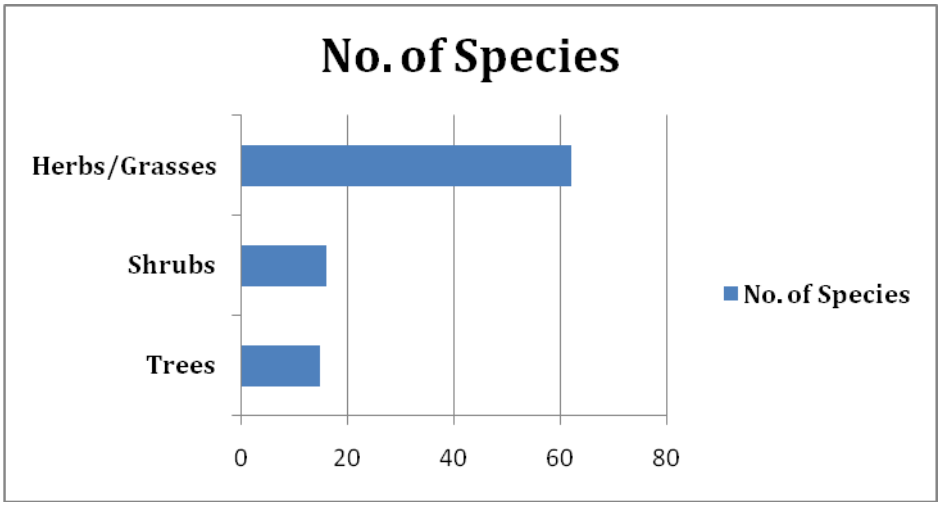


Figure 13: Graphical Representation of Flora in Study Area

Agricultural Practices:

Cultivation of wheat, maize, sugarcane crop is extensively practiced in this region while paddy (rice) and toor dal are cultivated on small scale near the alluvial plane of the study area. Vegetables are well grown all along the area. Some crop species which are well grown in the area aregiven below in following **Table-40**:

Table- 40: List of Major Crops Grown in the Study Area

Sl. No.	Crops	Scientific Name	Local name
1.	Wheat	*Triticum aestivum*	Gehu
2.	Maize	*Zea mays*	Makka
3.	Rice	*Oryza sativa*	Dhan
4.	Sugar cane	*Saccharum officinarum*	Ganna
5.	Pearl millet	*Pennisetum glaucum*	Bajra
6.	Sorghum	*Sorghum vulgare*	Jwar
7.	Pigeon pea	*Cajanus cajan*	Toor dal
8.	Cotton	*Gossypium*	Kapas
9.	Potato	*Solanum tuberosum*	Aalu
10	Turmeric	*Curcuma longa*	Haldi

- ***Faunal Community***

Fauna in core area: Field survey of the proposed project site was carried out for identification of fauna present in the core area. The proposed site is Govt. waste land with scattered weeds all around. Some tree and shrub species of *Acacia*, *Lantana, Ziziphus, Calotropis* etc. are seen in the areas which are supporting few faunal species like *Rattus rattus, Lepus nigricollis, Funambulus palmarum* etc.

Fauna in the buffer area: The buffer area of the project i.e. 10km radius of the proposed project site includes the agricultural land, villages, and the part of Bhogpur reserved forest. In village areas only domesticated animals were seen, however some rodents and mammals were also noticed roaming in the area. The RF area is the main habitat supporting the faunal diversity of this area. The inventory of the animal species present in and around the area was prepared and cross checked with the schedules of Wildlife acts, 1972. A number of 11 Mammals, 14 Birds, 10 Reptiles and 02 Amphibians were listed during the study. Four schedule-II Mammals are reported from the area and no schedule-I animal is reported. List of faunal species reported from the area is tabulated under **Table-41, 42, 43.**

Table- 41: List of Mammals in 10km Radius of the Project Site

Sl.No.	Zoological Name	Common Name	WL Act 1972, Schedule
1	*Boselaphus tragocamelus#*	Nilgai	III
2	*Canis aureus#*	Jackal	II
3	*Felis chaus*	Wild cat	II
4	*Funambulus palmarum#*	Indian palm squirrel	IV
5	*Lepus nigricollis#*	Indian Hare	IV
6	*Macca sp.*	Monkey	II
7	*Herpestes fuscus*	Nevala	II
8	*Mus muscatus#*	Mouse	V
9	*Rattus rattus*	House rat	V

 # observed during Primary survey

Table- 42: List of Birds in 10km Radius of the Project Site

Sl. No.	Zoological Name	Common Name
1	*Acridotheres tristis#*	Common mynah
2	*Alcedo atthis*	Common King fisher
3	*Bubulcus ibis*	Cattle egret
4	*Corvus splendens#*	House crow
5	*Eudynamix scolopaceus*	Koel
6	*Columbidae*	Dove
7	*Pycnonotus cafer*	Redvented bulbul
8	*Passer domesticus#*	House sparrow
9	*Pseudibis papillosa*	Black ibis
10	*Columba livia*	Rock pigeon
11	*Corves splendens#*	Crow
12	*Ploceus phillippinus*	Baya
13	*Psittacula krameri#*	Parrot
14	*Dicruridae*	Drongo
15	*Gracupica contra*	Pied myna
16	*Elanus caeruleus*	Common kite

17	*Parulidae*	Warbler

Table- 43: List of Reptiles & Amphibians in 10km Radius of the Project Site

Sl. No.	Zoological Name	Common Name
1	*Bungarus sp*	Krait
2	*Naja naja#*	Cobra
3	*Ptyas mucosus*	Rat snake
4	*Calotes versicolor#*	Garden lizard
5	*Hemidactylus sp*	House lizard
6	*Geoclemys hamiltonic*	Fresh water turtle
7	*Calotes versicolor*	Indian garden lizards
8	*Vipera ruselli*	Viper
9	*Bufo malanostidus#*	Toad
10	*Rana tigrina#*	Frog

observed during Primary survey

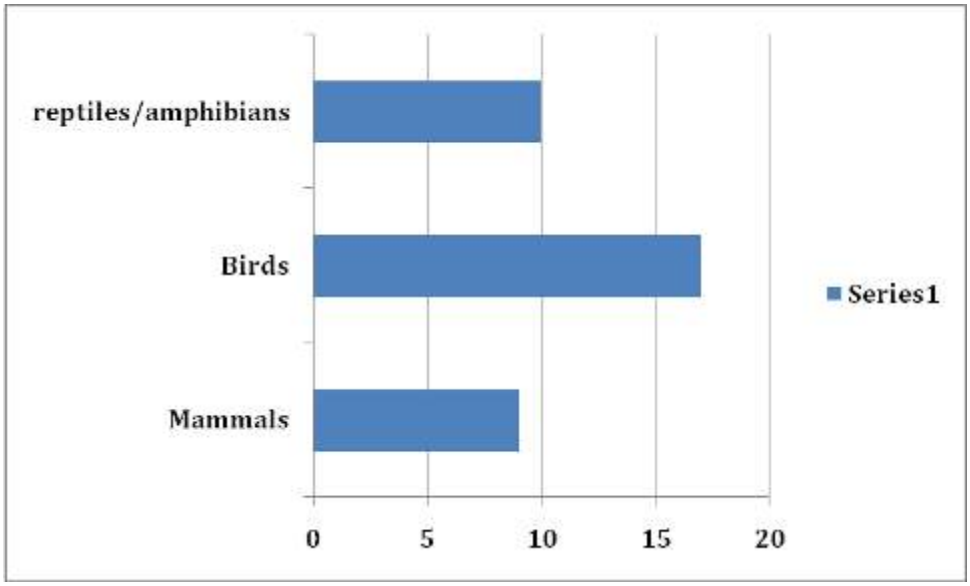


Figure 14: Fauna in Buffer Zone

Domestic Animals: As the buffer area is mainly consisting of villages, various domestic animals are reported from these villages. The domestic animals are mainly mammals. The domestic animals found in the study area are listed in the **Table-44**.

Table- 44: List of Domestic Fauna in the Study Area

S. No.	Zoological Name	Common Name
1.	*Bos indicus*	Cow
2.	*Bubalus indicus*	Buffalo
3.	*Canis lupus familiaris*	Dog
4.	*Capra hircus*	Goat
5.	*Equus ferus caballus*	Horse
6.	*Equus hermionus*	Ass
7.	*Felis domesticus*	Cat
8.	*Ovius polic*	Sheep
9.	*Sus scrofa domesticus*	Pig

Aquatic Ecology

Planktons:

- Planktons are represented by phytoplanktons and zooplanktons. Among phytoplanktons, three families i.e. cyanophyceae, chlorophyceae and bacillariophyceae were present.
- Blue green algae (cyanophyceae) consist of three species viz., Anabeana, Nostoc and Ocillatoria where Anabeana was found dominant. Green algae were represented by microflora like Chlorella, Cosmarium, Clostridium, Oocystis, Euglena and Chlymadomonas species. Among macroflora, Nitella and Potamogeton species were recorded.
- Zooplanktons show poor occurrence in the flowing canal water though some species of Protozoa, Rotifera and Crustacians have been observed in the stagnant pond water of Baragaun & Nagla Shaku village. Among Protozoans only Diffluzia and Oikomonas species were found. Whereas, Keratella and Brachionus are dominant in Rotifera. Cladocerans are represented by Daphnia sp. and Copepods by Cyclops sp only.
- Phytoplankton and Zooplankton are indicators of environmental stress. The quality and quantity of such biological species in a particular environment largely depends on various physico-chemical characteristics of water such a pH, conductivity, nutrients, BOD, alkalinity etc.

The following aquatic weeds have been reported in the study area

- Submerged Weeds : Hydrilla, Vallisveria, Potamogeton, etc.
- Emerging Weeds : *Ranuculus aquatalis, Limnophilia heterophyll*, etc.
- Floating Plants : Pistia, Azolla sp. Eichhorina etc.

Rare and Endangered Species & Migratory routes

None of the species among terrestrial or aquatic flora and fauna are found to be rare, threatened, endangered or vulnerable and listed under the IUCN red data book (2006) and no species is found to be reported under the schedule-I of the Indian Wildlife Act (1972). No migratory route of birds and mammals is reported during the study passing through the study area.

4.8 SOCIO-ECONOMIC ENVIRONMENT

4.8.1 Approach & Methodology

The proposed site is situated between 28°08'35'' to 28°10'25'' Northern latitude and between 77°53'47'' to 77°55'22'' Eastern longitude. It is located at a distance of approx. 10 km from Khurja town of Uttar Pradesh and approx. 36km from Aligarh, one of the major towns of Uttar Pradesh. The site is surrounded by villages Dushehara-kherli, Jahanpur, Naiphal (Unchagaon) and Rukunpur. The proposed plot is approachable from National Highway (NH-91), which passes through the site and is proposed to be re-routed. The Upper Ganga Canal passes through the North Eastern side of the plant. The Northern Railway main line passes on the Western side of the site at approx, 5 km distance. The nearest railway station is Danwar which is about 5km from the site. The nearest major Railway Station is at Khurja at a distance of about 11km on northern side. The nearest airport is at New Delhi at a distance of approx. 90km.

The socio-economic study report, presented hereunder, is based on the primary as well as secondary data. Socio-economic profile has been compiled from census data (2001), while primary verification has been carried out by using sample survey in the study are. This is then compared with the Primary Census Abstract, 2001 to establish trends for the period of two decades. For detailed socio-economic analysis 'Vikas Khand' has been taken as the minimum unit. Other source of Secondary data used for the study are; Village Directory of Uttar Pradesh, Census 2011; Statistical Abstract of Uttar Pradesh, 2011.

The area falling within 10 km distance from the proposed project area has been considered as the study area. The study area is spread over two districts of Uttar Pradesh, viz., Khurja tehsil of Bulandshahr district and *Gabhana Tehsil in Aligarh District.* There are 118 villages that fall under the Study Area of the proposed project. Out of these *93 villages come under Khurja Tehsil in Bulandshahr District* and *25 villages under Gabhana Tehsil in Aligarh District.* The vicinity map prepared from the Administrative Atlas 2001 of Uttar Pradesh is shown in **Figure-16.**

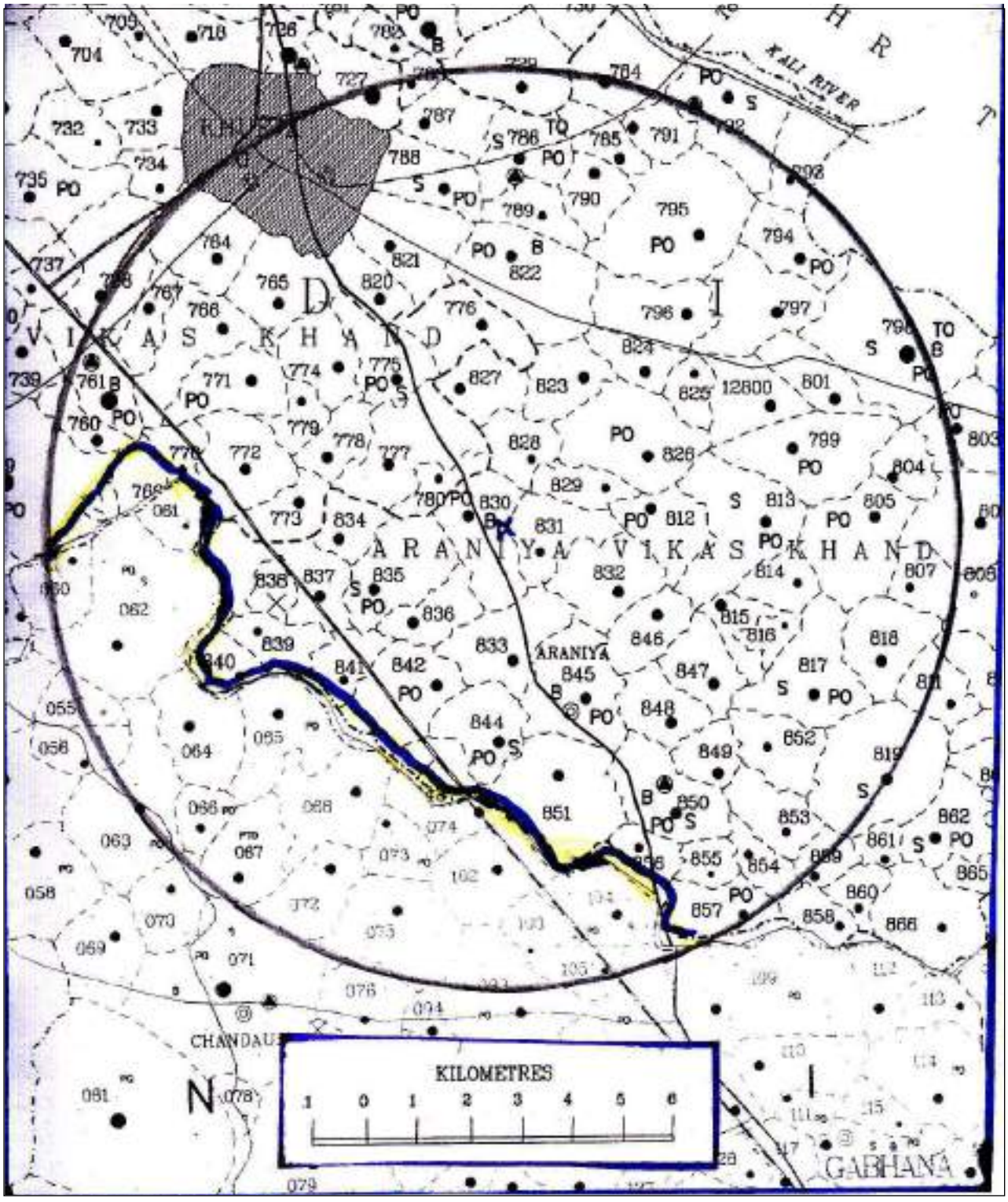


Figure 15: Vicinity Map of the Study Area

4.8.2 Demographic profile

Demography of Bulandshahr District

The District of Bulandshahar is in Meerut division of Utter Pradesh located between Ganga and Yamuna rivers. This is situated between 28°08'35'' to 28°10'25'' Northern and 77°53'47'' to77°55'22''eastern longitudes. The District is about 84km in length and 62km is breadth. The district is 237.44 meters above sea level. The river Ganga in the east separates this District from Moradabad and Badaun district and in the west river Yamuna separates the district from Haryana state and Delhi. In the north of district is Ghaziabad and in southeast are the borders of Aligarh district. The geographical area of the district is 4353sqkm which is about 1.48% of the total Uttar Pradesh area. The urban area of the district is 122.8sqkm and rural area as 4230.2sqkm. This district is near to Delhi and is in the national capital region. The nuclear atomic power plant is located at Narora town of the district. The national level satellite earth station is located near Sikandrabad town. Bulandshahr District is also an important grain producing agriculture District. Administratively, the district is divided into seven sub divisions *Dibai, Anoopshahr, Khurja, Shikarpur, Siyana, Bulandshahar* and *Sikandrabad*. For development purposes there are sixteen development blocks *Bulandshahar, Gulaothi, Lakhaowati, Shikarpur, Khurja, Pahasu, Arniya, Sikandrabad, Anoopshahr, Dibai, Danpur, Siyana, B.B.nagar, Jahagirabad, Uncha Gaon* and *Aganta* blocks.

An official Census 2011 detail of Bulandshahar has been released by the Directorate of Census Operations in Uttar Pradesh. Enumeration of key persons was also done by census officials in Bulandshahar District. In 2011, Bulandshahar had population of 3,499,171 of which male and female were 1,845,260 and 1,653,911 respectively. In 2001 census, Bulandshahar had a population of 2,913,122 of which males were 1,550,326 and remaining 1,362,796 were females. Bulandshahar District population constituted 1.75 percent of total Uttar Pradesh population. In 2001 census, this figure for Bulandshahar District was at 1.75 percent of Uttar Pradesh population. There was change of 20.12 percent in the population compared to population as per 2001. In the previous census of India 2001, Bulandshahar District recorded increase of 18.17 percent to its population compared to 1991. The data released by census India 2011, shows that density of Bulandshahar district for 2011 is 776 people per sq. km. In 2001, Bulandshahar district density was at 667 people per sq. km. Bulandshahar district administers 4512 square kilometers of areas. Average literacy rate of Bulandshahar in 2011 were 68.88 compared to 59.50 of 2001. If things are looked out at gender wise, male and female literacy were 80.93 and 55.57 respectively. For 2001 census, same figures stood at 74.44 and 42.47 in Bulandshahar District. Total literate in Bulandshahar District were 2,031,656 of which male and female were 1,252,314 and 778,342 respectively. In 2001, Bulandshahar District had 1,408,082 in its district. With regards to Sex Ratio in Bulandshahar, it stood at 896 per 1000 male compared to 2001 census figure of 879. The average national sex ratio in India is 940 as per latest reports of Census 2011 Directorate. In 2011 census, child sex ratio is 854 girls per 1000 boys compared to figure of 867 girls per 1000 boys of 2001 census data. In census enumeration, data regarding child under 0-6 age were also collected for all districts including Bulandshahar. There were total 549,796 children under age of 0-6 against 542,329 of 2001 census. Of total 549,796 male and female were 296,558 and 253,238 respectively. Child Sex Ratio as per census 2011 was 854 compared to 867 of census 2001. In 2011, Children under 0-6 formed 15.71 percent

of Bulandshahar District compared to 18.70 percent of 2001. There was net change of -2.99 percent in this compared to previous census of India. As per 2011 census, 75.21% population of Bulandshahar districts lives in rural areas of villages. The total Bulandshahar district population living in rural areas is 2,631,742 of which males and females are 1,390,490 and 1,241,252 respectively. In rural areas of Bulandshahar district, sex ratio is 893 females per 1000 males. If child sex ratio data of Bulandshahar district in rural area is considered, figure is 850 girls per 1000 boys. Child population in the age 0-6 is 422,617 in rural areas of which males were 228,415 and females were 194,202. The child population comprises 16.43% of total rural population of Bulandshahar district. Literacy rate in rural areas of Bulandshahar district is 68.71 % as per census data 2011. Gender wise, male and female literacy stood at 82.10 and 53.90 percent respectively. In total, 1,517,979 people were literate of which males and females were 954,110 and 563,869 respectively. The district at a glance is presented in **Table-45.**

Table- 45: Bulandshahar District at a Glance

Description	2011	2001
Actual Population	**3,499,171**	**2,913,122**
Male	1,845,260	1,550,326
Female	1,653,911	1,362,796
Population Growth	**20.12%**	**22.22%**
Area Sq. Km	4512	4512
Density/km²	**776**	**667**
Proportion to Uttar Pradesh Population	1.75%	1.75%
Sex Ratio (Per 1000)	**896**	**879**
Child Sex Ratio (0-6 Age)	854	867
Average Literacy	**68.88%**	**59.50%**
Male Literacy	80.93%	74.40%
Female Literacy	55.57%	42.48%
Total Child Population (0-6 Age)	**549,796**	**542,329**
Male Population (0-6 Age)	296,558	290,455
Female Population (0-6 Age)	253,238	251,874
Literates	**2,031,656**	**1,408,082**
Male Literates	1,253,314	936,195
Female Literates	778,342	471,887
Child Proportion (0-6 Age)	**15.71%**	**18.70%**
Boys Proportion (0-6 Age)	16.07%	18.80%
Girls Proportion (0-6 Age)	15.31%	18.48%

(Source: Data of Census 2011 – Uttar Pradesh)

Demography of the Tehsils

As per provisional reports of Census India, population of Khurja in 2011 is 111,089; of which male and female are 58,577 and 52,512 respectively. Although Khurja city has population of 111,089; its urban / metropolitan population is 142,636 of which 75,384 are males and 67,252 are female. The rural and urban populations of sub District Khurja are presented in **Table-46.** Total children (0-6)

in Khurja city are 15,510 as per figure from Census India report on 2011. There were 8,502 boys while 7,008 are girls. The child forms 13.96 % of total population of Khurja City.

Table- 46: Demographic Details of Khurja Tehsil

S.No	Total/Rural/Urban	No of Households	Persons	Males	Females
1.	Total	88678	519063	274796	244267
2.	Rural	60771	362581	192295	170286
3.	Urban	27907	156482	82501	73981

(Source: Data as for Census 2011 – Uttar Pradesh)

Table- 47: Demographic Details of Gobhana Tehsil

S.No	Total/Rural/Urban	No of Households	Persons	Males	Females
1.	Total	44,024	278,116	149,563	128,553
2.	Rural	41,477	264,364	142,239	122,125
3.	Urban	2,547	13,752	7,324	6,428

(Source: Data as for Census 2011 – Uttar Pradesh)

Table- 48: Population Details of Khurja Nagar Palika Parishad

Khurja City	Total	Male	Female
Population	111,089	58,577	52,512
Literates	62,230	35,737	26,493
Average Literacy (%)	56.03%	57.43%	42.57%
Sex Ratio	902/1000		

(Source: Data as for Census 2011 – Uttar Pradesh)

Table- 49: Population Details of Khurja Metropolitan area

Khurja Population	Total	Male	Female
Population	156482	82501	73981
Literates	88634	51577	37057
Average Literacy (%)	56.64	58.19	41.81
Sex Ratio	897/1000		

(Source: As per Census 2011 – Uttar Pradesh)

Demography of the Study Area

The following sections present the socio economic profile of the villages falling in the study area (demography, literacy, occupation, etc) based on secondary data available from *Primary Census Abstract, Census of India, 2001 and 2011;Village Directory of Uttar Pradesh, Census of India, 2011; Administrative Atlas of Uttar Pradesh, 2011; Sankhyakiya Patrika, Bulandshahar, 2006*; *Statistical Abstract of Uttar Pradesh, 2010*. For detailed socio-economic analysis, *'Vikas Khand'* has been taken

as the minimum unit. There are 118 villages that fall under the Study Area of the proposed project. Out of these *93 villages come under Khurja Tehsil in Bulandshahr District* and *25 villages under Gabhana Tehsil in Aligarh District.*

The Schedule Caste (SC) population within the study area is **28.48 %** of the total population with a sex ratio of **881** female/**1000** males. Schedule Tribe (ST) population in the study area is 0 %. Detailed status of gender–wise population structure is givenbelow in **Table-50.** Social structure is depicted graphically in **Figrue-17.**

Table- 50: Gender-Wise Population Status of the Study Area

Sl. No	Name of the Village	Population			SC			ST			Tehsil	District
		Total	Male	Female	Total	Male	Female	Total	Male	Female		
1	Abrahimpur junedpur urf mozpur	4132	2197	1935	1442	773	669	0	0	0	Khurja	Bulandshahar
2	Saudahavipur	5668	3049	2619	1197	643	554	0	0	0	Khurja	Bulandshahar
3	Maina Kalander Gadhi	1523	797	726	576	306	270	0	0	0	Khurja	Bulandshahar
4	Gaospur Taina	2267	1218	1049	732	399	333	0	0	0	Khurja	Bulandshahar
5	Usmapur	2862	1565	1297	1282	700	582	0	0	0	Khurja	Bulandshahar
6	Arniya Mansoorpur	2508	1284	1224	963	463	500	0	0	0	Khurja	Bulandshahar
7	Arnia Mozpur	1625	862	763	63	27	36	0	0	0	Khurja	Bulandshahar
8	Mohammadpur Navipur Urf Rampur	1053	540	513	360	186	174	0	0	0	Khurja	Bulandshahar
9	Sarawa Dadupur	2541	1302	1239	308	165	143	0	0	0	Khurja	Bulandshahar
10	Dostpur Dadupur	780	402	378	137	71	66	0	0	0	Khurja	Bulandshahar
11	Asagarpur	1677	900	777	114	56	58	0	0	0	Khurja	Bulandshahar
12	Keoli Kalan	1887	1021	866	354	206	148	0	0	0	Khurja	Bulandshahar
13	Kamalpur Mazra Nayser	2281	1238	1043	354	193	161	0	0	0	Khurja	Bulandshahar
14	Balarau	2408	1261	1147	1429	759	670	0	0	0	Khurja	Bulandshahar
15	Mirpur	3011	1586	1425	815	453	362	0	0	0	Khurja	Bulandshahar
16	Nagla Shekhu	3160	1680	1480	960	507	453	0	0	0	Khurja	Bulandshahar
17	Rohinda	3655	1925	1730	651	349	302	0	0	0	Khurja	Bulandsh

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18	Mansoorpur	1791	943	848	314	157	157	0	0	0	Khurja	Bulandshahar
19	Shahtajpur Bhal	584	315	269	109	60	49	0	0	0	Khurja	Bulandshahar
20	Ishanpur	829	444	385	86	48	38	0	0	0	Khurja	Bulandshahar
21	Talibpur	919	477	442	894	468	426	0	0	0	Khurja	Bulandshahar
22	Badha	2561	1377	1184	1696	915	781	0	0	0	Khurja	Bulandshahar
23	Kalakhuri	1211	664	547	520	283	237	0	0	0	Khurja	Bulandshahar
24	Sanda Faridpur	2641	1405	1236	1092	587	505	0	0	0	Khurja	Bulandshahar
25	Lakhawti Mirzapur	2980	1569	1411	829	438	391	0	0	0	Khurja	Bulandshahar
26	Baghrai	4033	2151	1882	1606	873	733	0	0	0	Khurja	Bulandshahar
27	Bijlipur	608	333	275	69	35	34	0	0	0	Khurja	Bulandshahar
28	Nyamtapur	974	528	446	80	44	36	0	0	0	Khurja	Bulandshahar
29	Bahanpur	1392	761	631	134	68	66	0	0	0	Khurja	Bulandshahar
30	Badshahpur Pachgai	3693	1975	1718	833	420	413	0	0	0	Khurja	Bulandshahar
31	Hamirpur	962	526	436	492	275	217	0	0	0	Khurja	Bulandshahar
32	Raipur Mauzampur	3178	1675	1503	539	281	258	0	0	0	Khurja	Bulandshahar
33	Devrala	4469	2333	2136	1121	580	541	0	0	0	Khurja	Bulandshahar
34	Shahbajpur Daulat	1704	924	780	293	159	134	0	0	0	Khurja	Bulandshahar
35	Palra	2011	1080	931	384	207	177	0	0	0	Khurja	Bulandshahar
36	Karaura	7417	3932	3485	2149	1141	1008	0	0	0	Khurja	Bulandshahar
37	Pharakana Gangagarhi	3962	2094	1868	1443	736	707	0	0	0	Khurja	Bulandshahar
38	Nagalia Takkar	1557	797	760	340	175	165	0	0	0	Khurja	Bulandshahar
39	Hirapur Nagla Jagat	2211	1182	1029	2051	1090	961	0	0	0	Khurja	Bulandshahar
40	Pilkhanari Urf Sabitgarh	2679	1414	1265	724	378	346	0	0	0	Khurja	Bulandshahar
41	Baghoo	1840	971	869	356	192	164	0	0	0	Khurja	Bulandshahar
42	Gangavali	2456	1314	1142	841	444	397	0	0	0	Khurja	Bulandshahar
43	Jatola	1848	1007	841	633	345	288	0	0	0	Khurja	Bulandshahar
44	Habibpur	893	452	441	613	312	301	0	0	0	Khurja	Bulandsh

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45	Pala	1997	1076	921	1339	730	609	0	0	0	Khurja	Bulandshahar
46	Hinsoti	1199	640	559	809	445	364	0	0	0	Khurja	Bulandshahar
47	Nagilia Udhaybhan	1986	1052	934	161	88	73	0	0	0	Khurja	Bulandshahar
48	Gworoli Bhojgarhi	3224	1680	1544	965	503	462	0	0	0	Khurja	Bulandshahar
49	Khutena	813	425	388	140	71	69	0	0	0	Khurja	Bulandshahar
50	Suratpur Kalan	975	519	456	136	71	65	0	0	0	Khurja	Bulandshahar
51	Suratpur Khurd	433	228	205	75	37	38	0	0	0	Khurja	Bulandshahar
52	Surjawali	2692	1448	1244	627	331	296	0	0	0	Khurja	Bulandshahar
53	Hisara	1421	759	662	235	118	117	0	0	0	Khurja	Bulandshahar
54	Bhogapur	1482	772	710	403	206	197	0	0	0	Khurja	Bulandshahar
55	Wazidpur	3175	1643	1532	624	325	299	0	0	0	Khurja	Bulandshahar
56	Jhamka	2584	1343	1241	425	211	214	0	0	0	Khurja	Bulandshahar
57	Agaura Amirpur	5216	2722	2494	800	431	369	0	0	0	Khurja	Bulandshahar
58	Yusufpur Malgosa	2981	1585	1396	61	31	30	0	0	0	Khurja	Bulandshahar
59	Salimpur Pahargarhi	1342	712	630	698	370	328	0	0	0	Khurja	Bulandshahar
60	Achalpur	992	534	458	132	73	59	0	0	0	Khurja	Bulandshahar
61	Baragaon	2401	1259	1142	298	163	135	0	0	0	Khurja	Bulandshahar
62	Hazratpur Puthari	1336	732	604	530	281	249	0	0	0	Khurja	Bulandshahar
63	Mohammadpur Mazara Barhagaon	995	516	479	26	15	11	0	0	0	Khurja	Bulandshahar
64	Rasoolpur	826	433	393	613	317	296	0	0	0	Khurja	Bulandshahar
65	Dashahara Kherli	2004	1078	926	387	209	178	0	0	0	Khurja	Bulandshahar
66	Jahanpur	1108	578	530	81	45	36	0	0	0	Khurja	Bulandshahar
67	Naiphal Urf Uchangaon	1876	988	888	788	427	361	0	0	0	Khurja	Bulandshahar
68	Rukanpur	1716	921	795	749	398	351	0	0	0	Khurja	Bulandshahar
69	Sherpur Mazra Naysar	1247	670	577	769	412	357	0	0	0	Khurja	Bulandshahar
70	Jawal	2284	1202	1082	966	503	463	0	0	0	Khurja	Bulandshahar

71	Badauli	2407	1242	1165	342	179	163	0	0	0	Khurja	Bulandshahar
72	Naysar	2716	1460	1256	1155	609	546	0	0	0	Khurja	Bulandshahar
73	Thangora	644	334	310	279	143	136	0	0	0	Khurja	Bulandshahar
74	Haidar Nagar Madkola	707	362	345	67	38	29	0	0	0	Khurja	Bulandshahar
75	Nagala Kut	918	483	435	181	96	85	0	0	0	Khurja	Bulandshahar
76	Danwar	2531	1356	1175	826	444	382	0	0	0	Khurja	Bulandshahar
77	Kaherola	2344	1248	1096	788	424	364	0	0	0	Khurja	Bulandshahar
78	Arnia Khurd	1973	1085	888	603	342	261	0	0	0	Khurja	Bulandshahar
79	Ghatal	1527	803	724	497	263	234	0	0	0	Khurja	Bulandshahar
80	Nagar	1907	1027	880	268	146	122	0	0	0	Khurja	Bulandshahar
81	Khuriyavali	1579	829	750	292	150	142	0	0	0	Khurja	Bulandshahar
82	Sarsal	1854	985	869	26	16	10	0	0	0	Khurja	Bulandshahar
83	Muni	4065	2141	1924	1091	573	518	0	0	0	Khurja	Bulandshahar
84	Keoli Khurd	3353	1768	1585	990	521	469	0	0	0	Khurja	Bulandshahar
85	Lakhanbara	814	448	366	114	60	54	0	0	0	Khurja	Bulandshahar
86	Shahpur Pahasu	1178	642	536	257	137	120	0	0	0	Khurja	Bulandshahar
87	Rudri	760	411	349	120	68	52	0	0	0	Khurja	Bulandshahar
88	Dhakpura	553	291	262	118	59	59	0	0	0	Khurja	Bulandshahar
89	Ahmadpur Halpura	569	311	258	240	135	105	0	0	0	Khurja	Bulandshahar
90	Raniyavali	1359	718	641	472	248	224	0	0	0	Khurja	Bulandshahar
91	Kamalpur Pahasu	629	337	292	8	4	4	0	0	0	Khurja	Bulandshahar
92	Narayanpur	808	415	393	440	219	221	0	0	0	Khurja	Bulandshahar
93	Majoopur	337	180	157	228	122	106	0	0	0	Gabhana	Aligarh
94	Balrampur	760	408	352	314	169	145	0	0	0	Gabhana	Aligarh
95	Jalakaseru	678	360	318	138	75	63	0	0	0	Gabhana	Aligarh
96	Dilavarpur	673	362	311	11	5	6	0	0	0	Gabhana	Aligarh
97	Kaseru	3541	1894	1647	610	321	289	0	0	0	Gabhan	Aligarh

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98	Sudeshpur	2962	1574	1388	391	207	184	0	0	0	Gabhana	Aligarh
99	Teekari Bhavapur	2270	1240	1030	835	461	374	0	0	0	Gabhana	Aligarh
100	Baharpur	2101	1152	949	1184	647	537	0	0	0	Gabhana	Aligarh
101	Badhiyana	1000	543	457	400	211	189	0	0	0	Gabhana	Aligarh
102	Surajpur	2231	1202	1029	624	347	277	0	0	0	Gabhana	Aligarh
103	Bhojpur Gyanpur	1931	1024	907	722	381	341	0	0	0	Gabhana	Aligarh
104	Chandaus	12319	6542	5777	3589	1911	1678	0	0	0	Gabhana	Aligarh
105	Tajpur	2792	1482	1310	545	296	249	0	0	0	Gabhana	Aligarh
106	Bhagatpur	916	482	434	132	64	68	0	0	0	Gabhana	Aligarh
107	Bhogpur	1844	1016	828	604	331	273	0	0	0	Gabhana	Aligarh
108	Jahrana	2287	1220	1067	744	390	354	0	0	0	Gabhana	Aligarh
109	Ramnagar	1154	611	543	188	99	89	0	0	0	Gabhana	Aligarh
110	Amritpur Bakhatpur	2843	1505	1338	909	491	418	0	0	0	Gabhana	Aligarh
111	Aogipur	2042	1109	933	63	37	26	0	0	0	Gabhana	Aligarh
112	Kinhua	1965	1077	888	287	161	126	0	0	0	Gabhana	Aligarh
113	Bhagwanpur	322	175	147	31	15	16	0	0	0	Gabhana	Aligarh
114	Pahavati	1811	987	824	731	392	339	0	0	0	Gabhana	Aligarh
115	Noorullapur	890	496	394	244	124	120	0	0	0	Gabhana	Aligarh
116	Madhaula	4864	2574	2290	1526	815	711	0	0	0	Gabhana	Aligarh
117	Maina Maujpur (CT)	7351	3900	3451	1916	1009	907	5	4	1	Khurja	Bulandshahar
118	Daurau Chandpur	3427	1781	1646	1174	619	555	0	0	0	Gabhana	Aligarh
	TOTAL	**253252**	**134577**	**118675**	**72129**	**38352**	**33777**	**5**	**4**	**1**		

(Source: As per Census 2011 – Uttar Pradesh)

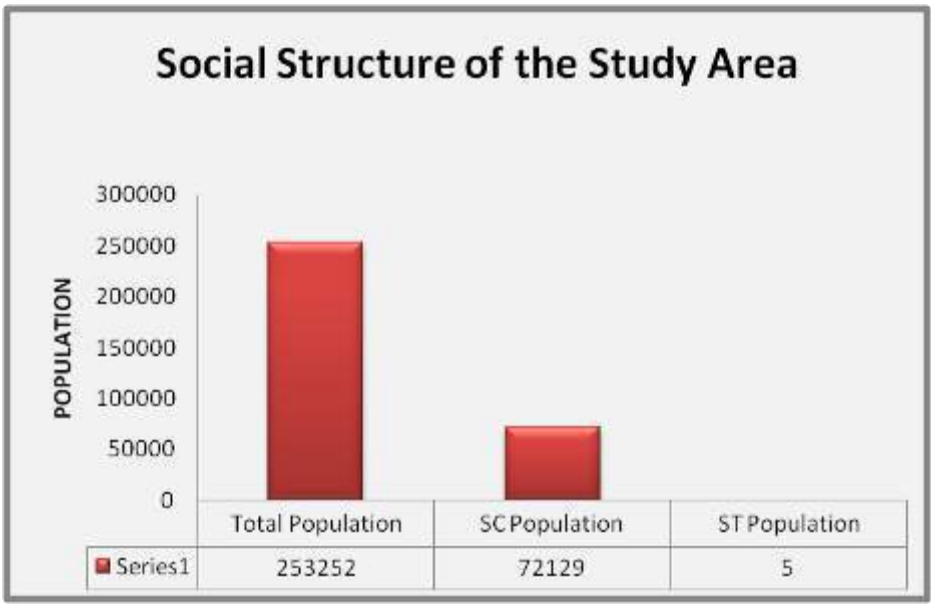

Figure 16: Social Structure of the Study Area

- **Sex Ratio in study Area**

The sex ratio of Khurja city is 880 per 1000 males. Child sex ratio of girls is 824 per 1000 boys. Details of sex ratio in the study area are given in **Table-51**.

Table- 51: Social Structure of the Study Area

	No. of House-hold	House-hold size	Population			Proportion (%)		Sex Ratio Female/1000Male		
			Total	SC	ST	SC	ST	Total	SC	ST
Abrahimpur junedpur urf mozpur	0781	4	4132	1442	0	34.90	0	880	865	0
Saudahavipur	932	4	5668	1197	0	21.12	0	858	861	0
Maina Kalander Gadhi		4	1523	576	0	37.82	0	910	882	0
Gaospur Taina	425	4	2267	732	0	32.29	0	861	834	0
Usmapur	489	3	2862	1282	0	44.79	0	828	831	0
Arniya Mansoorpur	443	4	2508	963	0	38.40	0	953	1076	0
Arnia Mozpur	288	5	1625	63	0	3.88	0	885	1333	0
Mohammadpur Navipur Urf Rampur	168	4	1053	360	0	34.19	0	950	935	0
Sarawa Dadupur	349	4	2541	308	0	12.12	0	951	866	0
Dostpur Dadupur	107	4	780	137	0	17.56	0	940	929	0
Asagarpur	246	4	1677	114	0	6.80	0	863	1035	0
Keoli Kalan	310	3	1887	354	0	18.76	0	848	718	0

Kamalpur Mazra Nayser	361	3	2281	354	0	15.52	0	842	834	0
Balarau	395	3	2408	1429	0	59.34	0	909	882	0
Mirpur	521	4	3011	815	0	27.07	0	898	799	0
Nagla Shekhu	549	4	3160	960	0	30.38	0	880	893	0
Rohinda	580	4	3655	651	0	17.81	0	898	865	0
Mansoorpur	291	4	1791	314	0	17.53	0	899	1000	0
Shahtajpur Bhal	95	3	584	109	0	18.66	0	853	816	0
Ishanpur	148	3	829	86	0	10.37	0	867	791	0
Talibpur	150	3	919	894	0	97.28	0	926	910	0
Badha	397	3	2561	1696	0	66.22	0	859	853	0
Kalakhuri	224	3	1211	520	0	42.94	0	823	837	0
Sanda Faridpur	447	3	2641	1092	0	41.35	0	879	860	0
Lakhawti Mirzapur	481	3	2980	829	0	27.82	0	899	892	0
Baghrai	639	4	4033	1606	0	39.82	0	874	839	0
Bijlipur	112	3	608	69	0	11.35	0	825	971	0
Nyamtapur	167	4	974	80	0	8.21	0	844	818	0
Bahanpur	223	4	1392	134	0	9.63	0	829	970	0
Badshahpur Pachgai	586	4	3693	833	0	22.56	0	869	983	0
Hamirpur	168	4	962	492	0	51.14	0	828	789	0
Raipur Mauzampur	536	4	3178	539	0	16.96	0	897	918	0
Devrala	752	4	4469	1121	0	25.08	0	915	931	0
Shahbajpur Daulat	252	4	1704	293	0	17.19	0	844	842	0
Palra	290	4	2011	384	0	19.09	0	862	855	0
Karaura	1165	4	7417	2149	0	28.97	0	886	883	0
Pharakana Gangagarhi	629	4	3962	1443	0	36.42	0	892	960	0
Nagalia Takkar	271	4	1557	340	0	21.84	0	953	942	0
Hirapur Nagla Jagat	377	4	2211	2051	0	92.76	0	870	881	0
Pilkhanari	456	4	2679	724	0	27.03	0	894	915	0
Baghoo	323	4	1840	356	0	19.35	0	894	854	0
Gangavali	451	4	2456	841	0	34.24	0	869	894	0
Jatola	318	4	1848	633	0	34.25	0	835	834	0
Habibpur	146	3	893	613	0	68.65	0	975	964	0
Pala	339	3	1997	1339	0	67.05	0	855	834	0
Hinsoti	181	3	1199	809	0	67.47	0	873	817	0
Nagilia Udhaybhan	339	3	1986	161	0	8.11	0	887	829	0
Gworoli Bhojgarhi	509	3	3224	965	0	29.93	0	919	918	0
Khutena	146	3	813	140	0	17.22	0	912	971	0
Suratpur Kalan	192	4	975	136	0	13.95	0	878	915	0
Suratpur Khurd	59	4	433	75	0	17.32	0	899	1027	0
Surjawali	412	4	2692	627	0	23.29	0	859	894	0
Hisara	237	4	1421	235	0	16.54	0	872	991	0
Bhogapur	245	4	1482	403	0	27.19	0	919	956	0
Wazidpur	539	3	3175	624	0	19.65	0	932	920	0
Jhamka	437	3	2584	425	0	16.45	0	924	1014	0

Agaura Amirpur	779	3	5216	800	0	15.34	0	916	856	0
Yusufpur Malgosa	386	3	2981	61	0	2.05	0	880	967	0
Salimpur Pahargarhi	250	4	1342	698	0	52.01	0	884	886	0
Achalpur	167	3	992	132	0	13.31	0	857	808	0
Baragaon	417	3	2401	298	0	12.41	0	907	818	0
Hazratpur Puthari	230	3	1336	530	0	39.67	0	825	886	0
Mohammadpur Mazara Barhagaon	151	3	995	26	0	2.61	0	928	733	0
Rasoolpur	170	3	826	613	0	74.21	0	907	933	0
Dashahara Kherli	344	3	2004	387	0	19.31	0	858	851	0
Jahanpur	179	3	1108	81	0	7.31	0	916	800	0
Naiphal Urf Uchangaon	304	4	1876	788	0	42.00	0	898	845	0
Rukanpur	292	4	1716	749	0	43.65	0	863	881	0
Sherpur Mazra Naysar	210	4	1247	769	0	61.67	0	861	866	0
Jawal	390	3	2284	966	0	42.29	0	900	920	0
Badauli	371	3	2407	342	0	14.21	0	938	910	0
Naysar	459	3	2716	1155	0	42.53	0	860	896	0
Thangora	119	3	644	279	0	43.32	0	928	951	0
Haidar Nagar Madkola	107	3	707	67	0	9.48	0	953	763	0
Nagala Kut	165	3	918	181	0	19.72	0	900	885	0
Danwar	413	3	2531	826	0	32.64	0	866	860	0
Kaherola	392	3	2344	788	0	33.62	0	878	858	0
Arnia Khurd	353	3	1973	603	0	30.56	0	818	763	0
Ghatal	263	3	1527	497	0	32.55	0	901	889	0
Nagar	311	3	1907	268	0	14.05	0	856	835	0
Khuriyavali	259	3	1579	292	0	18.49	0	904	946	0
Sarsal	246	3	1854	26	0	1.40	0	882	625	0
Muni	690	3	4065	1091	0	26.84	0	896	904	0
Keoli Khurd	509	3	3353	990	0	29.53	0	816	900	0
Lakhanbara	118	4	814	114	0	14.00	0	834	900	0
Shahpur Pahasu	183	4	1178	257	0	21.82	0	900	875	0
Rudri	127	4	760	120	0	15.79	0	829	764	0
Dhakpura	97	4	553	118	0	21.34	0	892	1000	0
Ahmadpur Halpura	103	4	569	240	0	42.18	0	866	777	0
Raniyavali	235	4	1359	472	0	34.73	0	946	903	0
Kamalpur Pahasu	102	3	629	8	0	1.27	0	872	1000	0
Narayanpur	121	3	808	440	0	54.46	0	862	1009	0
Majoopur	52	3	337	228	0	67.66	0	883	868	0
Balrampur	109	3	760	314	0	41.32	0	859	857	0
Jalakaseru	111	3	678	138	0	20.35	0	869	840	0
Dilavarpur	126	3	673	11	0	1.63	0	881	1200	0
Kaseru	621	3	3541	610	0	17.23	0	830	900	0

Sudeshpur	444	3	2962	391	0	13.20	0	823	888	0
Teekari Bhavapur	394	3	2270	835	0	36.78	0	841	811	0
Baharpur	351	3	2101	1184	0	56.35	0	856	829	0
Badhiyana	179	3	1000	400	0	40.00	0	885	895	0
Surajpur	356	3	2231	624	0	27.97	0	883	798	0
Bhojpur Gyanpur	321	3	1931	722	0	37.39	0	883	895	0
Chandaus	2032	3	12319	3589	0	29.13	0	900	878	0
Tajpur	462	3	2792	545	0	19.52	0	814	841	0
Bhagatpur	163	3	916	132	0	14.41	0	874	1062	0
Bhogpur	295	4	1844	604	0	32.75	0	873	824	0
Jahrana	405	4	2287	744	0	32.53	0	873	907	0
Ramnagar	199	4	1154	188	0	16.29	0	889	898	0
Amritpur Bakhatpur	470	4	2843	909	0	31.97	0	841	851	0
Aogipur	352	4	2042	63	0	3.09	0	824	707	0
Kinhua	357	4	1965	287	0	14.61	0	840	782	0
Bhagwanpur	50	4	322	31	0	9.63	0	834	1066	0
Pahavati	325	4	1811	731	0	40.36	0	794	864	0
Noorullapur	145	4	890	244	0	27.42	0	794	967	0
Madhaula	837	4	4864	1526	0	31.37	0	889	872	0
Maina Maujpur	1314	5	7351	1916	5	26.06	0.068	895	898	250
Daurau Chandpur	579	4	3427	1174	0	34.26	0	924	896	0
Total	**40021**		**253252**	**72129**	**5**	**28.48**	**0.002**	**608**	**880**	**250**

(Source: As per Census 2011 – Uttar Pradesh)

- **Literacy Status of the Study Area**

In education section, total literates in Khurja city are **149198** of which **92576** are males while **56622** are females. Average literacy rate of Khurja city is 67.63 percent of which male and female literacy was **62.05** and **37.95** percent. Detailed status of literacy is givenbelow in **Table-52** & pie chart **Figure-18.**

Table- 52: Literacy Status of the Study Area

Village	Total Literacy			Total Illiteracy		
	Total	Male	Female	Total	Male	Female
Abrahimpur junedpur urf mozpur	2664	1608	1056	1468	589	879
Saudahavipur	3440	2200	1240	2228	849	1379
Maina Kalander Gadhi	870	544	326	653	253	400
Gaospur Taina	1390	831	559	877	387	490
Usmapur	1699	1052	647	1163	513	650
Arniya Mansoorpur	1530	929	601	978	355	623
Arnia Mozpur	888	565	323	737	297	440
Mohammadpur Navipur Urf Rampur	608	381	227	445	159	286
Sarawa Dadupur	1002	666	336	1539	636	903

Dostpur Dadupur	335	205	130	445	197	248
Asagarpur	713	458	255	964	442	522
Keoli Kalan	1073	686	387	814	335	479
Kamalpur Mazra Nayser	958	605	353	1323	633	690
Balarau	1288	847	441	1120	414	706
Mirpur	1338	860	478	1673	726	947
Nagla Shekhu	2135	1308	827	1025	372	653
Rohinda	1484	956	528	2171	969	1202
Mansoorpur	1129	675	454	662	268	394
Shahtajpur Bhal	364	228	136	220	87	133
Ishanpur	560	330	230	269	114	155
Talibpur	499	299	200	420	178	242
Badha	1445	918	527	1116	459	657
Kalakhuri	766	471	295	445	193	252
Sanda Faridpur	1529	936	593	1112	469	643
Lakhawti Mirzapur	1552	989	563	1428	580	848
Baghrai	2506	1552	954	1527	599	928
Bijlipur	407	273	134	201	60	141
Nyamtapur	594	377	217	380	151	229
Bahanpur	812	504	308	580	257	323
Badshahpur Pachgai	1942	1256	686	1751	719	1032
Hamirpur	620	378	242	342	148	194
Raipur Mauzampur	1919	1209	710	1259	466	793
Devrala	2932	1773	1159	1537	560	977
Shahbajpur Daulat	1178	709	469	526	215	311
Palra	1318	793	525	693	287	406
Karaura	4079	2610	1469	3338	1322	2016
Pharakana Gangagarhi	2043	1311	732	1919	783	1136
Nagalia Takkar	1071	618	453	486	179	307
Hirapur Nagla Jagat	1166	758	408	1045	424	621
Pilkhanari Urf Sabitgarh	1701	1003	698	978	411	567
Baghoo	894	603	291	946	368	578
Gangavali	1457	928	529	999	386	613
Jatola	1206	748	458	642	259	383
Habibpur	483	319	164	410	133	277
Pala	1076	682	394	921	394	527
Hinsoti	628	405	223	571	235	336
Nagilia Udhaybhan	1499	841	658	487	211	276
Gworoli Bhojgarhi	2115	1276	839	1109	404	705
Khutena	511	305	206	302	120	182
Suratpur Kalan	691	419	272	284	100	184
Suratpur Khurd	291	174	117	142	54	88
Surjawali	1686	1007	679	1006	441	565
Hisara	840	527	313	581	232	349
Bhogapur	916	559	357	566	213	353

Wazidpur	1292	804	488	1883	839	1044
Jhamka	1333	841	492	1251	502	749
Agaura Amirpur	2417	1552	865	2799	1170	1629
Yusufpur Malgosa	1200	776	424	1781	809	972
Salimpur Pahargarhi	751	463	288	591	249	342
Achalpur	684	422	262	308	112	196
Baragaon	1588	950	638	813	309	504
Hazratpur Puthari	742	476	266	594	256	338
Mohammadpur Mazara Barhagaon	625	365	260	370	151	219
Rasoolpur	479	319	160	347	114	233
Dashahara Kherli	1409	818	591	595	260	335
Jahanpur	719	422	297	389	156	233
Naiphal Urf Uchangaon	1177	698	479	699	290	409
Rukanpur	1143	709	434	573	212	361
Sherpur Mazra Naysar	768	461	307	479	209	270
Jawal	1387	846	541	897	356	541
Badauli	1200	756	444	1207	486	721
Naysar	1627	1045	582	1089	415	674
Thangora	334	200	134	310	134	176
Haidar Nagar Madkola	321	204	117	386	158	228
Nagala Kut	617	369	248	301	114	187
Danwar	1622	1004	618	909	352	557
Kaherola	1537	927	610	807	321	486
Arnia Khurd	1266	785	481	707	300	407
Ghatal	830	520	310	697	283	414
Nagar	1160	755	405	747	272	475
Khuriyavali	945	588	357	634	241	393
Sarsal	964	644	320	890	341	549
Muni	2416	1472	944	1649	669	980
Keoli Khurd	1821	1151	670	1532	617	915
Lakhanbara	500	316	184	314	132	182
Shahpur Pahasu	705	448	257	473	194	279
Rudri	519	327	192	241	84	157
Dhakpura	412	239	173	141	52	89
Ahmadpur Halpura	372	240	132	197	71	126
Raniyavali	887	548	339	472	170	302
Kamalpur Pahasu	406	256	150	223	81	142
Narayanpur	525	317	208	283	98	185
Majoopur	158	101	57	179	79	100
Balrampur	485	299	186	275	109	166
Jalakaseru	393	249	144	285	111	174
Dilavarpur	402	280	122	271	82	189
Kaseru	2232	1383	849	1309	511	798
Sudeshpur	1627	1013	614	1335	561	774
Teekari Bhavapur	1298	843	455	972	397	575
Baharpur	1363	876	487	738	276	462

Badhiyana	598	386	212	402	157	245
Surajpur	1267	829	438	964	373	591
Bhojpur Gyanpur	1257	802	455	674	222	452
Chandaus	7281	4403	2878	5038	2139	2899
Tajpur	1776	1082	694	1016	400	616
Bhagatpur	578	351	227	338	131	207
Bhogpur	1135	730	405	709	286	423
Jahrana	1474	906	568	813	314	499
Ramnagar	748	452	296	406	159	247
Amritpur Bakhatpur	1861	1127	734	982	378	604
Aogipur	1358	839	519	684	270	414
Kinhua	1203	777	426	762	300	462
Bhagwanpur	226	142	84	96	33	63
Pahavati	1069	693	376	742	294	448
Noorullapur	571	383	188	319	113	206
Madhaula	3136	1871	1265	1728	703	1025
Maina Maujpur	5121	3010	2111	2230	890	1340
Daurau Chandpur	2041	1252	789	1386	529	857
TOTAL	**149198**	**92576**	**56622**	**104054**	**42001**	**62053**

(Source: As per Census 2011 – Uttar Pradesh)

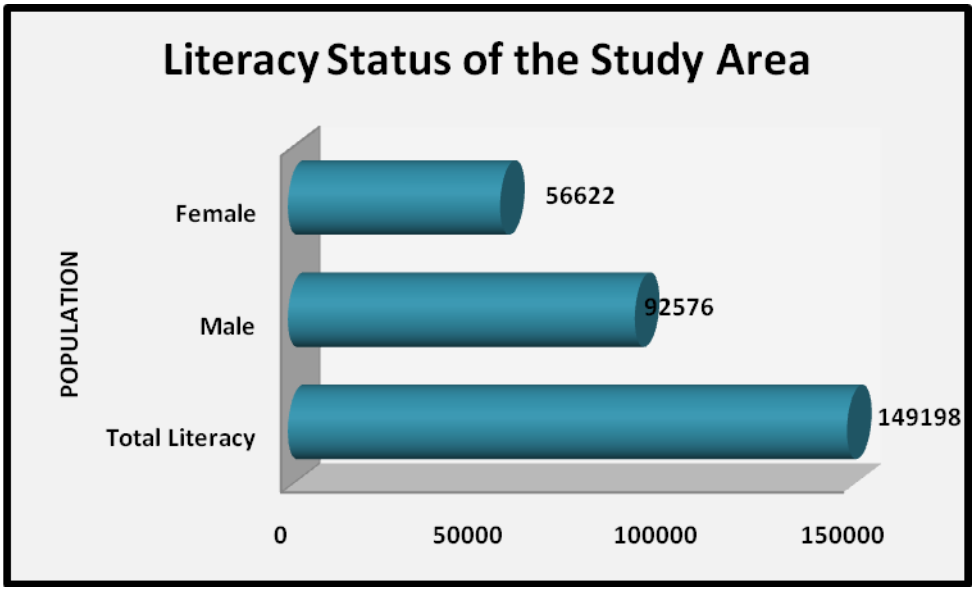

Figure 17: Literacy Status of the Study Area

4.8.3 Occupational Structure

The occupational structure of the population in the study area has been studied with reference to the total workers and non-workers .Further total workers grouped into two categories, main workers and marginal workers. Main workers have been grouped into four categories namely: Cultivators, agricultural laborers, household workers and other workers. The details of these groups are discussed below:

Total Workers

Work is defined as participation in any economically productive activity with or without compensation, wage. Such participation may be physical and/ or mental in nature. Work involves not only actual work but also include supervision and direction of work. It even includes part time help or unpaid work on farm, family enterprise or its economic activity. All persons engaged in 'work' as defined above are workers.

The number of total workers in the study area is **85487**which is **33.76%** of total population. Out of which **75.91%** is male and only **24.09%** is female. Total workers further divided into main workers and marginal workers. Detailed status of occupational structure is given below in **Table-53, 54, 55** & pie chart **Figure-19.**

Main Workers

Those workers who had worked for the major part of the reference period (i.e. 6 months or more) are term main workers. Total number of main workers in the study area is **59371** which are **69.45%** of total workers and **23.44 %** of total population.

Marginal Workers

The marginal workers are those workers, who are engaged in some work for a period of less than six months, during the reference year prior to the census survey. Total number of marginal workers in study area is **26116** which are approx. **30.55%** of the total workers.

Table- 53: Total Workers, Main Worker & Marginal Worker in the Study Area

Village	Total Worker			Main Worker			Marginal Worker		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Abrahimpur junedpur urf mozpur	1160	1035	125	1028	924	104	132	111	21
Saudahavipur	2050	1398	652	1694	1305	389	356	93	263
Maina Kalander Gadhi	552	346	206	401	315	86	151	31	120
Gaospur Taina	767	623	144	671	580	91	96	43	53
Usmapur	1114	815	299	482	453	29	632	362	270
Arniya Mansoorpur	700	618	82	528	499	29	172	119	53
Arnia Mozpur	467	426	41	424	396	28	43	30	13
Mohammadpur Navipur Urf Rampur	388	256	132	173	164	9	215	92	123
Sarawa Dadupur	534	517	17	518	504	14	16	13	3
Dostpur Dadupur	190	173	17	121	117	4	69	56	13
Asagarpur	490	412	78	385	369	16	105	43	62

Keoli Kalan	551	466	85	421	402	19	130	64	66
Kamalpur Mazra Nayser	807	650	157	669	604	65	138	46	92
Balarau	705	585	120	444	395	49	261	190	71
Mirpur	902	727	175	778	659	119	124	68	56
Nagla Shekhu	1231	838	393	837	695	142	394	143	251
Rohinda	1298	972	326	905	731	174	393	241	152
Mansoorpur	742	495	247	513	409	104	229	86	143
Shahtajpur Bhal	247	160	87	163	153	10	84	7	77
Ishanpur	279	234	45	221	208	13	58	26	32
Talibpur	289	237	52	275	231	44	14	6	8
Badha	923	704	219	611	542	69	312	162	150
Kalakhuri	511	333	178	155	142	13	356	191	165
Sanda Faridpur	760	575	185	491	461	30	269	114	155
Lakhawti Mirzapur	828	697	131	658	589	69	170	108	62
Baghrai	1377	1003	374	967	800	167	410	203	207
Bijlipur	195	174	21	192	172	20	3	2	1
Nyamtapur	311	256	55	230	207	23	81	49	32
Bahanpur	463	395	68	398	381	17	65	14	51
Badshahpur Pachgai	1668	1007	661	741	699	42	927	308	619
Hamirpur	315	272	43	310	268	42	5	4	1
Raipur Mauzampur	894	803	91	824	779	45	70	24	46
Devrala	1636	1160	476	1246	1064	182	390	96	294
Shahbajpur Daulat	740	463	277	378	322	56	362	141	221
Palra	714	571	143	450	423	27	264	148	116
Karaura	2185	1799	386	1152	1050	102	1033	749	284
Pharakana Gangagarhi	1255	970	285	610	544	66	645	426	219
Nagalia Takkar	479	413	66	318	284	34	161	129	32
Hirapur Nagla Jagat	816	596	220	426	358	68	390	238	152
Pilkhanari Urf Sabitgarh	1195	707	488	637	423	214	558	284	274
Baghoo	655	470	185	310	258	52	345	212	133
Gangavali	882	694	188	794	645	149	88	49	39
Jatola	1007	545	462	553	526	27	454	19	435
Habibpur	450	239	211	224	187	37	226	52	174
Pala	876	589	287	419	383	36	457	206	251
Hinsoti	375	314	61	234	226	8	141	88	53
Nagilia Udhaybhan	1028	636	392	587	514	73	441	122	319
Gworoli Bhojgarhi	1044	862	182	814	741	73	230	121	109

Khutena	213	200	13	210	198	12	3	2	1
Suratpur Kalan	268	238	30	254	224	30	14	14	0
Suratpur Khurd	118	101	17	118	101	17	0	0	0
Surjawali	914	710	204	483	451	32	431	259	172
Hisara	371	363	8	193	191	2	178	172	6
Bhogapur	426	388	38	366	349	17	60	39	21
Wazidpur	883	731	152	586	523	63	297	208	89
Jhamka	866	655	211	597	438	159	269	217	52
Agaura Amirpur	1355	1225	130	1213	1125	88	142	100	42
Yusufpur Malgosa	679	632	47	577	548	29	102	84	18
Salimpur Pahargarhi	427	374	53	142	133	9	285	241	44
Achalpur	296	233	63	252	212	40	44	21	23
Baragaon	782	603	179	497	463	34	285	140	145
Hazratpur Puthari	500	376	124	387	311	76	113	65	48
Mohammadpur Mazara Barhagaon	501	304	197	228	198	30	273	106	167
Rasoolpur	233	201	32	229	197	32	4	4	0
Dashahara Kherli	659	503	156	604	479	125	55	24	31
Jahanpur	379	310	69	338	287	51	41	23	18
Naiphal Urf Uchangaon	583	519	64	333	294	39	250	225	25
Rukanpur	531	393	138	349	321	28	182	72	110
Sherpur Mazra Naysar	612	377	235	406	332	74	206	45	161
Badauli	716	606	110	583	548	35	133	58	75
Naysar	920	651	269	900	636	264	20	15	5
Thangora	892	691	201	728	635	93	164	56	108
Haidar Nagar Madkola	316	190	126	210	150	60	106	40	66
Nagala Kut	158	147	11	102	95	7	56	52	4
Danwar	283	263	20	127	121	6	156	142	14
Kaherola	759	700	59	337	326	11	422	374	48
Arnia Khurd	890	606	284	827	578	249	63	28	35
Ghatal	550	488	62	512	465	47	38	23	15
Nagar	631	409	222	477	327	150	154	82	72
Khuriyavali	684	486	198	629	453	176	55	33	22
Sarsal	704	427	277	639	403	236	65	24	41
Muni	423	404	19	187	175	12	236	229	7
Keoli Khurd	1304	935	369	871	731	140	433	204	229
Lakhanbara	1029	884	145	948	825	123	81	59	22
Shahpur	229	196	33	201	192	9	28	4	24

Pahasu									
Rudri	357	300	57	301	269	32	56	31	25
Dhakpura	272	223	49	206	201	5	66	22	44
Ahmadpur Halpura	232	173	59	142	133	9	90	40	50
Raniyavali	150	137	13	136	128	8	14	9	5
Kamalpur Pahasu	448	329	119	193	171	22	255	158	97
Narayanpur	202	168	34	172	147	25	30	21	9
Majoopur	87	79	8	13	13	0	74	66	8
Balrampur	202	192	10	185	176	9	17	16	1
Jalakaseru	192	176	16	183	168	15	9	8	1
Dilavarpur	199	182	17	158	150	8	41	32	9
Kaseru	1564	1009	555	969	770	199	595	239	356
Sudeshpur	702	639	63	540	509	31	162	130	32
Teekari Bhavapur	1010	597	413	765	515	250	245	82	163
Baharpur	638	563	75	410	380	30	228	183	45
Badhiyana	279	237	42	249	223	26	30	14	16
Surajpur	842	618	224	761	562	199	81	56	25
Bhojpur Gyanpur	677	511	166	489	436	53	188	75	113
Chandaus	4266	3020	1246	1989	1586	403	2277	1434	843
Tajpur	1194	709	485	926	556	370	268	153	115
Bhagatpur	267	245	22	203	185	18	64	60	4
Bhogpur	553	434	119	288	272	16	265	162	103
Jahrana	1130	690	440	522	434	88	608	256	352
Ramnagar	429	272	157	391	245	146	38	27	11
Amritpur Bakhatpur	801	689	112	549	512	37	252	177	75
Aogipur	724	548	176	587	458	129	137	90	47
Kinhua	595	501	94	198	174	24	397	327	70
Bhagwanpur	130	90	40	64	58	6	66	32	34
Pahavati	712	531	181	540	489	51	172	42	130
Noorullapur	553	301	252	463	239	224	90	62	28
Madhaula	1717	1312	405	1169	1080	89	548	232	316
Maina Maujpur	1923	1714	209	1757	1591	166	166	123	43
Daurau Chandpur	1311	956	355	833	706	127	478	250	228
TOTAL	**85487**	**64894**	**20593**	**59371**	**50672**	**8699**	**26116**	**14222**	**11894**

(Source: As per Census 2011 – Uttar Pradesh)

Cultivators:

A person is classified as cultivator if he or she is engaged in cultivation of land own or from government or held from private persons or institutions for payment in money, kind or share. Cultivation work includes effective supervision or direction in cultivation. A person who has given out her/his land to another person or institution(s) for cultivation for money, kind or share of crop and who does not even supervise or direct cultivation process is not treated as cultivator. Similarly,

a person working on another person's land for wages in cash or kind or combination of both is not treated as cultivator.

Total cultivators in study area are **23344** out of which **92.17%** is male and **7.83%** is female

Household Worker:

Household industry is defined as an industry conducted by one or more members of the household at home or near area and only within the precincts of the house where the household lives in urban areas. The larger proportion of the household industry consists of the members of the household. The industry is not run on the scale of a register company or qualifies or has to be registered under the Indian Factories Act.

Household industry relates to production, processing, servicing, repairing or making and selling but not includes professions such as a pleader, Doctor, Musician, Dancer, Waterman, Astrologer, Dhobi, Barber, even if such professions, trade or services are run at home by members of the household. The total workers of this category are about **2097** (**2.45%** of total workers) in which **54.27%** are male and **45.73%** are female.

Non Workers:

The non-workers include those engaged in unpaid household duties, students, retired persons, dependents, beggars etc. The total number of non-workers population is **166957** which is **195.30%** of the total population. Out of which **41.488**% is male and **58.51**% is female.

Table- 54: Total Workers, Main Worker & Marginal Worker in the Study Area

Village	Main Cultivator Worker			House Hold Worker			Non Worker		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Abrahimpur junedpur urf mozpur	217	189	28	19	14	5	2972	1162	1810
Saudahavipur	981	877	104	75	15	60	3618	1651	1967
Maina Kalander Gadhi	150	145	5	8	4	4	971	451	520
Gaospur Taina	107	94	13	13	8	5	1500	595	905
Usmapur	272	263	9	11	8	3	1748	750	998
Arniya Mansoorpur	170	160	10	15	15	0	1808	666	1142
Arnia Mozpur	104	101	3	4	4	0	1158	436	722
Mohammadpur Navipur Urf Rampur	68	68	0	4	3	1	665	284	381
Sarawa Dadupur	189	186	3	3	0	3	2007	785	1222
Dostpur Dadupur	110	107	3	2	2	0	590	229	361
Asagarpur	183	180	3	3	3	0	1187	488	699
Keoli Kalan	194	191	3	16	14	2	1336	555	781

Kamalpur Mazra Nayser	162	159	3	11	6	5	1474	588	886
Balarau	146	119	27	7	7	0	1703	676	1027
Mirpur	66	57	9	23	18	5	2109	859	1250
Nagla Shekhu	258	246	12	24	14	10	1929	842	1087
Rohinda	136	133	3	17	5	12	2357	953	1404
Mansoorpur	186	165	21	16	15	1	1049	448	601
Shahtajpur Bhal	61	56	5	0	0	0	337	155	182
Ishanpur	111	110	1	6	6	0	550	210	340
Talibpur	56	50	6	1	1	0	630	240	390
Badha	269	253	16	9	9	0	1638	673	965
Kalakhuri	80	78	2	0	0	0	700	331	369
Sanda Faridpur	198	194	4	10	6	4	1881	830	1051
Lakhawti Mirzapur	152	145	7	21	13	8	2152	872	1280
Baghrai	331	286	45	5	2	3	2656	1148	1508
Bijlipur	112	96	16	0	0	0	413	159	254
Nyamtapur	58	57	1	0	0	0	663	272	391
Bahanpur	178	175	3	0	0	0	929	366	563
Badshahpur Pachgai	390	374	16	6	3	3	2025	968	1057
Hamirpur	109	107	2	0	0	0	647	254	393
Raipur Mauzampur	379	366	13	7	7	0	2284	872	1412
Devrala	567	523	44	13	5	8	2833	1173	1660
Shahbajpur Daulat	200	189	11	36	14	22	964	461	503
Palra	237	225	12	5	3	2	1297	509	788
Karaura	586	551	35	15	13	2	5232	2133	3099
Pharakana Gangagarhi	163	155	8	84	61	23	2707	1124	1583
Nagalia Takkar	159	154	5	18	12	6	1078	384	694
Hirapur Nagla Jagat	98	85	13	4	3	1	1395	586	809
Pilkhanari Urf Sabitgarh	170	152	18	49	20	29	1484	707	777
Baghoo	164	156	8	37	13	24	1185	501	684
Gangavali	322	305	17	3	2	1	1574	620	954
Jatola	403	389	14	13	12	1	841	462	379
Habibpur	170	144	26	0	0	0	443	213	230
Pala	154	149	5	1	1	0	1121	487	634
Hinsoti	164	157	7	1	1	0	824	326	498
Nagilia Udhaybhan	396	360	36	23	20	3	958	416	542
Gworoli Bhojgarhi	411	391	20	14	12	2	2180	818	1362
Khutena	170	162	8	1	1	0	600	225	375
Suratpur Kalan	111	104	7	1	1	0	707	281	426

Suratpur Khurd	46	45	1	0	0	0	315	127	188
Surjawali	283	265	18	6	6	0	1778	738	1040
Hisara	171	170	1	1	1	0	1050	396	654
Bhogapur	266	256	10	1	1	0	1056	384	672
Wazidpur	91	82	9	4	2	2	2292	912	1380
Jhamka	193	179	14	15	8	7	1718	688	1030
Agaura Amirpur	363	321	42	59	55	4	3861	1497	2364
Yusufpur Malgosa	166	157	9	6	6	0	2302	953	1349
Salimpur Pahargarhi	93	92	1	1	0	1	915	338	577
Achalpur	156	140	16	5	1	4	696	301	395
Baragaon	382	365	17	3	2	1	1619	656	963
Hazratpur Puthari	182	175	7	1	0	1	836	356	480
Mohammadpur Mazara Barhagaon	138	126	12	4	2	2	494	212	282
Rasoolpur	18	17	1	7	5	2	593	232	361
Dashahara Kherli	513	404	109	9	5	4	1345	575	770
Jahanpur	136	130	6	17	16	1	729	268	461
Naiphal Urf Uchangaon	224	210	14	1	1	0	1293	469	824
Rukanpur	95	89	6	9	8	1	1185	528	657
Sherpur Mazra Naysar	200	175	25	0	0	0	635	293	342
Badauli	203	192	11	4	4	0	1568	596	972
Naysar	215	153	62	149	66	83	1487	591	896
Thangora	329	311	18	12	8	4	1824	769	1055
Haidar Nagar Madkola	51	51	0	1	1	0	328	144	184
Nagala Kut	53	53	0	1	1	0	549	215	334
Danwar	62	62	0	0	0	0	635	220	415
Kaherola	114	111	3	0	0	0	1772	656	1116
Arnia Khurd	180	176	4	11	8	3	1454	642	812
Ghatal	203	195	8	24	22	2	1423	597	826
Nagar	183	171	12	19	12	7	896	394	502
Khuriyavali	265	247	18	64	16	48	1223	541	682
Sarsal	227	212	15	9	3	6	875	402	473
Muni	106	106	0	13	12	1	1431	581	850
Keoli Khurd	188	167	21	40	38	2	2761	1206	1555
Lakhanbara	511	470	41	27	17	10	2324	884	1440
Shahpur Pahasu	90	88	2	10	10	0	585	252	333
Rudri	117	105	12	3	2	1	821	342	479
Dhakpura	93	92	1	0	0	0	488	188	300
Ahmadpur Halpura	73	73	0	0	0	0	321	118	203

Raniyavali	64	62	2	1	1	0	419	174	245
Kamalpur Pahasu	56	53	3	9	9	0	911	389	522
Narayanpur	100	90	10	2	2	0	427	169	258
Majoopur	10	10	0	0	0	0	250	101	149
Balrampur	92	90	2	0	0	0	558	216	342
Jalakaseru	112	104	8	3	2	1	486	184	302
Dilavarpur	81	80	1	1	1	0	474	180	294
Kaseru	473	352	121	9	8	1	1977	885	1092
Sudeshpur	250	243	7	16	13	3	2260	935	1325
Teekari Bhavapur	220	180	40	81	33	48	1260	643	617
Baharpur	192	180	12	0	0	0	1463	589	874
Badhiyana	133	125	8	0	0	0	721	306	415
Surajpur	312	234	78	3	2	1	1389	584	805
Bhojpur Gyanpur	185	177	8	9	8	1	1254	513	741
Chandaus	356	312	44	254	174	80	8053	3522	4531
Tajpur	390	333	57	132	10	122	1598	773	825
Bhagatpur	88	81	7	6	3	3	649	237	412
Bhogpur	161	151	10	0	0	0	1291	582	709
Jahrana	361	303	58	10	6	4	1157	530	627
Ramnagar	108	105	3	34	10	24	725	339	386
Amritpur Bakhatpur	208	196	12	6	6	0	2042	816	1226
Aogipur	311	284	27	12	9	3	1318	561	757
Kinhua	61	53	8	9	9	0	1370	576	794
Bhagwanpur	32	30	2	3	2	1	192	85	107
Pahavati	124	122	2	0	0	0	1099	456	643
Noorullapur	89	83	6	237	52	185	337	195	142
Madhaula	476	454	22	32	19	13	3147	1262	1885
Maina Maujpur	238	226	12	28	18	10	5428	2186	3242
Daurau Chandpur	254	233	21	10	6	4	2116	825	1291
TOTAL	**23344**	**21517**	**1827**	**2097**	**1138**	**959**	**166957**	**69268**	**97689**

(Resource: As per Census Data 2011)

Agricultural Labourers:

Persons working on the land of others for wages or share in the yield have been treated as agricultural laborers. The total workers of this category are about 12640 in which 84.18% are male and 15.81% are female.

Other Workers:

All workers, i.e., those who have been engaged in some economic activity during the last one-year are other workers. The type of workers that come under this category is government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trading,

transport, banking, mining, construction, political or social work, priests, entertainment artist, etc. In effect, all workers except cultivators or agricultural laborers or household industry workers are other workers. The total workers of this category are about 21290 (24.90% of total workers) in which 81.62% are male and 18.38% are female.

Table- 55: Agricultural Worker & Others Worker in the Study Area

Village	Agricultural Laborer			Other Worker		
	Total	Male	Female	Total	Male	Female
Abrahimpur junedpur	54	47	7	738	674	64
Saudahavipur	167	158	9	471	255	216
Maina Kalander Gadhi	83	79	4	160	87	73
Gaospur Taina	78	77	1	473	401	72
Usmapur	2	2	0	197	180	17
Arniya Mansoorpur	110	105	5	233	219	14
Arnia Mozpur	34	23	11	282	268	14
Mohammadpur Navipur	40	37	3	61	56	5
Sarawa Dadupur	39	36	3	287	282	5
Dostpur Dadupur	0	0	0	9	8	1
Asagarpur	139	131	8	60	55	5
Keoli Kalan	125	121	4	86	76	10
Kamalpur Mazra Nayser	91	87	4	405	352	53
Balarau	26	23	3	265	246	19
Mirpur	162	97	65	527	487	40
Nagla Shekhu	30	24	6	525	411	114
Rohinda	190	81	109	562	512	50
Mansoorpur	43	38	5	268	191	77
Shahtajpur Bhal	42	39	3	60	58	2
Ishanpur	28	24	4	76	68	8
Talibpur	44	13	31	174	167	7
Badha	125	100	25	208	180	28
Kalakhuri	4	2	2	71	62	9
Sanda Faridpur	191	173	18	92	88	4
Lakhawti Mirzapur	201	168	33	284	263	21
Baghrai	164	96	68	467	416	51
Bijlipur	4	2	2	76	74	2
Nyamtapur	89	75	14	83	75	8
Bahanpur	119	114	5	101	92	9
Badshahpur Pachgai	111	108	3	234	214	20
Hamirpur	107	106	1	94	55	39
Raipur Mauzampur	328	306	22	110	100	10
Devrala	356	279	77	310	257	53
Shahbajpur Daulat	55	42	13	87	77	10
Palra	60	60	0	148	135	13
Karaura	183	161	22	368	325	43
Pharakana Gangagarhi	165	156	9	198	172	26
Nagalia Takkar	27	23	4	114	95	19

Hirapur Nagla Jagat	207	183	24	117	87	30
Pilkhanari Urf Sabitgarh	175	85	90	243	166	77
Baghoo	42	38	4	67	51	16
Gangavali	341	221	120	128	117	11
Jatola	61	54	7	76	71	5
Habibpur	9	4	5	45	39	6
Pala	233	208	25	31	25	6
Hinsoti	59	58	1	10	10	0
Nagilia Udhaybhan	54	42	12	114	92	22
Gworoli Bhojgarhi	136	112	24	253	226	27
Khutena	26	22	4	13	13	0
Suratpur Kalan	123	106	17	19	13	6
Suratpur Khurd	18	16	2	54	40	14
Surjawali	129	122	7	65	58	7
Hisara	7	7	0	14	13	1
Bhogapur	4	4	0	95	88	7
Wazidpur	31	19	12	460	420	40
Jhamka	119	52	67	270	199	71
Agaura Amirpur	282	266	16	509	483	26
Yusufpur Malgosa	157	152	5	248	233	15
Salimpur Pahargarhi	9	7	2	39	34	5
Achalpur	24	19	5	67	52	15
Baragaon	36	29	7	76	67	9
Hazratpur Puthari	78	66	12	126	70	56
Mohammadpur Mazara Barhagaon	26	20	6	60	50	10
Rasoolpur	173	145	28	31	30	1
Dashahara Kherli	13	12	1	69	58	11
Jahanpur	61	54	7	124	87	37
Naiphal Urf Uchangaon	17	15	2	91	68	23
Rukanpur	111	107	4	134	117	17
Sherpur Mazra Naysar	155	111	44	51	46	5
Badauli	249	235	14	127	117	10
Naysar	431	343	88	105	74	31
Thangora	254	198	56	133	118	15
Haidar Nagar Madkola	20	19	1	138	79	59
Nagala Kut	8	8	0	40	33	7
Danwar	41	41	0	24	18	6
Kaherola	66	64	2	157	151	6
Arnia Khurd	207	195	12	429	199	230
Ghatal	183	161	22	102	87	15
Nagar	131	77	54	144	67	77
Khuriyavali	111	88	23	189	102	87
Sarsal	119	113	6	284	75	209
Muni	17	14	3	51	43	8
Keoli Khurd	266	232	34	377	294	83
Lakhanbara	320	253	67	90	85	5
Shahpur Pahasu	84	81	3	17	13	4
Rudri	147	141	6	34	21	13

Dhakpura	92	91	1	21	18	3
Ahmadpur Halpura	34	33	1	35	27	8
Raniyavali	67	61	6	4	4	0
Kamalpur Pahasu	75	60	15	53	49	4
Narayanpur	30	24	6	40	31	9
Majoopur	2	2	0	1	1	0
Balrampur	91	84	7	2	2	0
Jalakaseru	58	55	3	10	7	3
Dilavarpur	6	6	0	70	63	7
Kaseru	273	232	41	214	178	36
Sudeshpur	103	94	9	171	159	12
Teekari Bhavapur	312	174	138	152	128	24
Baharpur	136	129	7	82	71	11
Badhiyana	23	18	5	93	80	13
Surajpur	132	111	21	314	215	99
Bhojpur Gyanpur	90	89	1	205	162	43
Chandaus	194	175	19	1185	925	260
Tajpur	110	94	16	294	119	175
Bhagatpur	64	58	6	45	43	2
Bhogpur	58	54	4	69	67	2
Jahrana	72	60	12	79	65	14
Ramnagar	30	29	1	219	101	118
Amritpur Bakhatpur	191	184	7	144	126	18
Aogipur	49	40	9	215	125	90
Kinhua	104	94	10	24	18	6
Bhagwanpur	9	9	0	20	17	3
Pahavati	313	276	37	103	91	12
Noorullapur	112	82	30	25	22	3
Madhaula	164	152	12	497	455	42
Maina Maujpur	177	165	12	1314	1182	132
Daurau Chandpur	83	74	9	486	393	93
Total	**12640**	**10641**	**1999**	**21290**	**17376**	**3914**
(Source: As per Census 2011 – Uttar Pradesh)						

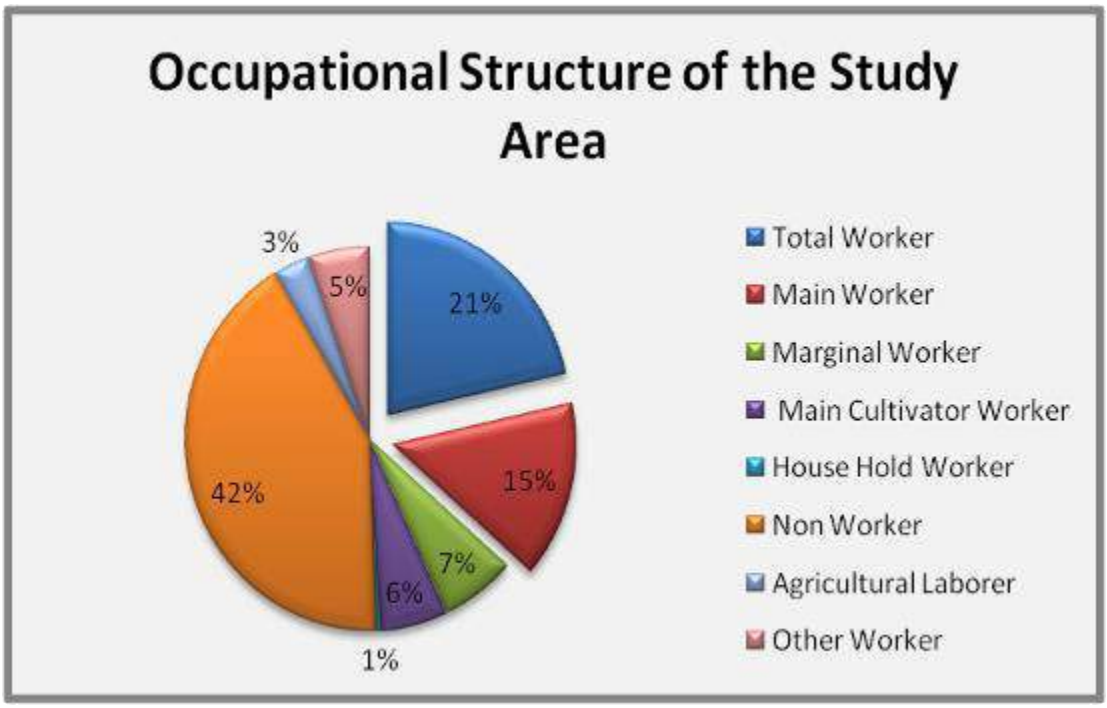

Figure 18: Occupational Structure of the Study Area

4.8.4 Infrastructure and Amenities

A review of infra structural facilities and amenities existing in the area has been done on the basis of the information given in census Data of 2011. Infra structural facilities and amenities like education, Health, Drinking Water, Electrification. And transport and communication network are though existent yet their number is not lucrative.

Medical Facilities:

According to the village Directory, Census Data of 2011, there are 14 Allopathic hospital, 274 Allopathic Dispensaries, 10 Child Welfare Centers, 61 Health Centers, 8 Nursing homes, 308 Private and Subsidized Medical Practitioners and 118. Community Health Workers in the Study area. The status of study area is given in **Table-56:**

Table- 56: Medical Facilities

MEDICAL FACILITIES	Number
Allopathic Hospital	14
Ayurvedic Hospital	15
Unani Hospital	4
Allopathic Dispensary	274
Ayurvedic Dispensary	123
Child Welfare Centers	10
Health Center	63
Primary Health Center	64

Primary Health Sub Center	344
Family Welfare Center	35
T.B. Clinic (with Dots Center)	1 +60 (One TB clinic & sixty Dots Center)
Nursing Home	8
Registered Private Medical Practitioners	308
Subsidized Medical Practitioners	30
Community Health Workers	120
Total Numbers	2053

(Source: Village Directory of Uttar Pradesh for 2011)

Educational Facilities:

In the 118 villages within the study area, there are 172 Primary/elementary school, 81 Middle schools, 25 Secondary School/ Senior Secondary School, 6 Colleges. There is however, no training school fund in the study area. The educational facilities within the study area are presented in **Table-57** & bar chart **Figure-20.**

Table- 57: Educational Facilities

EDUCATIONAL FACILITIES	NO. OF INSTITUTION
Primary / Elementary school	172
Middle school	81
Secondary School/ Senior Secondary School	25
College	6
Industrial School	3

(Source: Village Directory of Uttar Pradesh for 2011)

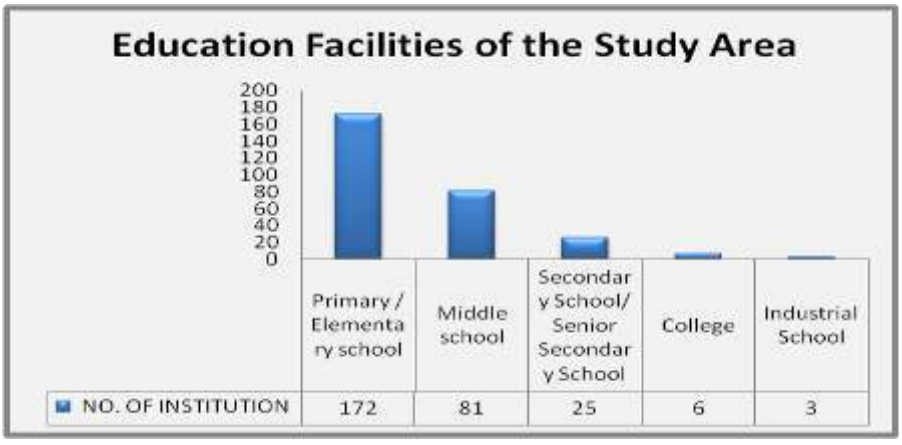

Figure 19: Education Facilities of the Study Area

Drinking Water:

As per the census Data of 2011, all the villages in the study area has one of other Source of drinking water. The major source of drinking water in the study area is hand pump (118 villages) followed by tube well 135, villages 118 villages have top water facility. During summer, the major source of

drinking water is hand pump 118 villages, 118 villages use top water and 118 village use well water. The numbers of wells, hand pumps, tube-wells and tap water supply in the study area are shown in **Table-58** & bar chart **Figure-21.**

Table- 58: Drinking Water

DRINKING WATER FACILITIES	NUMBER
Hand pump	207
Tube well	136
Tap water	126
Well Water	21
Canal Water	09
River Water	07
Tank	23
Lake	04

(Source: Village Directory of Uttar Pradesh for 2011)

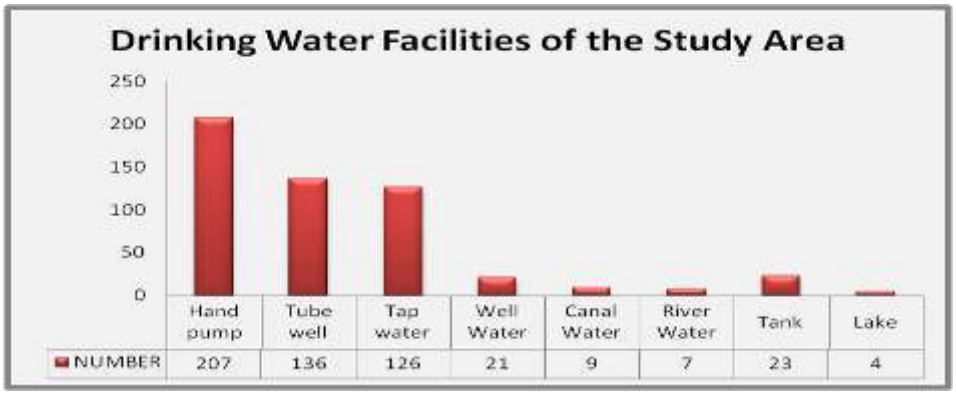

Figure 20: Drinking Water Facilities of the Study Area

Post and Telegraph:

Out of the 118 villages in the study area, 65 villages have post office facility. The post and telegraph facilities in the study area depicted in **Table-59** & pie chart **Figure-22.**

Table- 59: Post and Telegraph Facilities

FACILITIES	VILLAGES
Post Office	65
Telephone center	04
Telephone connection	183
Density of Telephone	50
PCO STD	38
PCO Rural	12

(Source: District state. & Eco. Office, Bulandshahar for 2011)

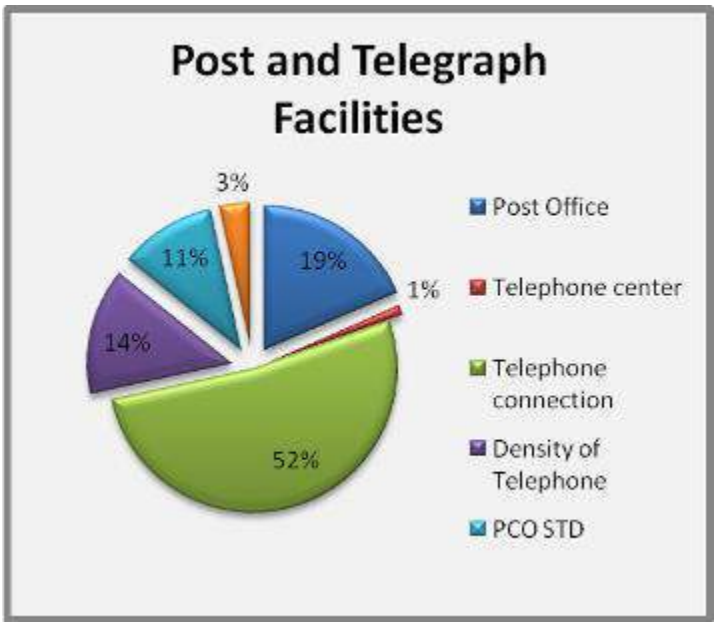

Figure 21: Post & Telegraph Facilities of the Study Area

Power Supply:

All the 118 villages in the study area have power supply. The number of villages having electricity for domestic, agriculture and for all purpose is shown in **Table-60.**

Table- 60: Power Supply Facilities

CATEGORIES	VILLAGES
For domestic Use	54%
For Agriculture Use	46%

Source: Village Directory of Uttar Pradesh for 2011)

News Paper and Magazine:

According to the census Data of 2011, out of the 118 villages in the study area, News Paper service is available in 98 villages and magazines are delivered in 80 villages.

Transport:

The mode of transport in the study area is mainly Private tempos / autos along with state transport / private bus services. As per census of 2011.out of the 118 villages in the study area have bus services. There are railway services available in 118 villages and 4 Villages have Navigable water way including River, Canal etc. There is no air field in the study area.

Banking and Credit Society Facility:

As per the census Data 2011, banking facility is available in 15 Commercial Bank, 8 Rural Bank, and 26

Co-Operative Bank and07 PLDB Branches in the study area.

Table- 61: Banking and Credit Society

BANKING COMMERCIAL	NUMBERS
Commercial Bank	15
Rural Bank	8
Co-Operative Bank	26
PLDB Branches	07

(Source: District State & Eco. Office, Bulandshahar for 2011)

CHAPTER-5: ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

5.1 GENERAL

Any developmental activity in its wake will bring about some impacts associated with its origin, which can be broadly classified as reversible, irreversible, long and short-term impacts. In this chapter, an endeavor has been made to identify various Environmental Impacts associated with the plant construction, operation and other activities wherein, there may be a chance of pollution. Based on the possible worst case emissions and waste generation from the proposed project and also taking into consideration the baseline environmental status at the proposed project site and surroundings, the environmental factors that are likely to be affected (Impacts) are assessed and identified.

Both beneficial (positive) and detrimental (negative) impacts are accounted for this purpose. The prediction of impacts helps in the preparation of a sound Environmental Management Plan which has to be executed during the on-going activities for the proposed project to minimize the adverse impacts on the environmental quality. In some case, mathematical models were used to quantitatively describe the cause-effect relationships between the sources of pollution and different components of environment. In case if the mathematical models are not available or it is not possible to identify/validate a model for particular situation, predictions would be made through available scientific knowledge.

The potential impacts on the environment from the proposed project are identified based on the nature of the various activities associated not only with the project implementation and operation, but also on the current status of the environmental quality at the project site.

The objectives of impact identification are as follows:-

- To ensure compliance with regulations
- To provide a comprehensive coverage of a full range of impacts, including social, economic and physical.
- To distinguish between positive and negative, large and small, long term and short term, reversible and irreversible impacts.
- To identify secondary, indirect and cumulative impacts as well as direct impacts.
- To consider impacts within the constraints of an area's carrying capacity.

As a first step, the entire power generation process has been divided into a number of smaller sub-activities for construction and operation phases. The probable impacts of each of these activities on various sectors of environment (such as air, water, soil, biotic, socio-economic environment etc.) have been identified and listed. **Table-62** lists various activities of construction phase and their probable impacts on various sectors of environment. The impacts are classified as long term impacts and short term impacts. Except for the impacts of the proposed land acquisition for ash disposal area, all other impacts are envisaged to be short term impacts, confined to construction

period only (42 months). Further, the magnitude of the impacts are envisaged to be low, as the site and infrastructural facilities are fully developed. Mitigation measures for significant impacts are discussed in Chapter-5.

Table- 62: Identification of Probable Impacts during Construction Phase

Activity	Sector	Probable Impacts
A) Long Term Impacts		
Land Acquisition	Land	• Direct Change in Land Use Pattern • Change in land use pattern in the vicinity
	Socio-economics	• Displacements and Loss of livelihood • Employment in construction activities
B) Short Term Impacts		
Site clearing and Leveling (cutting, stripping, excavation, earth movement, compaction)	Air	• Fugitive Dust Emissions • Noise/ Air Emissions from construction equipment &machinery
	Water	• Run-off from vegetation stripped area
	Land	• Loss of fertile top soil • Change in Drainage Pattern
	Ecology	• Loss of vegetation/ habitat • Topographic Transformations
Transportation and Storage of Construction Material/ Equipment	Air	• Noise and Air Emissions from Vehicles • Fugitive Dust Emissions due to Traffic Movement • Spillage and fugitive emissions of construction materials
	Water	• Spillage of construction material and flow into streams • Run-off from Storage Areas of Construction Material
	Soil	• Deposition of spilled construction material on soil
	Public Utilities	• Increased flow of traffic • Congestion on roads
Civil Construction Activities	Air	• Noise and Air Emissions from Construction Machinery • Fugitive Dust Emissions due to Movement of Traffic
	Water	• Run-off from Construction Areas containing Construction Material
Mech. & Elec. Erection Activities	Air	• Noise & Air Emissions from Machines/ activities
	Water	• Run-off from Erection Areas containing Oils, Paints
Influx of Labour & Construction of Temporary Houses	Socio-economics	• Stress on infrastructure • Stress on social relations
	Land	• Change in land use pattern of the area in labour colonies
	Water	• Sanitary effluents from labour colonies
Transportation and Disposal of Construction Debris	Air	• Noise and Air Emissions from Transport Vehicles • Fugitive Dust Emissions due to Movement of Traffic • Spillage and fugitive emissions of debris materials
	Water	• Spillage/ spread of debris material and flow into streams • Run-off from Disposal Areas

	Soil	• Spillage/ spread/ deposition of debris • Conversion of land into waste land

Table-63 lists various activities of operation and maintenance phase and their probable impacts on various sectors of environment. Most of these impacts are long term impacts. However, the significance of most of these impacts is envisaged to be low, as discussed in the following sections.

Table- 63: Identification of Probable Impacts during Operation Phase

Activity	Sector	Probable Impacts
Transportation of fuel (Coal& LDO)	Air	• Noise and Air Emissions from Vehicles • Fugitive Dust Emissions due to Traffic Movement • Spillage and fugitive emissions of coal/ oil
	Water	• Spillage of coal/ oil and flow into streams
	Public Utilities	• Increased flow of traffic • Congestion on roads
Unloading, Crushing and Storage of Crushed Coal/ Unloading and Storage of Oil	Air	• Noise and Air Emissions from Vehicles • Fugitive Dust Emissions from Coal Handling Areas
	Water	• Effluents for CHP/ Oil Storage Areas • Effluents from Dust Extraction/ Suppression systems • Run-off from Coal Stock Yard
Burning of Fuel	Air	• Stack emissions (PM, SO2, NOx& Hg)
Withdrawal of Water	Water	• Reduced availability to downstream users • Reduced flow in downstream direction/ change in regime
	Ecology	• Entrapment/ Impingement of Organisms
Water Treatment for various uses	Water	• Generation of Effluents and Sludges from Treatment Plant • Clarifier Sludge • Filter Backwash • DM Plant Regeneration Waste • Tube Settler Sludge
Power Cycle	Water	• Discharge of Blowdown
Equipment Cooling	Water/ Ecology	• Discharge of Hot Water containing chemicals/ biocide
Transportation, Storage & Use of Chemicals/ Cl2	Air/ Water	• Risks of Accidental spillage/ waste of chemicals
Transportation and Disposal of Ash	Land	• Land requirement for ash disposal
	Air	• Fugitive Emissions
Operation of Transformers and Switchyard	Water	• Generation of effluents containing oil
Maintenance (Cleaning, Over-haul, Oil Change, Lubrication etc.)	Water	• Generation of effluents containing oil/ chemicals

Domestic Use of Water in Plant and Township	Water	• Generation of sanitary effluents

5.2 LAND ENVIROMENT

Since Khurja Thermal Power Plant is proposed to be established on an area of 1200.843 acres at Khurja, it is expected to affect the land environment essentially. Impact assessment study on land environment can be done by considering land use pattern/ land cover, topography, drainage pattern and geological features of the project site as well as the study area.

5.2.1 Anticipated Impacts

During Construction Phase

- The establishment of Khurja STPP will lead to permanent change in the land use pattern of the project site from agricultural land to industrial land.
- The surrounding land-use is generally agricultural. Developmental activity may induce changes in land-use pattern of the adjoining areas because of the increased availability of infrastructural facilities, increase in commercial value/ potential of land *etc.*
- Land may get contaminated due to waste generated due to construction activities.

During Operational Phase

- There will be no change in land-use pattern after construction work is over; hence no impact is envisaged during operational phase.
- The land use pattern during construction phase which may be due to temporary construction and makeshift arrangements would be gradually stabilized by itself during operational phase. The construction camps and makeshift services would be either dismantled or realigned and will be made permanent.
- Other source of impact for land environment can be the disposal of solid wastes from the plant.

5.2.2 Mitigation Measures

During Construction Phase

- The impact shall be permanent and irreversible but it is unavoidable.
- All the raw materials required for construction will be stored in the designated area within the plant boundary.

During Operational Phase

- The area should be developed aesthetically so that there would not be any adverse impact during operational phase.
- As described above no solid waste will be disposed on outside land.

5.3 SOIL ENVIRONMENT

5.3.1 Anticipated Impacts

During Construction Phase

- Constructional activities like leveling, excavation and removal of existing vegetation would invariably disturb the soil of the area. The impacts on soil during construction phase shall be mainly due to loss of topsoil in the construction areas and contamination of the soils of surrounding area due to construction materials such as cement, sand, oils, etc. The disturbances would be more pronounced during the summer and monsoon seasons with strong rains.

During Operational Phase

- During operation of a thermal power project, the soil within the deposition zone of pollutants may undergo physico-chemical changes due to deposition of SPM and washout of gases (SO_2 and NOx) during the rains. However, the impacts of these are likely to be marginal.

5.3.2 Mitigation Measures

During Construction Phase

- The soil impact is temporary and shall be confined to the areas of construction only. Appropriate soil conservation measures associated with improved construction techniques would minimize such local impacts.

During Operational Phase

- Preliminary land surface investigations confirmed the site as being uncontaminated. However, soil sample testing is recommended for further geotechnical investigation.

5.4 WATER QUALITY

The water requirement of the project shall be fulfilled by the Upper Ganga Canal. No ground water shall be used for project activities. The liquid effluents generated shall be collected and treated/ recycled. An independent plant effluent drainage system would be constructed to ensure that plant effluents do not mix with storm water drainage. Therefore, it is anticipated that there will be no significant impact on the surface water or ground water hydrology and water use of the area. Rain water harvesting will be carried out in consultation with Central Ground Water Board.

5.4.1 Anticipated Impacts

During Construction Phase

- During the construction phase site preparation (leveling, excavations etc.) and erection of structures will have temporary effect on the water quality of receiving water body. Flow of loose materials (soil and construction material) into the drain, especially during monsoons will result in higher turbidity and suspended solids content.
- Domestic waste water generated from temporary toilets may cause contamination in water.

During Operational Phase

- The possible sources of waste water within the project site are:
    - CT (Cooling Tower) System blow down
    - Plant domestic
    - Oily waste from oil storage areas
    - Filter backwash from DM Plant
    - Floor washings etc.
- Water quality of local water bodies can be affected by the discharge of liquid effluent from the plant in river.
- Ground water pollution can take place due to leachate from ash pond.
- Ground water pollution can take place due to leachate from storage of toxic waste.
- Sewage water generated may cause contamination in water.

5.4.2 Mitigation Measures

During Construction Phase

- During site development necessary precautions will be taken, so that the runoff water from the site gets collected in sedimentation tank for treatment. The treated water will be reused for construction purposes and for sprinkling on roads to control the dust emissions.
- The domestic wastewater generated from temporary toilets used by the work force will be diverted to septic tank followed by soak pit. Therefore, impact on water quality due to proposed unit would be insignificant.

During Operational Phase

- The cooling tower shall be operated at > 5 COC to conserve water and to facilitate zero effluent discharge.
- CT blow down would be utilized for meeting the requirement of ash handling system, Coal handling system (dust suppression). Excess blow down, if any, will be treated in the RO system and recycled. There will be no waste water discharge from ash water pond or ash pond directly or any other effluent from the plant.

- The effluent treatment schemes for the project are presented in Chapter-9. While developing the water system for the project, utmost care has been taken to maximize the recycle/ reuse of effluents and to ensure zero effluent discharge. All major water systems of the plant (cooling water system, service water system, coal handling water system and bottom ash handling system) have re-circulatory systems.
- Ash pond bottom will be lined by compacting clay making an impervious layer. Though possibility of leaching of metals from ash water is very low, the impervious lining will eliminate possibility of ground water pollution.
- There is also no storage of toxic waste and thus there is also no scope of polluting ground water sources by seepage or leaching.
- Sanitary effluents from main plant and township will be treated in a sewage treatment plant.

5.5 AIR QUALITY

5.5.1 Construction Phase Impacts

- The potential source of air quality impact arising from the establishment/construction of the proposed project is fugitive dust generation. The dust, measurable as PM_{10} and $PM_{2.5}$ would be generated as a result of construction activities. The potential dust sources associated with the construction activities are loading and unloading of the materials, top soil removal, vehicular movement over unpaved roads, and wind erosion etc. The possible construction activities that contribute to the environmental impacts are broadly given below:
    - Dust Generation during leveling of earth
    - Dust generation due to the movement of vehicles on unpaved roads
    - Emission of pollutants from vehicular exhaust
    - Unloading of raw materials and removal of unwanted waste material from site
    - Accumulation of excavated earth material

5.5.2 Operation Phase Impacts

The proposed project is a coal based thermal power plant and the major source of pollution would be the emissions from the stack. The important air pollutants generated from the thermal power plant are Particulate Matter (PM), Sulfur Dioxide (SO2), and oxides of nitrogen (NOX). The major air pollutants generated from the proposed thermal power plant are given below:

1. Particulates matter in the flue gas
2. SO_2 and NO_X in the flue gas
3. Coal dust due to handling of coal
4. Fly ash dust particles from ash silos and ash disposal areas

Prediction of Impacts

Prediction of short term impacts on air quality due to stack emissions has been carried out using 'Aermode dispersion model' based on steady state Gaussian plume dispersion. The model is based on the ISC ST3 model, developed by United States Environment Protection Agency [USEPA]. In the present

case, the model simulations deal with three major pollutants viz., Sulphur Dioxide (SO_2), Oxides of Nitrogen (NO_x) and Particulate Matter (PM) emitted from the stack. To incorporate adequate safety margin in the estimates, the following have been assumed:

- Emission rate of particulate matter has been considered as emission rate of PM_{10},
- For SO_2 emission rate, it has been assumed that the Sulphur contained in the fuel is converted quantitatively into SO_2 and discharged into atmosphere.

Model Options Used For Computations

The options used for short-term computations are:

- The plume rise is estimated using Briggs formulae, but the final rise is always limited to the height of the mixing layer;
- Stack tip down-wash is not considered;
- Buoyancy Induced Dispersion is used to describe the increase in plume dispersion during the ascension phase;
- Calms processing routine is used by default;
- Wind profile exponents is used by default, 'Irwin';
- Flat terrain is used for computations;
- It is assumed that the pollutants do not undergo any physico-chemical transformation and that there is no pollutant removal by dry deposition;
- Washout by rain is not considered;

Input data for Prediction Modeling

The details of coal characteristics and stack emissions are presented in **Table-64** and **65** respectively. In the present computation, the worst coal emission details have been considered.

Table- 64: Expected Coal Characteristics for Khurja STPP (2x660 MW)

Coal Parameter	Unit	Values
Ash	%	<34
GCV	Kcal/kg	>4200
Moisture	%	13.0

Table-65: Details of Stack Emissions

Parameters	Units	Value
Stack Height	m	275
No. of flue per stack	no.	2
Number of stacks	no.	1 (twin flue)
Flue diameter	m	7.65
Flue gas velocity/flue	m/sec	21
Flue gas temperature/ flue	^oC	125
Volumetric flow rate/flue	Nm^3/sec/unit	660

Rate of coal burning	Tones/hr/unit	339
Sulphur in coal (maximum)	%wt./wt.	0.30
Estimated Emission Rates		
Sulphur dioxide @100 mg/m^3	g/sec/unit	66.0
Nitrogen oxides @100 mg/m^3	g/sec/unit	66.0
Particulate Matter @30 mg/m^3	g/sec/unit	19.8

Meteorological Data

The site specific hourly micro-meteorological data recorded near the project site for one full season, i.e., three months from 1st March to 31st May, 2016, using a micro processor based automatic weather monitoring system (WM251), have been used for dispersion modeling.

Determination of Atmospheric Stability

In the present study the Pasquill – Gifford Stability Classes have been determined using Solar Radiation/Delta-T (SRDT) method as discussed below:

Solar Radiation/Delta-T (SRDT) Method

The method is based on the Bowen et al. with modifications in the Turner's Method. In this method the structure of the Turner's are tried to retain as much as possible. However, the need of observations of cloud cover and ceiling is obviated. This method uses the surface layer wind speed measured at 10 m height in combination with the measurement of total solar radiation during day time and a low-level vertical temperature difference (∂T) i.e. 2 m and 10 m at the night time.

The relationship employed in the estimation method assumes that the steady state conditions. The night time is defined as a period from one hour before sunset to one hour after sunrise.

The key to Solar Radiation/Delta-T (SRDT) method for estimation of Pasquill-Gifford (P-G) stability categories are given in **Table-66** and **67** for day and night time respectively.

Table- 66: Key to Solar Radiation Delta-T (SRDT) Method for Estimating P-G Stability Categories during Day Time

Wind Speed (m/s)	Solar Radiation (W/m^3)			
	≥ 925	925 – 675	675 – 175	≤ 175
<2	A	A	B	D
2 – 3	A	B	C	D
3 – 5	B	B	C	D
5 – 6	C	C	D	D
≥ 6	C	D	D	D

Table- 67: Key to Solar Radiation Delta-T (SRDT) Method for Estimating P-G Stability Categories during Night Time

Wind Speed (m/s)	Vertical Temperature Gradient, ^{o}C	
	< 0	**≥ 0**
<2	E	F
2.0 – 2.5	D	E
≥ 2.5	D	D

Mixing Depth

The site-specific mixing depth data are not available. Therefore, in the present study the hourly daytime mixing depth has been derived on the basis of the data presented in a CPCB publication "Spatial Distribution of Hourly Mixing Depth over Indian Region". The pre-monsoon season data has been used. The hourly mixing depth considered for the dispersion modeling is presented in **Table-68.**

Table- 68: Mixing Depth Considered for Dispersion Modeling

Time Period (Hr)	Mixing Depth (m)
07:00	80
08:00	150
09:00	350
10:00	600
11:00	1010
12:00	1770
13:00	2250
14:00	2550
15:00	2700
16:00	2650
17:00	2450
18:00	2170
19:00	1450
20.00	1250
21.00	850
22.00	450
23.00	150
24.00	60

Presentation of Results

In the present study, simulations have been carried for the monitoring period using the hourly Triple Joint Frequency data viz., stability, wind speed, mixing height and temperature. Short-term simulations were carried to estimate concentrations at the receptors to obtain an optimum description of variations in concentrations over the site in 10 km radius covering 16 directions. The isopleths for the

highest 24-hr average incremental concentrations of SO_2, NO_x and PM_{10} are presented in **Figures-23, 24** and **25** respectively for winter season. The first 10 highest predicted 24-hourly incremental concentrations are presented in **Table-69**.

Table- 69: Predicted 24-Hr. average Maximum Incremental Concentrations

Rank	Peak Incremental Concentration (µg/m3)			Distance from source, m		Peak date
	SO_2	NO_x	PM_{10}	X-axis	Y-axis	
1st	5.06	5.06	1.51	1232.66	1691.96	24/3/2016
2nd	3.77	3.77	1.13	1755.72	1164.99	14/4/2016
3rd	2.19	2.19	0.65	2586.74	2860.06	21/4/2016
4th	2.01	2.01	0.60	3859.94	4377.40	27/4/2016
5th	1.98	1.98	0.59	3859.94	4377.40	28/7/2016
6th	1.83	1.83	0.54	3859.94	4377.40	30/4/2016
7th	1.77	1.77	0.53	3859.94	4377.40	3/5/2016
8th	1.72	1.72	0.51	3859.94	4377.40	19/5/2016
9th	1.63	1.63	0.49	2586.74	2860.06	22/5/2016
10th	1.37	1.37	0.41	3859.94	4377.40	25/5/2016

Resultant Concentrations after Implementation of the Project

The maximum incremental GLCs due to the proposed project for SPM, SO_2 and NOx are superimposed on the maximum baseline SPM, SO_2 and NOx concentrations recorded during the study period to arrive at the likely resultant concentrations after implementation of the proposed power plant. The cumulative concentrations (baseline + incremental) after implementation of the project are tabulated below in **Table-70**.

Table- 70: Resultant Maximum GLC during Operation Phase of Khurja STPP

Pollutant	Maximum AAQ Concentrations Recorded During the Study (µg/m³)	Incremental Concentration	Resultant Concentration (µg/m³)	National Ambient Air Quality Standards (µg/m³)
SO_2	19	5.06	24.06	80
NOx	35	5.06	40.06	80
PM_{10}	92	1.51	93.51	100

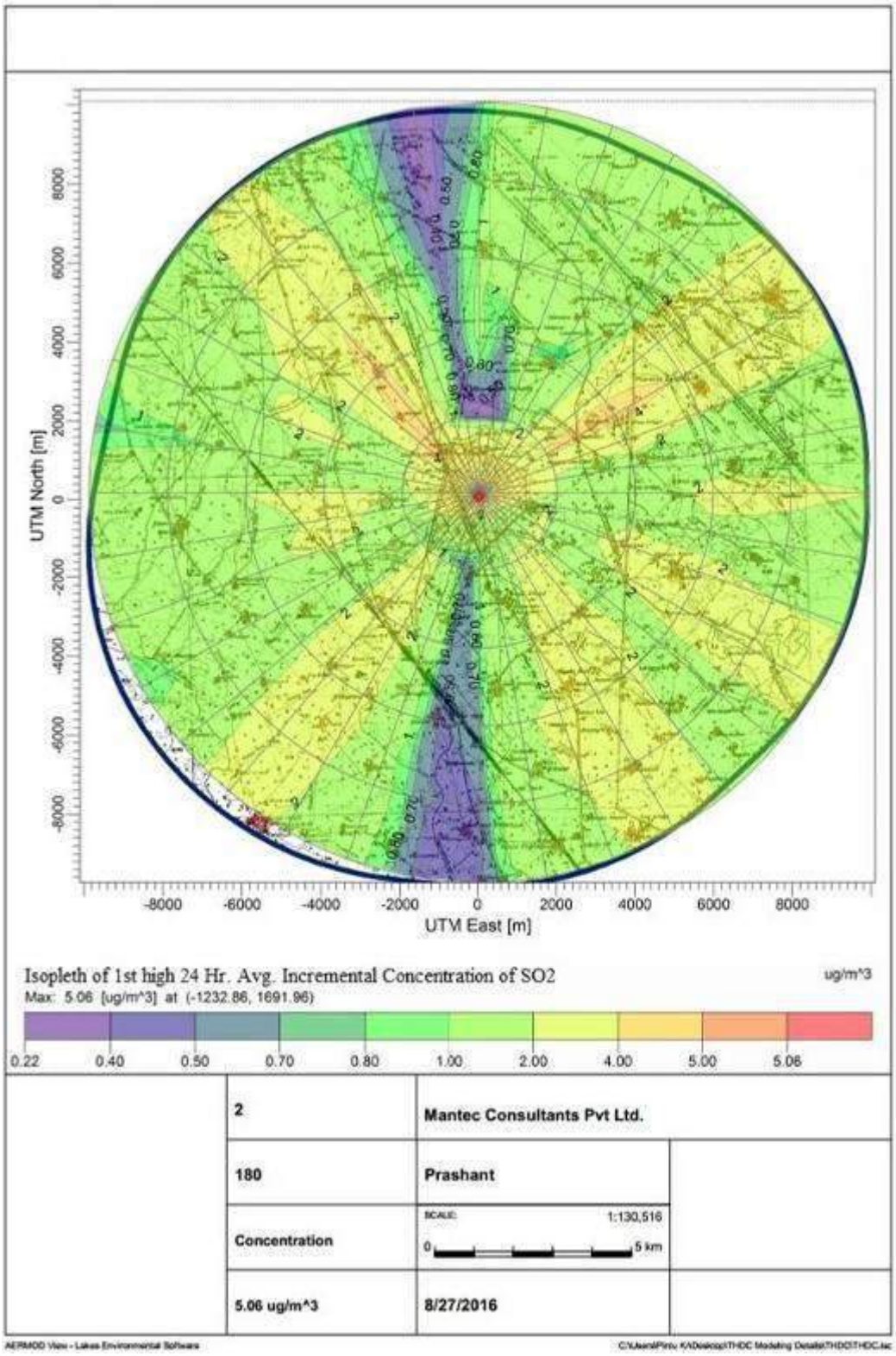

Figure 22: Isopleths of Maximum 24-hr average Incremental SO_2 Concentrations

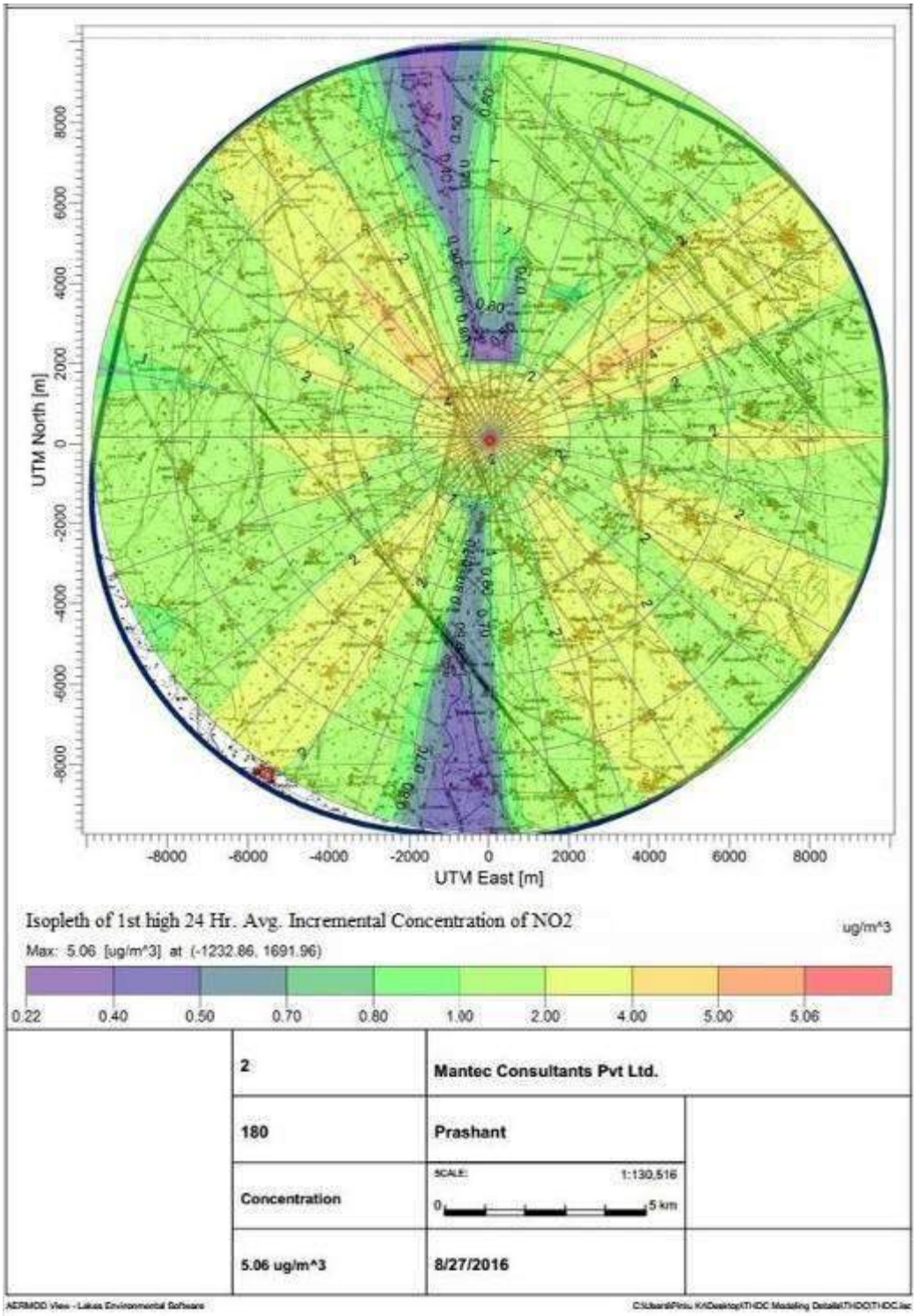

Figure 23: Isopleths of Maximum 24-hr average Incremental NO_2 Concentrations

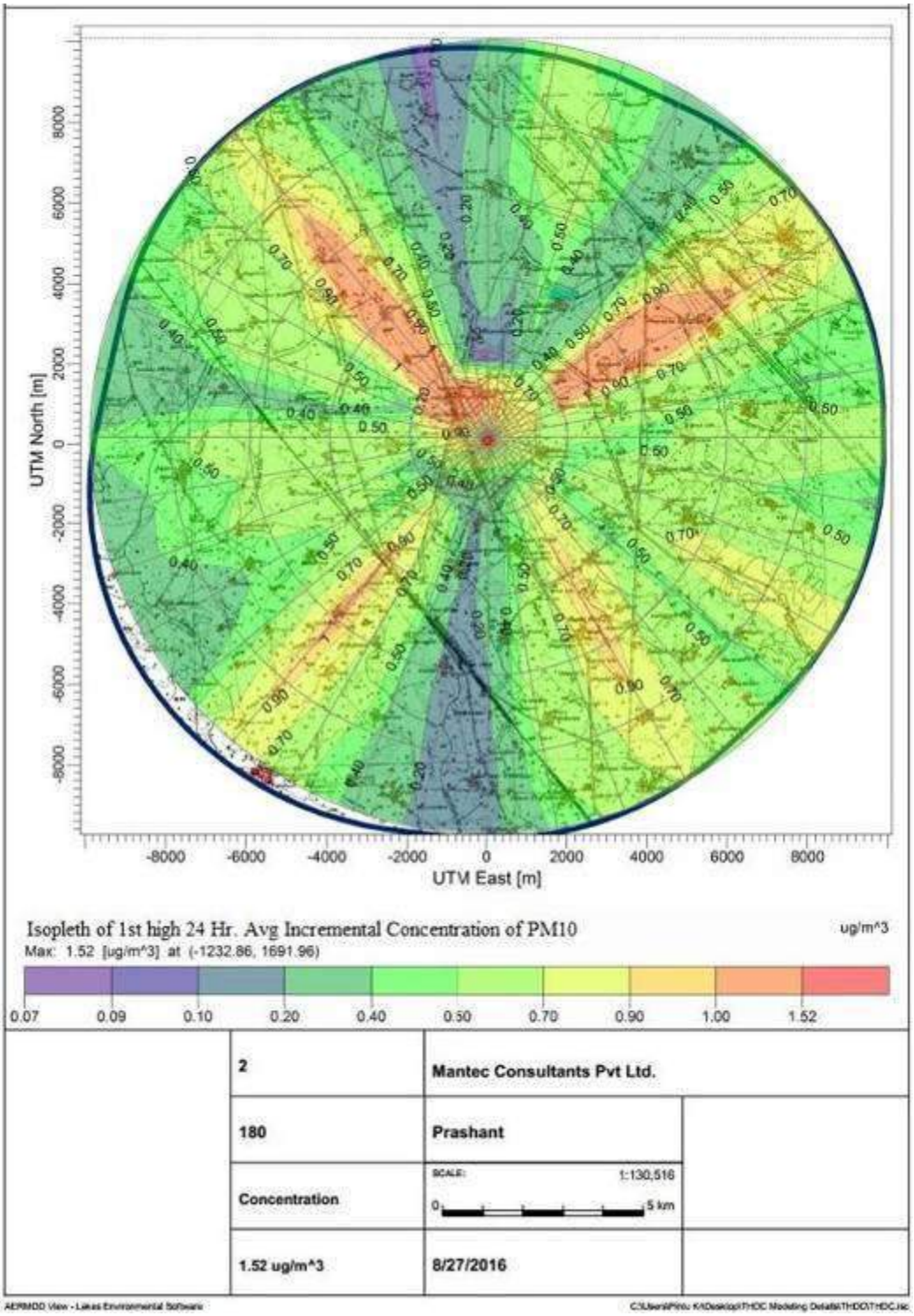

Figure 24: Isopleths of Maximum 24-hr average Incremental PM_{10} Concentrations

5.5.3 Mitigation Measures

During Construction Phase

- Regular water sprinkling will be done to avoid the dust entering into the atmosphere. During windy days, the frequency of water sprinkling will be increased.
- Temporary tin sheets of sufficient height will be erected around the project site as a barrier for dust control.
- The excavated material shall be reused within the project boundary and the movement of cut and fill material will be limited.
- Plantation of trees around the project boundary will be maintained.
- All the vehicles carrying raw materials will be covered with tarpaulin/plastic sheet.
- Vehicles and machineries will be regularly maintained to conform to the emission standards stipulated under Environment (Protection), Rules 1986.

During Operational Phase

- To control the particulate matter in the flue gas, an electrostatic precipitator with an efficiency of 99.89% is proposed. The ESP ensures that the particulate matter concentration in out going flue gas is maintained below 30 mg/Nm^3.
- For control of SO_2 and NOx within specified limits of 100 mg/Nm^3, Flue gas Desulphurization (FGD) and Selective catalytic Reduction (SCR) systems, in combination with LNB, are proposed.
- The treated flue gases will be discharged through a stack of 275 m height, for better dispersion.
- Coal Handling Area:
    - Dust suppression/extraction facilities will be provided to mitigate the dust generated at coal conveying area, transfer points and coal stockyard.
    - Enclosed galleries will be provided to arrest the coal dust generated at all the conveyor points.
    - The coal dust from coal transfer points would be restricted to 5 mg/Nm^3.
- Ash Handling Area
    - In order to restrict the fly ash dust particles from the silos, vent filters will be installed on top of intermediate silos & main fly ash silos.
    - 100% Dry fly ash extraction, storage and disposal facilities are proposed for utilization of 100% fly ash in dry form. Closed trucks & containers would be allowed to avoid fugitive emissions.
    - To reduce the dust nuisance while loading the ash into the open trucks from fly ash silos, the fly ash would be conditioned with water spray.

5.6 NOISE ENVIRONMENT

5.6.1 Anticipated Impacts

During Construction Phase

- The major activities, which produce periodic noise, during construction phase, are as follows:
    - Foundation works
    - Fabrication of structures
    - Plant erection
    - Operation of construction equipment
    - Movement of vehicles

During Operational Phase

- Any industrial complex, in general, consists of several sources of noise pollution. The different sources of noise pollution are mentioned below:
    - Crusher unit
    - Induced draft & Forced draft fans
    - Boiler feed pumps
    - Turbine
    - Generator
    - Cooling Tower
    - Frequent vehicular movement

Prediction of Impacts

The major noise generating sources during the construction phase are vehicular traffic, construction equipment like, dozer, scrapers, concrete mixers, cranes, generators, pumps, compressors, rock drills, pneumatic tools, vibrators etc. The operation of these equipments will generate noise ranging between 75 – 90 dB (A).

The predicted noise level due to operation of such equipment at a distance of 500 m from the source is 42.4 dB (A).

Impact on Noise Level

Any industrial complex in general consists of several sources of noise in clusters or single. This clusters/single source may be housed in buildings of different dimensions made of different materials or installed in open or under sheds. The material of construction implies different attenuation co-efficient. In order to predict ambient noise levels due to the proposed power plant the noise modeling has been done. For computing the noise levels at various distances with respect to the plant site, noise levels are predicted by a user friendly model the details of which are elaborated below.

Model for Sound Wave Propagation during Operation

For an approximate estimation of dispersion of noise in the ambient air from the point source, a standard mathematical model for sound wave propagation is used. The noise generated by

equipment decrease with increase distance from the source due to wave divergence. An additional decrease in sound pressure level with distance from the source is expected due to atmospheric effect or its interaction with objects in the transmission path.

For hemispherical sound wave propagation through homogenous loss free medium, one can estimate noise levels at various locations, due to different sources using model based on first principles, as per the following equation:

$$L_{p2} = L_{p1} - 20\text{Log}\,(r_2 / r_1) - A_E - A_M \quad \text{.....} \quad (1)$$

Where,

Sound L_{p2} and L_{p1} are the Sound Pressure Levels (SPL) at points located at a distances of r_2 and r_1 from the source. A_E& A_M are attenuations due to Environmental conditions (E) and Machine correction (M). The combined effect of all the sources can be determined at various locations by the following equation.

$$L_{p(total)} = 10\text{Log}\,(10^{(Pa)/10} + 10^{(Pb)/10} + 10^{(Pc)/10} + \text{. . ……..}) \text{ .....} \quad (2)$$

Where L_{pa}, L_{pb}, L_{pc} are noise pressure levels at a point due to different sources.

Machine Correction (A_M)

The background noise level, when the machine is not in operation should be determined at one or more locations while conducting the test. The readings at each location, with the machine in operation should exceed the background levels by at least 10 dB in each pressure level of interest. If the difference is less than 10 dB, correction should be applied. If the difference between the measured sound and the background sound in any sound pressure level is less than 3 dB a valid measurement of the machine cannot be made. In order to reduce background noise to acceptable levels, it may be necessary to acoustically treat the equipment.

Environmental Correction (A_E)

The equivalent sound pressure level can be calculated from the measured sound pressure level ($L_{eq\ measured}$) averaged over the measurement surface area 'S' and from corrections K_1 and K_2 and is given by ;

$$(L_{eq\ calculated}) = (L_{eq\ measured}) - K_1 - K_2 \quad \text{.....} \quad (3)$$

Where,

K_1 = Factor for the background noise correction. The correction was not applied in this modeling exercise, as it was not possible to measure the background noise levels by putting off machines. Hence it was considered as zero.

K_2 = Environmental correction

Model Details

Based on the above equation user friendly model has been developed. The details of the model are as follows:

- Maximum number of sources is limited to 200;
- Predicted Noise levels at any distance specified from the source;
- Model is designed to take topography or flat terrain;
- Co-ordinates of the sources in meters;
- Maximum and Minimum levels are calculated by the model;
- Output of the model in the form of isopleths; and
- Environmental attenuation factors and machine corrections have not been incorporated in the model but corrections are made for the measured L_{eq} levels.

Input for the model

The sources where noise level monitored inside the building are Turbine, I. D. Fan, P. A. Fan, F. D. Fan, air compressors boiler feed pumps, cooling water pumps etc. The designed noise level for the various equipments for STPP, are given in **Table-71** the values mentioned are at 1 m distance from the source.

Table- 71: Likely Noise Levels at Khurja STPP (2x660 MW)

S. No.	SOURCE	NOISE LEVEL Leq in dB(A)
1	Turbine Hall	90
2	Boiler Feed Pump	90
3	Circulating Water Pump	90
4	Primary Air Fan	90
5	Force Draft Fan	90
6	Instrument Air Compressor	90
7	Diesel Generator	85
8	Induced Air Fan	85

Presentation of Results

Ambient Noise Levels

The ambient noise levels have been predicted with proposed value for Khurja STPP (2x660 MW). The ambient noise level recorded during field studied in the nearby area located at a distance of 500 m from the site ranges between 41.8 to 59.6dB (A) during daytime and 32.6 to 50.2 dB (A) during night time. The predicted noise levels at the boundary of the plant in different directions are given in **Table-72**. Hence, there will not be any significant impact on the village due to masking effect.

Table- 72: Predicted Noise Levels

S. No.	Distance (m)	Noise level dB (A)
1	100	50.5
2	200	47.3
3	300	44.4
4	400	42.1
5	500	42.4
6	750	38.0
7	1000	37.4
8	1500	35.3
9	2000	33.1

Industrial Noise Standards

The OSHA has recommended permissible noise exposure limit for Industrial worker which is based on 90 dB(A) for 8 hours exposure a day with 5 dB (A) trading rates. The limits are given in **Table-73**.

Table- 73: Permissible Exposure Noise Limits

Total time of exposure per day in hours	Sound pressure level in dB(A)
8	90
6	92
4	95
3	97
2	100
1	105
½	110
¼	115

Work Zone Noise Levels

The protective measures need to be provided to the operators and workers working near the high noise generating machinery. As per Occupational Safety and Health Administration (OSHA) Standards, the maximum allowable noise level for the workers is 90 dB (A) for 8 hours exposure a day. Therefore, adequate protective measures in the form of ear muffs/ear plugs to the workers working in high noise areas need to be provided. In addition reduction in noise levels in the high noise machinery areas could be achieved by adoption of suitable preventive measures such as use of enclosures with suitable absorption material, etc. Further, in addition to the in plant noise control measures, all the open areas within the plant premises and all along the plant boundary will be provided with adequate green belt to diffuse the noise.

5.6.2 Mitigation Measures

During Construction Phase

The impact on noise environment can be made insignificant by adopting the following mitigative measures:

- Noise generating equipment will be used during day time.
- Where ever possible the noise generating equipment will be kept away from the human habitations.
- All the vehicles entering into the project will be informed to maintain speed limits, and not to blow horns unless it is required.
- The workers involved in operating major noise generating equipments will be provided with personal protective equipment like ear plugs/ear muffs etc.

During Operational Phase

The noise due to the operation of the proposed project will have only marginal impact on the baseline noise levels by adopting the following noise control Measures:

- Properly designed plant and machinery (i.e. by providing inbuilt mechanisms like silencers, mufflers, and enclosures for noise generating parts) and shock absorbing pads in the foundation of vibrating equipment will be provided.
- In the high noise intensity working areas/zones ear muffs or ear plugs or any other suitable personal protective equipment would be provided to the workmen.
- Provision of isolation for major noise generating equipments.
- Regular noise level monitoring would be carried out for taking corrective action, wherever required.
- The steam turbine generator would be housed in a closed building, which would considerably reduce the transmission of noise from the generator to outside environment. The inlet air and exhaust gas streams would be provided with silencers for noise reduction.
- Necessary plantation all along the boundary and with total area not less than 33% would be developed as the greenbelt, so that the noise emissions at the plant boundary to be within the stipulated standards of CPCB and the OSHA standards.

5.7 BIOLOGICAL ENVIRONMENT

5.7.1 Anticipated Impacts

During Construction Phase

On Terrestrial Ecology

- The site for the (2x660 MW) Khurja STPP and its components are neither located within any sensitive areas nor too close to them, it is unlikely to have any significant impact on any terrestrial flora, fauna and eco-systems. The impact of the construction activities would

remain primarily confined to the construction site. Earth enabling work involving excavation and filling up operations result in fugitive dust emission. Deposition of fugitive dust on pubescent leaves of nearby vegetation may lead to temporary reduction of photosynthesis.

On Aquatic Ecology

- The runoff from construction area may lead to a short-term increase in suspended solids and decrease in dissolved oxygen near the discharge point in receiving water body. This may lead to a temporary decrease in the photosynthetic activity of phytoplanktons, rise in anaerobic conditions, habitat destruction and food chain modification.

During Operational Phase

On Terrestrial Ecology

- Particulates and Sulphur dioxide are major air pollutants of a coal based thermal power plant. The impact on the terrestrial ecosystem due to operation of the thermal power project may occur from deposition and absorption of air pollutants on flora and soil surfaces.
- Deposition of fly ash may interrupt gaseous exchange through leaves, thereby affecting plant growth However, the impact of the project is envisaged to be negligible, as the expected resultant ground level concentration of PM_{10} (93.5 µg/m^3), SO_2 (24.1 µg/m^3) and NOx (40.1 µg/m^3) after considering emissions from the project are well within the Indian Standards for Ambient Air Quality. Since most of the tree species occurring in the area are deciduous, they have high Air Pollution Tolerance Index (APTI), and therefore impact of SO_2 will not be significant.

On Aquatic Ecology

- The water system of the project has been designed with maximum recycle/ reuse of water, and a very small quantity shall be drawn as a make-up to the system. Therefore, there is no likelihood of entrapment or impingement of phytoplankton/ zooplankton in the water intake system. Further, as the project will have a close cycle cooling system with cooling towers and clarified water as make-up to the cooling system, there will be no thermal impact on aquatic ecosystem due to operation of the project.

5.7.2 Mitigation Measures

During Construction Phase

On Terrestrial Ecology

Such impacts would, however, be confined mostly to the initial periods of the construction phase and would be minimized through adoption of control measures such as paving and surface treatment, water sprinkling and plantation schemes. The impact would be restricted to surrounding flora within the plant boundary and on the immediate agricultural field. As the land is mostly barren with patches of grass and shrubs uprooting of trees will not be required.

On Aquatic Ecology

- However, for major part of the year during construction phase, no detectable impact is expected because water quality will not change significantly.

During Operational Phase

On Terrestrial Ecology

- Green belt will be developed towards the eastern and northern side of the project. In addition, extensive afforestation and plantation activities shall be undertaken in all available spaces within the main plant and township areas. Further, avenue plantation will also be undertaken along roadside in plant and township areas.

On Aquatic Ecology

- A small quantity of treated effluents conforming to the regulatory standards shall only be discharged into natural water course. Therefore, there will be no significant impact on the water quality due to discharge of effluents. Hence, it can be concluded that there would be no impact on aquatic life of the river.

5.8 SOLID WASTE

5.8.1 Anticipated Impacts

During Construction Phase

The solid waste, during the construction stage, will be generated due to the usage of different type of raw materials for the construction of the proposed project. The raw materials used for construction purpose, the packing material used for packing of various items used in creation of power plant infrastructure, and other procedures carried out during construction phase generates solid waste.

During Operational Phase

- Fly ash and bottom ash will be main solid waste being generated from the plant.

5.8.2 Mitigation Measures

During Construction Phase

The solid waste generated during construction phase does not create any chemical or biochemical pollution. Hence, maximum effort would be made to reuse and recycle the generated solid waste. Most of the solid waste material can be used for filling/leveling of low-lying areas. Majority of the waste materials produced are durable and have a high potential for reuse.
All attempts should be made to stick to the following measures.

- All construction waste shall be stored within the site itself. A proper screen will be provided so that the waste does not get scattered.
- Attempts will be made to keep the waste segregated into different heaps as far as possible so that further gradation and reuse is facilitated.
- Materials, which would be reused for purpose of construction, leveling, making roads/pavement will also be kept in separate heaps from those which are to be sold or land filled.

The use of the construction material basically depends on their separation and conditions of the separated material. A majority of these materials are durable and therefore, have a high potential for reuse.

During Operational Phase

Accumulation of ash into ash pond may cause air pollution and risk due to breach of ash pond dyke. In order to avoid these problems, 100% dry fly ash extraction, collection, storage and disposal facilities are proposed to supply ash to the ash consumers such as cement industries, brick units, asbestos industries, Ready Mix Concrete (RMC) units etc. Similarly hydro bins are proposed for storage and supply of bottom ash to the brick industries, filling low lying areas etc. 100% ash utilization plan has been prepared and given in Chapter-10 of this Report.

5.9 ENVIRONMENTAL IMPACT EVALUATION (L2)

Methodology (L3)

The improved "Modified Matrix" method adopted hereunder involves the establishment of cause-effect relationship. It also involves assignment of "Parameter Importance Value" (PIV) against each environmental impact parameter. These values are determined by subjective judgement considering the relative importance or significance of individual parameter. After deciding PIV, these values are distributed among all the cause-effect relationships established between different project activities and the respective affected environmental parameters by means of indices which are called "Relative Parameter Importance Indices" (RPII) such that the sum of all the indices is equal to unity. The value of RPII is decided based on the relative importance of cause-effect relationship.

Another index which is to be determined for each cause effect relationship is called "Environmental Impact Index" (EII). The scale for EII varies from zero to one. The value one is assigned to an impact of highest order and zero is assigned to an impact of negligible magnitude. For adverse impacts, EII carries a negative sign and for beneficial impacts, it carries positive sign.

Table- 74: Determination of EII

Sr. No.	IMPACT MAGNITUDE (in %)	EII
1.	NO CHANGE	0.00
2.	0-4.9% CHANGE	0.05
3.	5-14.9% CHANGE	0.10
4.	15-24.9% CHANGE	0.20
5.	25-34.9% CHANGE	0.30
6.	35-44.9% CHANGE	0.40
7.	45-54.9% CHANGE	0.50
8.	55-64.9% CHANGE	0.60
9.	65-74.9% CHANGE	0.70
10.	74-84.9% CHANGE	0.80
11.	85-94.9% CHANGE	0.90
12.	> 95 % CHANGE	1.00

Parameter Importance Value for Environmental Components

The environmental components listed in the earlier section are assigned with PIV so as to convert the environmental impacts into commensurate units, which could be aggregated easily to get the total score of environmental impacts. The parameter importance values are assigned by marking and pair-wise comparison procedure. This procedure involves preparation of a table containing number of columns corresponding to the range of value, which can be assigned a "score of importance" against each impact area. The score of importance is any integer ranging from one to six. The most affected parameter carries a score of six and the least affected parameter carries a score of one.

This score is made considering the intensity and nature of impact over the impact area identified. The impact areas considered along with their ranking are tabulated in **Table-74**. The weightage for each impact area is calculated by dividing the ranking integer by sum of rankings. The parameter importance value is calculated by multiplying the weightage by 1000, so that the sum total of all parameter importance value is 1000. The final values computed by this procedure are also tabulated in **Table-75.**

Table- 75: Determination of Parameter Importance Value

Sl. No	Impact area	Ranking						Total	Weight-age	PIV
		1	2	3	4	5	6			
1.	Surface water resources	-	-	-	-	*	-	5	0.091	90.91
2.	Ground water resources	-	*	-	-	-	-	2	0.036	36.36
3.	Air quality	-	-	-	-	*	-	5	0.091	90.91
4.	Water quality	-	-	*	-	-	-	3	0.055	54.55
5.	Noise levels	-	-	-	*	-	-	4	0.073	72.73
6.	Health	-	-	-	*	-	-	4	0.073	72.73
7.	Public utilities	-	-	*	-	-	-	3	0.055	54.55
8.	Economic aspects	-	-	-	-	*	-	5	0.091	90.91
9.	Land use & soil characteristics	-	-	*	-	-	-	3	0.055	54.55
10.	Flora	-	-	-	*	-	-	4	0.073	72.73
11.	Wild life	-	-	-	*	-	-	4	0.073	72.73
12.	Human settlement	-	-	-	*	-	-	4	0.073	72.73
13.	CSR schemes	-	-	-	-	*	-	5	0.091	90.91
14.	Rehabilitation	-	-	-	*	-	-	4	0.073	72.73
Total								**55**	**1.000**	**1000.00**

Relative parameter importance index (RPII)

The RPII indicates the importance of interaction between the action and environmental components. It is assigned any value between 0 and 1 so that the sum of all the values of RPII under each impact area is equal to 1. The importance of an interaction is related to the significance or assessment of the consequences, of the anticipated interaction. Assignment of RPII to an interaction is based on the subjective judgement. While deciding RPII, first the RPII values are distributed among adverse and beneficial impacts depending upon their significance. The RPII values so distributed are once again distributed among the respective interactions depending upon their individual significance. The most important interaction under a particular impact area is given the maximum RPII, whereas the lowest important one is given minimum RPII. As the significance increases the RPII also increases.

Environmental Impact Index (EII)

The index represents the magnitude of an impact due to the interaction established between an environmental component and a project activity. This impact magnitude is represented by a numerical value which is determined. The EII are determined for each impact area project activity interaction.

Weighted environmental impact index (WEII)

The Weighted Environmental Impact Index (WEII) for individual cause effect interaction is computed by multiplying RPII with EII. Now, the WEII for each impact area is computed by adding the WEII values for all cause-effect interactions under that impact area.

Impact Unit

The impacts of different impact areas, in commensurate units, are computed by multiplying the WEII values with PIVs for respective impact areas.

Potential Impact identification using Environmental Impact Matrix (L3)

The impact is calculated by multiplying the sum of all WEII's against each environmental component by its corresponding PIV. Total impact score is calculated by adding all individual impact scores. The evaluated environmental impact is presented in **Table-76**.

Table- 76: Evaluated Environmental Impact

Impact area	WEII (RPII X EII)	PIV	Impact unit (WEII X PIV)
Surface water resources	-0.660	90.91	-60.00
Ground water resources	0.000	36.36	0.00
Air quality	-0.450	90.91	-40.91
Water quality	0.000	54.55	0.00
Noise levels	-0.115	72.73	-8.36
Health	-0.105	72.73	-7.64
Public utilities	0.100	54.55	5.46
Economic aspects	0.110	90.91	10.00
Land use & soil characteristics	-0.450	54.55	-24.55
Flora	0.200	72.73	14.55
Wild life	0.080	72.73	5.82
Human settlement	-0.650	72.73	-47.27
CSR schemes	0.200	90.91	18.18
Rehabilitation	-0.170	72.73	-19.64
Total		1000.00	-154.37

The total impact score is assessed by using following relative scale:

Up to -200 : No appreciable impact on environment

-200 to -400	:	Appreciable but reversible impact and appropriate control measures are important.
-400 to -600	:	Significant impact mostly reversible after a short period and mitigation measures crucial.
-600 to -800	:	Major impact which is mostly irreversible
-800 to -1000	:	Permanent irreversible impact

The total impact score is -154.37, which indicate “no appreciable impact on environment". The negative impacts are thus negligible. This is mainly because the plant is designed and planned incorporating all environmental concerns. The pollution is controlled at source. However, the negative effect, when accumulated would tend to become significant, if the proposed mitigation measures are not implemented.

CHAPTER-6: ANALYSIS OF ALTERNATIVES

6.1 GENERAL

Consideration of alternatives to a project proposal is a requirement of EIA process. During the scoping process, alternatives to a proposal can be considered or refined, either directly or by reference to the key issues identified. A comparison of alternatives help to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendly and cost effective options.

6.2 ALTERNATIVE FOR SITE SELECTION

The proposed site for Khurja Super Thermal Power Station 2 X 660MW was found suitable by THDC based on the following considerations:

- Availability of suitable & adequate land
- Availability of reliable source of water
- Availability of road and railway access
- Environmental aspects
- Availability of infrastructural facilities

Following points of consideration provides justification for the site selection of the proposed project.

- ✓ The site is generally in conformity to the siting criteria of MoEF. No wildlife sanctuaries/national park or any ecological sensitive area of national importance exists within 7 km radius of proposed site.
- ✓ No archaeological monument and defense installations exist within 10 km of proposed site.
- ✓ The site is away from railway lines.
- ✓ Prima facie, the area is more or less free from homesteads.
- ✓ Considering availability of major portion of land for locating the proposed power plant, fairly flat, not prone to flooding, free from dwelling units and availability of water source within distance of 8 km, the proposed site, which generally meets environmental guidelines has been selected for setting up of the project.
- ✓ About 1400 acres of land shall be required for setting up the proposed power project. As per the revenue records, 1201 acres of acquired land stands transferred in the name of UPSIDC for non-agricultural use. A MoU betweenTHDC and UPSIDC has already been signed on 14th December 2013 for transfer of land to THDC on 90 years lease as per currently applicable rules and regulations of GoUP. UPSIDC shall hand over the physical possession of the land immediately after the compensation/ex-gratia is paid to the erstwhile land owners. (Copy of MoU us placed as **Annexure-6**). The process of taking over the physical possession of 1201 acres, already acquired land by UPSIDC from erstwhile land owners, is in advanced stage. About 125 acre land shall be required outside the plant boundary to accommodate the water and rail corridors.

- ✓ National Highway (NH-91) passes through the said land and as per requirement of MoEF Siting Criteria, 500m of land requires to be left vacant on either side of the highway, resulting in non-utilization of left-out land. To ensure utilization of entire land for development of the project, MoRTH/NHAI was requested through MoP to consider the proposal of rerouting of the highway. On 29.10.2013, NHAI conveyed their in-principle consent for re-routing of the NH-91. About 76 acre of land available due to re-routing of present alignment of NH-91 shall be utilized for the project.
- ✓ The availability of land shall enable the layout to accommodate another unit of 660MW. Accordingly, the layout has been prepared for 2 X 660 MW (Present Proposal) + 1 X 660 MW Unit (Future Provision).

Therefore, no alternate site is suggested for the proposed project.

6.3 ALTERNATIVE FOR TECHNOLOGY

Presently subcritical coal fired boilers of capacity 210/ 500 MW have been proven in India with reliability, performance and low cost option. Recently unit size of 600 MW sub-critical units is being implemented. However, the CEA recommended for implementation of supercritical units of bigger size capacity to add to the capacity addition program under 12^{th} and 13^{th} plan periods. This will ensure large capacity addition required to maintain the GDP in India and also reduce the carbon footprint and pollution reduction. There are presently 660 MW and 800 MW category of supercritical coal fired boilers under development in India.

Advantages of Implementation of Supercritical Technology for Power Generation

Sub-critical & supercritical conditions basically refer to behavior of the water at the critical point (i.e. 256 kg/cm^2, 565^0C).

The supercritical technology ensures the following advantages:

- Enhance plant efficiency
- Reduction in coal consumption for the same output
- Minimize discharge of pollutants to the environment
- At reduced loads also the boiler efficiency remains almost same
- Shorter start up time
- Sustains rapid load changes
- Reduce carbon footprint

Comparison of Subcritical & Supercritical TPP

The relative comparison of subcritical unit & supercritical unit in terms of capital cost, performance, plant operation, availability etc. are as given in **Table-77.**

Table- 77: Comparison of Subcritical & Supercritical

Particulars	Subcritical unit	Supercritical units
Capital Cost	Base	Higher by 10 to 15%
Heat Rate	Base	Lower by 5%
Boiler Efficiency	Base	5% higher
Auxiliary Consumption	Base	Less
Plant Efficiency	Base	Higher by 2%, leads to reduction in coal consumption
Ash Generation	Base	Lower due to lower coal consumption
Process Make-up Water Requirement	Base	Lower due to supercritical boiler
Part Load Operation	Base	Higher efficiency at part loads
Predicted Availability	Base	No significant variation
Start up Times	Longer duration	Lower duration
Indian Experience	Extensive	Very limited
Availability of Equipment	Indigenous	Partly Indigenous and partly imported technology
Sizes	210/ 500/ 600 MW sizes of equipment are available	Limited to 660 & 800 MW
Project Schedule (Months)	38 to 40	48 to 50

The proposed project will employ supercritical coal fired power generation unit, having 2 x 660 MW gross capacities. Supercritical technology enables Rankine cycle to be operated at higher operating pressures thereby increasing the cycle efficiency. Higher efficiency means a reduction in fuel consumption and thereby a reduction in emissions per unit of electricity generated. The supercritical technology will enhance operational efficiency over subcritical technology, which is the most prevalent and commonly used for thermal power generation in India.

Hence adopting supercritical technology for higher size of coal based unit leads to enhanced plant efficiency, less fuel consumption and reduced green house emissions.

CHAPTER-7: ENVIRONMENTAL MONITORING PROGRAM

7.1 GENERAL

Regular monitoring of environmental parameters is of immense importance to assess the status of environment during project operation. With the knowledge of baseline conditions, the monitoring programme will serve as an indicator for any deterioration in environmental conditions due to operation of the project, which will enable to take suitable mitigatory steps in time to safeguard the environment.

Monitoring is important to measure the efficiency of control measures. An environmental impact assessment study is carried over for a specified period of time and the data generated for that specific period cannot bring out all variations induced by the natural or human activities. Therefore, regular monitoring programme of the environmental parameters is essential to take into account the changes in the environmental quality. The objectives of monitoring are to:-

- Verify effectiveness of planning decisions;
- Measure effectiveness of operational procedures;
- Confirm statutory and corporate compliance; and
- Identify unexpected changes.

Identify unexpected changes, Environmental Monitoring & reporting Procedure

Monitoring will confirm that emissions are within the prescribed limits. This will take the form of direct measurement and recording of quantitative information, such as quantity and concentrations of discharges, emissions and wastes for measurement against corporate or statutory standards, consent limits or targets. It may also require measurement of ambient environmental quality in the vicinity of a site using ecological/biological, physical and chemical indicators. Monitoring may include socioeconomic interaction, through local liaison activities or even assessment of complaints.

The preventive approach by management may also require monitoring of process inputs, for example, type and method used, resource consumption, equipment and pollution control performance etc. Monitoring will also be required to meet compliance with statutory and corporate requirements. Finally, monitoring results will provide the basis for auditing.

7.2 ENVIRONMENTAL MONITORING SCHEDULE

Post project monitoring will be carried out as per conditions stipulated in Environmental Clearance Letter issued by MoEF&CC, Consent issued by SPCB as well as according to CPCB guidelines.

Details of the proposed environmental monitoring schedule, which will be undertaken for various environmental components, are detailed below in **Table-78**:

Table- 78: Proposed Environmental Monitoring Programme

S.N.	Particulars		Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
1.	**Air Pollution and Meteorology**				
	A.	Ambient Air Quality & Stack emissions			
		AAQ at 4 locations	Twice in a week	24 hourly	PM_{10}, $PM_{2.5}$, SO_2, NOx and CO
		Stack emission (2 Stacks)	Twice/week	Manual	PM, SO_2, NOx and CO
			Automatic	Continuous	PM, SO_2 & NOx
	B.	Meteorology			
		Meteorological data to be monitored at the proposed Plant site.	Daily	Continuous Monitoring	Wind speed, direction, Min. and Max. Temperature, relative humidity, solar radiation, atm. pressure and rainfall.
2.	**Water and Wastewater Quality**				
	A.	Industrial/Domestic			
	1.	Plant effluents	Monthly	24 hr composite	pH, Temp, Cond., TSS, TDS, BOD, O&G, Phenolics
			Quarterly		Heavy metals
	2.	Sanitary effluents	Monthly		pH, Temp, Cond., TSS, TDS, BOD, O&G, Phenolics
			Quarterly		Heavy metals
	B.	Water quality in the study area			
	1.	Ground Water Three Samples	Monthly	Grab	As per the parameters specified under IS:10500
		Bacteriological	Monthly		MPN and Total coliform
		Heavy metals	Once in study period		Heavy metals
	2.	Surface Water Three Samples	Monthly	Grab	Parameters specified under CPCB criteria (Class C)
		Bacteriological	Monthly		MPN and Total coliform
		Heavy metals	Once in study period		Heavy metals
3.	**Industrial Noise Levels**				

S.N.	Particulars		Monitoring Frequency	Duration of Sampling	Important Monitoring Parameters
	Ambient Noise Levels				
		Ten Locations	Once in study period	24 hr continuous with one hr interval	Ambient Equivalent continuous Sound Pressure Levels (Leq) at day and Night time.
4.	**Soil Characteristics**				
	1.	Ten samples in nearby villages and ash pond area	Once in study period	Grab sample	Colour, textural class, pH, Electrical Conductivity, cation exchange capacity, total P, N, K and mercury and Infiltration test.

7.2.1 Environmental Monitoring Parameters

Monitoring Methods

The project site is considered as core zone and the area lying within 10 km radius from the project site is considered as buffer zone.

Meteorology Monitoring

It is recommended that a full fledged meteorological station will be set-up at site to generate on-site meteorological data during construction and operation of the project. Meteorological stations will be monitored for wind direction and speed, rainfall, temperature & humidity and evaporation.

Air Quality Monitoring

Ambient air quality should be monitored both upwind & downwind directions along with adequate meteorological measurement for proper interpretation of data of PM_{10}, $PM_{2.5,}$ SO_2, NO_2 and CO. The number of monitoring stations, air pollutants and frequency of monitoring will be decided as per the CPCB guidelines in 2009.

Water Quality Monitoring

Monitoring of surface run-off and ground infiltration will be done once in every season except monsoon. Quality of groundwater and surface water samples will be analyzed for all the parameters as per IS-10500 and IS-2296 respectively.

Effluent Quality Monitoring

Main plant effluents comprising of boiler blow down and DM Plant neutralization pit shall be passed through a central monitoring basin (CMB). The CMB will act as equalization chamber for

both flow as well as quality of effluent. The final effluent shall be corrected for pH and then discharged through plant drains. Physico-chemical parameters (e.g. pH, temperature, conductivity and TSS) will be monitored on a regular basis.

In order to monitor the effective functioning and efficiency of the sewage treatment plant, the effluent will be monitored on daily basis, especially BOD.

Noise Quality Monitoring

Noise level monitoring will be done at the work zone to assess the occupational noise exposure levels. Noise levels will also be monitored at the noise generating sources like mineral handling arrangements, vehicle movements and also nearby villages for studying the impact due to higher noise levels for taking necessary control measures at the source.

Soil Quality Monitoring

Soil samples will be collected from ten sites in nearby villages and near ash pond area shall be monitored with frequency of once in study period.

Occupational Health & Safety

Health check-up for the workers will be conducted at regular intervals of time in a year. The health camps status will be monitored and the information will be furnished to the approving authority. Environment Management Cell will also coordinate with general public, regulatory authorities, local administration to appraise environmental performance of the mine.

7.3 REPORTING SCHEDULE OF MONITORING DATA

The frequency of reporting of monitored data will be on six monthly bases to the State PCB and to Regional Office of MoEF, New Delhi. Compliance report will be submitted twice in a year for 6 months interval. The Environmental statement will be prepared for the entire year of operations and will be regularly submitted to regulatory authorities.

CHAPTER-8: ADDITIONAL STUDIES

8.1 PUBLIC CONSULTATION

All the major environmental concerns expressed during the Public Consultation Process are addressed below. A proposed action plan on issues raised in Public Hearing is also prepared accordingly and given in **Table-79**.

Applied for PH : 03.06.2015

Advertisement for PH : 28.06.2015 (Bulandshahr-Amar Ujala, Delhi-Hindustan Times)

PH Date : 01.08.2015

PH Minutes : 18.08.2015

PH Venue : Tehsil Conference Hall, Khurja, District Bulandshahr

PH Chairman : Shri Vishal Singh, ADM Bulandshahr (Admin.)

PH Members : Shri Vishal Singh, ADM (Admin.)/President, Bulandshahr

: Shri Indu Prakash Singh, SDM, Khurja, District Bulandshahr

: Shri Ashutosh Chauhan, RO, UPPCB, Bulandshahr

: Shri Geetesh Chandra, ASO, UPPCB, Bulandshahr

: Shri Anand Shrinant, Tehsildar Personnel, Khurja, Bulandshahr

: Shri D.K. Gupta, JE, UPPCB, Bulandshahr

: Shri Satendra Pratap Singh, JE, UPPCB, Bulandshahr

: Shri Ram Avtar Sharma, Registry Revenue Officer, Khurja

: Shri Dharmendra Kumar, Typist/Clerk, UPPCB, Bulandshahr

: Shri R.K. Bhatt, AGM, STPP Khurja, District Bulandshahr

: Shri A.S. Brara, Consultant, Mantec Consultants Pvt. Ltd., Delhi

Shri Ashutosh Chauhan, RO, UPPCB, with permission of Chairman, addressed public hearing and welcomed everyone. He informed general public about public hearing and gave a brief description of the proposed project and invited a representative from M/s THDC India Limited, Khurja, District Bulandshahr and asked people to raise queries regarding project, if any. Shri Mukul Sharma (Manager-Design, Thermal) gave a detailed description of the project.

Shri Arvinder Brara, Consultant (Mantec Consultants Pvt. Ltd.) informed that project will abide by all rules of Ministry of Environment & Forest (MoEF), GoI and project will benefit people of nearby villages. He talked regarding benefits of electricity produced from project and also informed that pollution produced during operational phase will be minimized by applying pollution management techniques.

The consultant has informed that as per the DPR prepared by NTPC, the unit will be installed as per the modern technology and the unit will be run in such a manner that it will generate zero waste. The water for the proposed project will be taken from the Upper Ganga Canal and the wastewater will be reused. The rain water will be collected during rainy season and shall be harvested to recharge the ground water.

Regional Officer, UPPCB, Bulandshahar had asked the consultants about the provisions to treat the effluent generated from the D.M. Plant back wash. The Consultant has informed that no waste generated from the plant will be discharged outside the plant compound.

RO, UPPCB, Bulandshahr asked about the final disposal/use of treated wastewater from the treatment plant. Consultant replied that treated effluent of wastewater treatment plant will be used in the water sprinkler system to suppress the dust emission from the coal handling.

The ADM (Admin.), district Bulandshahar had opened the discussion for the comments from the public present in the public hearing.

Table- 79: Public Hearing Minutes along with Action Plan & Budget Allocation

S. No.	Name of Person	Query Raised	Reply to Query	Action Plan	Budget Allocation
1.	Shri Kamal Singh, Village Dussehra	He informed that project will emit smoke, ash & other pollutants during operation that will affect environment & our health and the agriculture land nearby the project may lose its fertility. During project operation, the agricultural land may get affected by the waste generated from the plant, if it is not 100%	RO, UPPCB, Bulandshahr has directed the consultant that ash generated during operational phase will not be discharged in the nearby river/nallah under any circumstances. Consultant: A chimney of 275 m in height will be installed to reduce/control the air pollution which	The effluent generated due to plant operation will get recycled and reused for the plant operation within the project's boundary and will not get disposed off on the public land. Also a wide green belt will be developed around the project area to minimize the effect of Air &	Sum of Rs. 1783.5 crore has been allotted towards EMP of the project.

		recycled and reused.	will be generated from the operation of thermal power plant. Installation of ESP shall also be ensured to minimize the impact of air pollutants emitted from the TPP on nearby agricultural land, environment and population. The wastewater will be completely reused after necessary treatment and the recycled water shall be used in the green belt development. The proposed project of 2 x 660 MW capacities will be commissioned as per the ZLD guidelines issued by MoEF, GoI and the DPR of the same is prepared by NTPC with inclusion of modern technology.	Noise pollution due to plant operation.	
		What are the provisions to be adopted to control the emission of fly ash generated from the coal handling?	Consultant: The covered trucks will be used in the transportation and water sprinkling to be done regularly for dust suppression.	100% dry fly ash extraction, collection, storage and disposal facilities are proposed to supply ash to the ash consumers such as cement industries, brick units, asbestos industries, Ready Mix Concrete	Rs. 5 crore has been allotted towards Dust Extraction & Suppression system and Rs. 44.7 crore towards Ash water recirculation.

				(RMC) units etc. Similarly hydro bins are proposed for storage and supply of bottom ash to the brick industries, filling low lying areas etc. 100% ash utilization plan has been prepared and enclosed with the EIA report.	
		The value of the land has been increased; hence compensation amount may be relooked into. Last date of the compensation distribution may be informed.		Ex-gratia has been given to the land owners as settled between the land owners and district administration.	
		It is requested to the administration that THDC shall adopt the most affected villages. And make them Adarsh Gram. Also, it is asked that village Nagla which is most affected from this project will be rehabilitating to some other location or not?	Consultant has informed that provision of investment of 2% of the total project cost is made in the CSR activity to develop nearby villages and CSR amount will be used as per the guidelines issued by GoI, which is 0.5% the total project cost. Almost 2000 people from nearby villages will get employment.	The provision of 2% of the net profit is envisaged in the CSR activity to develop nearby villages as per the Govt of India guidelines. The CSR amount will be used for the up-liftment and development of nearby villages. Additionally during the construction of the project a provision of Rs.	An amount of (approx) Rs. 33.20 Crores towards Corporate Social Responsibility activities during construction phase and in operation phase, money on CSR activities shall be invested as per the

				33.20 crore of the cost of project for local area development. Almost 2000 people from nearby villages will get direct and indirect benefits by the proposed project.	Government policy and norms.
2.	Shri Rajkumar Singh, Village Dussehra	Most of the farmers are dead whose land is acquired for the proposed project and hence, they are not registered as land owner record. Appropriate compensation has also not been given to their families so far. Also, it was informed that the project commissioning is allowed only if compensation will be given by 15.08.2015.		Ex-gratia has been given to the land owners as settled between the land owners and district administration.	
		Besides, Shri Raj Kumar Singh has submitted a written list of queries regarding negative impacts that may arise due to proposed project.		EMP has been formulated to minimize the negative impacts and to maximize the positive impacts of the project.	Sum of Rs. 1783.5 crore has been allotted towards EMP of the project.
		The time duration	Shri R.K.Bhatt, AGM,	Compensation has	

		has been extended 10 times in the past and last extension was given 16 weeks ago. Kindly inform the deadline for the compensation.	STPP Khurja replied: The compensation is likely to be distributed by the end of August 2015.	been paid and land is in physical possession of THDCIL.	
		Employment should be given to the villagers.		THDCIL will give preference to the local people for employment during construction and operational phase of the project after imparting the necessary skills as per the requirement of the project and their capabilities.	
3.	Shri Indu Prakash Singh, SDM, Khurja	List of all the villagers except village Dussehra will be prepared within the next two working days without any delay. Project commissioning will be done only after compensation is given.	Shri R.K.Bhatt, AGM, STPP Khurja replied: He has assured that the compensation of the land acquired for the proposed THDC STPP (2X660 MW) will be given by the end of August 2015.	Compensation has been paid and land is in physical possession of THDCIL.	
4.	Shri Omveer Singh, Village Dussehra	Proper compensation of the land acquired and all the basic facilities should be provided to the villagers		Compensation has been paid and land is in physical possession of THDCIL. Amenities under the CSR scheme will be provided.	

5.	Shri Hariom Singh, Village Dussehra	Due to construction of boundary wall nearby villages may be disconnected and their routes will be diverted. What are the provisions made to connect these villages from the national highway in this regard? Also, it was asked that the village sewer drains, storm drains, village ponds, Muktidham area, aid to homeless widows and the land compensation amount was declared as 721.00 INR. Will the company increase the compensation in time? Kindly inform in writing and explain to villagers.		All the existing internal routes passing through the project site will be re-routed in consultation with village panchayats and district administrator. Compensation has been paid and land is in physical possession of THDCIL.	Sum of Rs 1220 Lakhs has been allotted for Rural / Slum Development (THDCIL Utthan) under CSR.
6.	Shri Haripal Singh, Ex-MLA, Khurja	Almost 50% of the people sitting in the public hearing have no idea about the environment. In present scenario, circle rate of the land to be acquired is 7000.0 INR. What is the significance		The public hearing was conducted to make the local people aware about the proposed project and its impact on their physical and social environment.	

		of conducting this public hearing after obtaining clearances from all the departments?		Conduction of Public hearing is a pivotal step to get environmental clearance for the project from the environment ministry.	
7.	Shri Madhur Chauhan, Village Dussehra	Will the discharged effluent which is used for greenbelt development be treated effluent or raw effluent? Will the treated water be reused completely or not?	Shri Sanjay Kher, AGM, THDC India Ltd has replied 100% recycle and reuse condition is given in environment clearance provision. It was also ensured that water used for the greenbelt development will not be polluted one in any means.	The effluent generated by the project's activity will be treated and recycled and then will be used for plantation work.	An amount of Rs. 5 crore has been allotted towards Green Belt, Afforestation & Landscaping.
8.	Shri Indrapal Sharma, Village Dussehra	The laborers will be hired by contractors for the project then why does he give job to local people?	ADM (Admin) thanked all the participants for attending the public hearing with patience and raised their queries. Also, he ensured that the compensation against the land acquired for the project is being done with the help of member of parliament (MP) and local administration. SDM, Khurja informed that the public hearing is conducted to listen to the environmental issues due to	Local villagers will be preferred after imparting the necessary skills as per the requirement of the project and their capabilities as far as employment is concerned.	

			proposed project. Efforts are being made towards compensation for the acquired land. Also, it was informed that the employment will be given to the local people from the nearby villages. Further, it was also informed that the today`s activity and questions/answers have been recorded and will be submitted to the concerned agency with CD, other relevant documents and records.		
9.	Shri Kailash Sharma, Village Rukanpur	Project affected village Rukanpur Nagla to be rehabilitated to some other place as per R&R policy.	M/s THDCIL has informed that the project affected village Rukanpur and Nagla will be developed as per the guidelines and policy of government of India.	Rehabilitation and Resettlement (R&R) Plan for the Project Affected Persons (PAPs) as per Govt of UP, R&R Policy circulated vide U.P. Govt. Order No- 632/1-13-11-20(29) 2004 dated 02.06.2011 and Land Acquisition Act-2013.	
10.	Shri Kailash Sharma, Village Rukanpur	What are the benefits from the proposed project to the local people?	M/s THDCIL has informed that the local people will be benefitted from the proposed project and all the project affected villages will	Through various activities proposed by THDCIL under CSR, overall up-liftmen of the project affected	An amount of approx. Rs. 33.20 Crores towards Corporate Social

			be connected to the National Highway.	villages will be done. Also local people will be preferred for employment purpose. Due to the proposed project power supply in the area will also improve.	Responsibility activities during construction phase and in operation phase, money on CSR activities shall be invested as per the Government policy and norms which will used for overall development of the area.
11.	Shri Kamal Chauhan, village Dussehra	No bypass route is constructed for the Road/National highway in Gujarat state where NTPC plant was constructed.	M/s THDCIL has replied that according to MoEF, GoI; project will not be established upto 500 meters distance from the National Highway. Provision of a bypass road is also made in this regard and to facilitate transport of local people, all the necessary arrangements will be made and no place of religious/social importance will be disturbed.		

8.2 RISK ASSESSMENT

8.2.1 Introduction

Risk analysis follows an extensive hazard analysis. Identification of causes and types of hazards is the primary task for planning for risk assessment. Hazard can happen because of the nature of chemicals handled and also the nature of process involved. So for risk analysis first step is to identify the hazardous chemicals which are to be studied for risk analysis.

It involves the identification and assessment of risks at the project site and in the neighboring population who could get exposed to, as a result of hazards present. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of population etc.

In the sections below, the identification of various hazards, probable risks in the proposed power plant, maximum credible accident analysis, consequence analysis are addressed which gives a broad identification of risks involved in the plant. The Disaster Management Plan (DMP) has been presented based on the risk estimation for fuel storage only since there is no hazardous chemical storage in the power plant.

Approach to the Study

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas;
- Identification of representative failure cases;
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion;
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
- Assess the overall suitability of the site from hazard minimization and disaster mitigation point of view
- Furnish specific recommendations on the minimization of the worst accident possibilities; and
- Preparation of broad Disaster Management Plan (DMP), On-site and Off-site Emergency Plan, which includes Occupational and Health Safety Plan.

8.2.2 Hazard Assessment & Evaluation

Methodology

An assessment of the conceptual design is conducted for the purpose of identifying and examining hazards related to feed stock materials, major process components, utility and support systems, environmental factors, proposed operations, facilities, and safeguards.

Preliminary Hazard Analysis (PHA)

A preliminary hazard analysis is carried out initially to identify the major hazards associated with storages and the processes of the plant. This is followed by consequence analysis to quantify these hazards. Finally, the vulnerable zones are plotted for which risk reducing measures are deduced and implemented. Preliminary hazard analysis for the whole plant is given in **Table-80**.

Table- 80: Preliminary Hazard Analysis for the Whole Plant in General

PHA Category	Description of Plausible Hazard	Recommendation	Provision
Environmental factors	If there is any leakage and eventuality of source of ignition.	--	All electrical fittings and cables are provided as per the specified standards. All motor starters are flame proof.
Environmental factors	Highly inflammable nature of the liquid fuels may cause fire hazard in the storage facility.	A well designed fire protection including foam, dry powder, and CO_2 extinguisher should be provided.	Fire extinguisher of small size and big size are provided at all potential fire hazard places. In addition to the above, fire hydrant network is also provided.

Maximum Credible Accident Analysis (MCAA)

Hazardous substances may be released as a result of failures or catastrophes, causing possible damage to the surrounding area. This section deals with the question of how the consequences of the release of such substances and the damage to the surrounding area can be determined by means of models. Major hazards posed by flammable storage can be identified taking recourse to MCA analysis. MCA analysis encompasses certain techniques to identify the hazards and calculate the consequent effects in terms of damage distances of heat radiation, toxic releases, vapour cloud explosion, etc. A host of probable or potential accidents of the major units in the complex arising due to use, storage and handling of the hazardous materials are examined to establish their credibility. Depending upon the effective hazardous attributes and their impact on the event, the maximum effect on the surrounding environment and the respective damage caused can be assessed. The reason and purpose of consequence analysis are many folds like:

- Part of Risk Assessment;
- Plant Layout/Code Requirements;
- Protection of other plants;
- Protection of the public;
- Emergency Planning; and
- Design Criteria.

The results of consequence analysis are useful for getting information about all known and unknown effects that are of importance when some failure scenario occurs in the plant and also to get information as how to deal with the possible catastrophic events. It also gives the workers in the plant and people living in the vicinity of the area, an understanding of their personal situation.

Damage Criteria

The fuel storage and unloading at the storage facility may lead to fire and explosion hazards. The damage criteria due to an accidental release of any hydrocarbon arise from fire and explosion. The vapors of these fuels are not toxic and hence no effects of toxicity are expected.

8.2.3 Construction Hazards

Conventional Construction Hazards are given as follows:

- Falls: either people falling or things falling on people
- Electrical contact – see proximity requirements to work around overhead power lines
- Working on or near live equipment – workers who are asked to work on or near energized equipment (regardless of the energy source) must comply with plant requirements to be applied in all work situations where systems are to be de-energized and locked out by devices such as switches or valves rigging and hoisting hazards
- Site-specific hazards — to be identified by the plant representative.

8.2.4 Chemical Hazards

Identification of Hazardous Chemicals is done in accordance with The Manufacture, Storage and import of Hazardous Chemical Rules, 1989. Schedule-1, of the Rule provides a list of the Toxic and Hazardous chemicals and the flammable chemicals. It defines the flammable chemicals based on the flashpoint and boiling point.

"Major accident hazards (MAH) installations" is defined as the isolated storage and industrial activity at a site handling (including transport through carrier or pipeline) of hazardous chemicals equal to or, in excess of the threshold quantities specified in Column-3 of Schedule-2 and 3 respectively.

Schedule-3 has classified hazardous substances in an operating plant into 5 groups and has provided the threshold quantities for application of above rules.

Group1 & 2 – Toxic substances
Group 3 – Highly reactive substances
Group 4 – Explosive substance
Group 5 – Flammable substances

The following **Table-81** shows the list of major chemicals which have been identified as hazardous chemicals in The Manufacture, Storage and import of Hazardous Chemical Rules, 1989 and which are to be considered as Major accident hazards (MAH) installations.

Table- 81: Hazardous Chemicals in Thermal Power Plant

S. No.	Chemical	Use	Nature of Chemical (Schedule 1 & 3)	Storage Quantity	Threshold quantity for MAH
1.	Fuel Oil	Supporting Fuel	Highly Flammable	3750 KL*	2500 tonnes
2.	Transformer Oil	Transformer	Highly Flammable	15 KL	2500 tonnes
3.	Chlorine	Cooling Tower	Toxic – Group 2	25 tonnes*	10 tonnes
4.	Sulfuric Acid	Water Treatment	Hazardous	24 tonnes	Not considered
5.	Caustic soda	Water Treatment	Hazardous	24 tonnes	Not considered

* To be considered as MAH

The chemicals which are stored more than the threshold quantities are to be considered for major accident hazard. Fuel oil (LDO/HFO), used as supportive fuel in the boiler, and is classified as Highly Flammable liquid as its flash point remains within 30°C–90°C. Its threshold quantity is 2500 tonnes. Similarly for Chlorine is a toxic gas and its MAH quantity is 25 tonnes. Quantity stored for transformer oil very low to be considered for the study. Sulphuric Acid and Caustic soda are hazardous chemicals but are not included in Schedule-3 for MAH.

Hazards from chlorine come from loss of containment which may be leakages, pipe rupture or vessel rupture. As liquefied chlorine is released under pressure it forms a liquid pool and then evaporates. A substantial release will then form a vapour cloud. A considerable amount of mixing with air occurs during evaporation. As the cloud travels under the influence of wind, it disperses and its concentration becomes further diluted and at some distance concentration becomes non hazardous. Four specific scenarios can be considered

- Failure of Liquid outlet valve
- Failure of Gas outlet valve
- Body leakage of a corroded cylinder
- Any leakage in the gas pipeline

8.2.5 Fire Hazards

Diesel is a petroleum product. It is a highly flammable liquid having flash point between 32 –96°C. However its auto ignition temperature is 256°C. Its boiling point ranges between 150-400°C. Furnace Oil is of similar characteristics having flash point above 66°C. Major Hazards from oil storage can be fire. Maximum credible accidents from oil storage tank can be

- Tank Fire: Oil is stored in floating roof tank. Leak in rim seal leading to accumulation of vapour is a source of fire. Lighting can be a source of ignition and can cause tank fire. Overflow from tank leading to spillage may cause vapour cloud formation. This can catch fire and it can flash back to the tank to cause tank fire.

- Pool / Dyke fire: If there is outflow from the tank due to any leakage from tank or any failure of connecting pipes or valves, oil will flow outside and form a pool. Where the tank is surrounded by a dyke, the pool of oil will be restricted within that dyke. After sometime, the vapour from the pool can catch fire and can cause pool or dyke fire.

8.2.6 Explosion Hazards

Explosion hazards can take place due to the following machineries:

- Hydrogen plant
- Turbo generators where hydrogen is used for cooling of TG
- Transformer (oil cooled)
- Boiler (Coal/Oil fired)
- Coal dust in Mills and Boilers

Explosion hazards can take place due to the following reasons also:

Bursting of Pipe Lines, Vessels

- Water / Steam pipes due to high pressure/ temperature
- H_2 Gas lines and Acid lines.
- Acid/Alkali tanks
- H_2 Gas Cylinders
- Compressed air header
- Compressed air receivers
- H_2 Gas Holder
- Electrical Hazards
- Fire Hazards

Release of Gases / Dust

- Chlorine in water treatment plant
- Hydrogen in turbo generator area of main plant
- Pulverized coal dust from mills and associated piping
- Fly ash from chimneys and ash ponds, ESP hoppers and bottom ash system
- Coal dust in transfer points, CHP, Crusher & mill area.
- Flue gas from the ducts

Release of Liquid

- Acid and alkali tanks in water treatment plants
- Chlorine toners in WTPs
- Fuel oil tanks in fuel oil handling section
- Ash dyke
- Turbine oil and seal oil leakage

Coal Handling Plant - Dust Explosion

Coal dust when dispersed in air and ignited would explode. Crusher house and conveyor systems are most susceptible to this hazard. To be explosive, the dust mixture should have:

- Particles dispersed in the air with minimum size (typical figure is 400 microns);
- Dust concentrations must be reasonably uniform; and
- Minimum explosive concentration for coal dust (33% volatiles) is 50 gm/m^3.

Failure of dust extraction and suppression systems may lead to abnormal conditions and may increase the concentration of coal dust to the explosive limits. Sources of ignition present are incandescent bulbs with the glasses of bulkhead fittings missing, electric equipment and cables, friction, spontaneous combustion in accumulated dust. Dust explosions may occur without any warnings with Maximum Explosion Pressure up to 6.4 bars. Another dangerous characteristic of dust explosions is that it sets off secondary explosions after the occurrence of the initial dust explosion. Many a times the secondary explosions are more damaging than primary ones. The dust explosions are powerful enough to destroy structures, kill or injure people and set dangerous fires likely to damage a large portion of the Coal Handling Plant including collapse of its steel structure which may cripple the life line of the power plant.

Stockpile areas shall be provided with automatic garden type sprinklers for dust suppression as well as to reduce spontaneous ignition of the coal stockpiles. 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, crusher house, control rooms etc. A centralized control room with microprocessor based control system (PLC) has been envisaged for operation of the coal handling plant. Except for locally controlled equipment like traveling tripper, dust extraction/ dust suppression / ventilation equipment, sump pumps, water distribution system etc., all other in-line equipment will be controlled from the central control room but will have provision for local control as well. All necessary interlocks, control panels, MCC's, mimic diagrams etc. will be provided for safe and reliable operation of the coal handling plant.

8.2.7 Health Hazards

- Some workers in boiler rooms may suffer from diseases of the upper respiratory tract such as bronchitis, and from conjunctivitis caused by vanadium compounds (dust given off by oil combustion) and SO_2.
- Flue cleaners and cinder removers may, after some years, suffer from chronic bronchitis and rhino-pharyngitis as well as pneumo-sclerosis caused by cinder dust and sulphur dioxide and trioxide.
- The residues of oil combustion are more harmful than the dust given off after the combustion of other fuels.
- Dermatitis can develop from ashes contacting damp skin.
- Eczema may result from the combined action of compounds of nickel, vanadium, and sulphuric acid present in the residues.

- One potential health hazard of being in the vicinity of high electromagnetic fields in thermal generating plants. This concern should be monitored for future information.

8.2.8 Conclusion

The preliminary risk assessment has been completed for the proposed power plant and associated facilities and the broad conclusions are as follows:

- There will be no significant community impacts or environmental damage consequences; and
- The hazardous event scenarios and risks in general at this facility can be adequately managed to acceptable levels by performing the recommended safety studies as part of detailed design, applying recommended control strategies and implementing a Safety Management System.

8.3 DISASTER MANAGEMENT PLAN (DMP)

8.3.1 Introduction

Disaster management has assumed significant role due to modern complex nature of power plants, chemical and petrochemical operations. Disasters are major accidents, which cause wide spread disruption of human and commercial activities. Disaster can be defined as a sudden occurrence of such magnitude as to affect normal pattern of life in the plant and/or vicinity causing extensive damage to life and property. Normally, common accidents are absorbed by the community, but disasters are major accidents and community cannot absorb within its own resources. Most of the disasters, natural or technological (man-made) have sudden onset and give very short notice or no time to prevent the occurrence.

Disaster is a major emergency in plants, which has the potential to cause serious injury or loss of life, both inside and outside the works. It would normally require the assistance of outside emergency services to handle it effectively. Although the emergency may be caused by a number of different factors, e.g. plant failure, human error, earthquake, vehicle crash or sabotage, it will normally manifest itself in three basic forms:

A disaster occurring in the plant may affect/cause

- several sections within it
- serious injuries / loss of lives,
- Extensive damage to property
- Serious disruption outside the works area

It requires the best use of internal resources as well as outside resources to handle it effectively. It is therefore, necessary to ensure safety and reliability of any power station, through a systematic study based on mathematical modeling to identify possible failures and prevent their occurrence before the disaster.

8.3.2 Disaster Control Philosophy

The principal strategy of Disaster Management Plan of power plant is prevention of the identified major hazards. Since these hazards can occur only in the event of loss of the chemicals from its containment, one of the key objectives of technology selection, project engineering, construction, commissioning and operation is "Total and Consistent Quality Assurance". The project authority is committed to this philosophy right from the conceptual stage of the plan so that the objective of prevention can have ample opportunities to mature and be realized in practice.

The second control strategy adopted for reducing potential emergencies is "Minimization of Operation Inventories of Hazardous Substances" both in process plants as well as in storage within limits of viability of continuous operation.

Another control measure that will be adopted is "Early Detection of any accidental leak and activation of well structured, resourced and rehearsed On-Site Emergency Plan" to intercept the incident with speed and ensure safety of employees, operating plants, public and environment as a matter of priority.

For Control of Disaster, Thermal Power Plant should obey the following rules:

- **Factories Act Requirement**

In accordance with the provision of Section-2(cb), read with The Factories Act-1948, **"power generating industry" is classified as hazardous process** under item 5 thereof.

According to Section 41-b, para–4, of Factories Act-1948, all factories engaged in hazardous processes must have Disaster Management Plan.

- **Section 41-b, Para -4 of Factories Act-1948**

Every occupier shall, with the approval of the Chief Inspector, draw up an on-site emergency plan and detailed disaster control measures for his factory and make known to the workers employed there in and to the general public living in the vicinity of factory, the safety measures required to be taken in the event of an accident taking place.

The plan is developed to make best possible use of resources at its command and/or outside agencies for the following purposes.

- Prevention, Mitigation & Preparedness (Pre phase)
- Response, Rehabilitation & Recovery (Post phase)
- Safe guard others by evacuating them to safer places;
- Rescue of victims and treating them suitably to effect speedy recovery at hospital;
- Identify the personnel affected / dead;
- Inform relatives of those deceased / affected;
- Providing relevant records / data needed as evidence for subsequent enquiry;
- Rehabilitation of the affected persons;

8.3.3 Vulnerable Units

The maximum credible accident and consequence analysis carried out during Industrial hazards. Vulnerable units needing consideration in Disaster Management Plan (DMP) are coal, chlorine, high-speed diesel and heavy fuel oil/LSHS.

Analysis of Vulnerable Zones

From the analysis of the vulnerable zones the action suggested are discussed below:

- All the storage vessels containing hazardous chemicals like HSD, LSHS & HFO at the tank farm will be dyked. The dyke volume will not be less than 1.1 times the volume of the storage vessel.
- All the storage vessels will be placed in the storage area in such a manner so as to conform to the requirements of Chief Controller of Explosives.
- Presence of human beings in the hazardous storage areas will be controlled and no unauthorized person will be allowed in these areas.
- Weeds, long grass, deciduous shrubs and trees and any combustible material will be removed from hazardous storage areas from time to time.
- Windsocks will be provided at oil storage yard and chlorine storage area.
- Tank farm would be provided with PCC at ground.

8.3.4 Emergency Plan

Objectives

The On-site and Off-site emergency plans will be covered personnel of proposed project. The Emergency Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operation in this same order of priorities. The objective of the emergency plan is to make use of the combined resources of the plant and the outside services to achieve the following:

- Affect the rescue and medical treatment of casualties
- Safeguard other people
- Minimize damage to property and the environment
- Initially contain and ultimately bring the incident under control
- Identify the affected
- Provide for the needs of relatives
- Provide authoritative information to the news media
- Secure the safe rehabilitation of affected area
- Preserve relevant records and equipments for the subsequent enquiry into the cause and circumstances of emergency

<u>On-site Emergency Planning</u>

On site Emergency Plan is required to meet the emergency condition during disastrous event in the plant. Its objectives are to:

- Rescue and treat casualties
- Safeguard other people & Installations
- Minimize damage
- Control initially and restore ultimately to normal situation
- Arrange rehabilitation of the affective people

The obligation of an occupier of hazardous chemicals to prepare an on – site emergency plan is stipulated in Rule 13 of the Manufacture, Storage and Impact of Hazardous Chemicals Rules, 1989. Section 41B (4) of the Factories Act, 1948 (as amended) also states that every occupier is to draw up an on-site emergency plan with detailed disaster control measures. It is therefore necessary to develop an on-site disaster management plan through a systematic study of the hazard possibilities.

Control Requirement of an On-site Emergency Plan

The Disaster Management Plan will set out the way in which designated people at the site of the incident can initiate supplementary action both inside and outside the works at an appropriate time. An essential element of the plan will be to make safe the affected unit, for example by shutting down. The plan will contain the full sequence of key personnel to be called in from other sections or form off-site.

Management will ascertain that sufficient resources exist at their works to carry out the plan for various assessed incidents in conjunction with preliminary services, for example, sufficient water for cooling and fire fighting.

- ✓ *Alarm and Communication Mechanism*

Communication is crucial factor in handling an emergency. As a general practice, all employees will be able to raise an emergency alarm so that the earliest possible action can be taken to control the situation. There will be an adequate number of points from where the alarm can be raised either directly by activating an audible warning or indirectly, viz. a signal or message to the permanently manned location.

- ✓ *Control Center*

The Emergency Control Center is the place from where the operations to handle the emergency are coordinated. An Emergency Control Center (ECC) will be established and equipped with relevant data and equipment to assist the control center personnel in disaster management. The Emergency Control Center will be manned by Deputy General Manager / Senior General Manager in charge of Operation and Maintenance of plant, Safety Officer and the senior officers of the other services. Other personnel will not have access to the control center. Emergency Control Center will be sited in an area of minimum risk and preferably close to a main road to allow for easy access to a radio-equipped vehicle for use if other systems fail or extra communication facilities are needed. An

alternate center, similarly equipped, will also be available at a different location. Emergency Control Center will contain.

- An adequate number of external and internal telephones / mobile phones
- Public address system
- A few copies of the on-site emergency plan
- Note pads, pens and pencils to record messages received and any instructions for delivery by runners
- Rolls of employees
- Addresses of the employees
- List of key personnel, their addresses and telephone numbers.
- A tape recorder with battery and cassettes on which the incident occurred, actions being taken and progress can be recorded
- Torches, explosimeters, personnel protective equipment, artificial respirators, gas masks, emergency lights etc.

Two suitable emergency control center sites within power station complex will be:

- At security gate-Emergency Control Center No. 1
- At utility office-Emergency Control Center No. 2

✓ *Roles and Responsibilities (Proposed)*

Shift manager will take overall control of the works during emergency as CIC /WIC and will operate from Emergency Control Center (ECC). A multi-channel communication network will connect ECC with all the plant control rooms and also with local police control room, area fire station, area hospital and district authorities through hot lines.

Respective Unit Heads will immediately assume specific roles and emergency management responsibilities. The Roles and Responsibilities of power station personnel can be defined only after the commissioning of the plant.

✓ *Emergency Response Facilities (Proposed)*

Preliminary facilities envisaged are-

- Emergency shutdown procedure
- A dedicated and pressurized fire fighting ring-main with adequate number of fire hydrants, fixed position monitors, water curtains, fog nozzles located strategically throughout the site
- A number of fire fighting pumps with both electric and diesel prime movers backed by adequate supply of raw water
- Dedicated fire alarm networks with adequate number of fire alarm call points and emergency telephone handsets throughout the site
- A two-way Public Address (PA) system installed independently in all production units and also in important service areas

- Adequate supply of protective clothing & breathing apparatus will be made available to all personnel of emergency team
- On-site first aid and treatment center with round the clock medical attendance

✓ *Outline of Key emergency Actions*

The on-site emergency will in all probability commence with a major spill of hazardous chemical like HSD, HFO, Chlorine etc. or its uncontrolled release into the plant atmosphere.

In accordance with the detail on-site emergency plan, the following key personnel will immediately take control of the emergency.

- On-site fire crew led by a fire marshal will arrive at the scene of incident with firefighting equipment as necessary.
- Emergency Security Controller will commence his role from the main gate office.
- Incident Controller will rush to the scene of emergency.
- Works Main Controller will arrive at the ECC with members of Emergency Control team and will assume absolute control of the site. He will receive information continuously from Incident Controller & Emergency Security Controller and give directions to:
    - Incident Controller
    - All plant control rooms
    - Emergency Security Controller
    - Site or Shift Medical Officer
    - Personnel Manager

As soon as key emergency personnel will take up positions in their respective locations, the management of the incident will commence with the site main controller performing the lead functions.

At the site of incident, the incident controller will directly handle the emergency with the help of specific support groups.

At the security gate office the emergency security controller and personnel manager will be in contact with various external agencies as per requirements.

At the site medical center the shift/site medical officer will take control of medical support services.

Works main controller, will be directing and deciding a wide range of issues. In particular, WMC will decide and direct:

- Whether the incident controller requires reinforcement both in terms of manpower and other resources.
- Whether staffs in different locations are to be remaining indoors or are to be evacuated and assembled at the designated collection centers.
- Whether and when district emergency services are to be called to supplement the resources of plant's emergency crew, intimation to district authority should be given.

- How to deal with fatalities reported either by incident controller or by shift medical officer.

These are some of the key emergency decisions and actions, the Works Main Controller will have to take. When the incident has eventually been brought under control as declared by the incident controller, WMC will send two of his assisting managers for inspection of:

- Site of the incident for an assessment of total damage and prevailing conditions, with particular attention to possibility of re escalation of the emergency now under control
- Other parts of the site which might have been affected by impacts of the incident
- Personnel collection and roll call centers to check if all persons on duty have been accounted for
- All plant control rooms to assess and record the status of respective plants and any residual actions deemed necessary
- Site's first aid and medical center to inspect any casualty (ies), their state of treatment and also to get a report on off-site hospitalization, for subsequent follow-up.

The post-emergency inspectors will return to ECC with their observations and report their findings to WMC

Based on these reports WMC will communicate further directive to all sub-centers of emergency management and will finally declare and communicate termination of emergency and authorize step by step restoration of normal operation of the site. The sirens will be sounded giving all clear signal.

✓ *Conducting Evacuation*

Once WMC will decide that an area is to be evacuated, the evacuation will be conducted in a well-coordinated and safe manner. Evacuation involves a number of steps, which include assigning tasks to evacuation assistance personnel, informing potential evacuees, providing transportation, emergency medical care and security for evacuated areas and sheltering evacuees as necessary.

✓ *Evacuation Tasks*

The first step is to assign tasks to evacuation assistance personnel. These tasks include information concerning:

- The specific area to evacuate
- Route of evacuation
- Protective gear to be worn
- Instructions to be given to evacuees
- Transportation of evacuees who are without private transportation
- Assistance to specific population
- Shelter locations
- Traffic and pedestrian control
- Communication procedures

The progress of the evacuation efforts will be monitored by WMC who will also provide continuous direction to evacuation assistance personnel.

- ✓ *Security in Evacuated Areas*

Once an area is evacuated, law enforcement personnel will guard the area to prevent looting and other unauthorized sections. Security forces operating in or around an evacuated area will be dressed in appropriate protective gear.

- ✓ *Re-entry into Evacuated Areas*

Before making the decision to authorize re-entry, data collected by the monitoring crews will be verified and the advice of health officials to be considered.

- ✓ *Updating of On-site Plan*

On-site plan will be updated based on modifications in the factory or at-least once a year on specific authorization of Works Manager. Safety Officer will maintain a record to this effect.

- ✓ *Mock Drill for Rehearsing On-site Plan*

A mock drill to rehearse on-site plan with a view to train and make the personnel aware of the procedure in case of emergency will be carried out by works Manager. The drill will be conducted seriously and lessons learnt will be analyzed and corrective actions will be taken. The record of rehearsal will be maintained.

- ✓ Transport

Vehicles, ambulances and cars available with power plant, will immediately be made available for disaster management. Additional transport based on requirement will be requisitioned.

Off-site Emergency Planning

The off-site emergency plan is an integral part of a hazard control system. It will be based on the identified accident scenario, which could affect people and environment outside the works. Thus, the off-site plan follows logically from the analysis to provide the basis for the on-site plan and the two plans will therefore complement each other. During preparation of off-site emergency plan, the district authorities and other organization in the vicinity and pollution control board would be consulted. The key feature of a good off-site emergency plan is the flexibility in it's an application to emergencies.

- Educating the people around
- Mock drills
- Communication
- Transport
- Medical facilities
- Coordination

- Evacuation
- Mutual aid scheme

Post Emergency Relief To The Victims

The Public Liability Insurance Act, 1991 provides for the owner who has control over handling hazardous substances to pay specified amount of money to the victims as interim relief by taking insurance policy for this purpose. The District Collector has definite role in implementation of this act. After proper assessment of the incident, he shall invite applications for relief, conduct an enquiry into the claims and arrange payment of the relief amount to the victims.

8.3.5 Control Measures for Coal Yards

The total quantity of coal will be stored in separate stock piles, with proper drains around to collect washouts during monsoon season.

Water sprinkling system will be installed on stocks of coal in required scales to prevent spontaneous combustion and consequent fire hazards. The stock geometry will be adopted to maintain minimum exposure of stock pile areas towards predominant wind direction.

8.3.6 Preventive Measures for Loading/Unloading of Chemicals

Based on the preliminary identification, the major hazardous installation at power plant are storage of hydrogen, HFO, HSD and chlorine. Heavy Fuel Oil and HSD are the secondary fuel for combustion support at low load and for startup. Following are the important considerations for loading/unloading of hazardous chemicals.

- Written instructions will be given which clearly define responsibilities for all personnel involved in loading/unloading operations.
- A responsible person normally a section supervisor on site will check that the quantity and type of fuel oil being transferred is suitable for the receiving tanks. Tanks will be checked to see how full they are before filling, and also during filling using the contents gauge. The maximum level device will be used to ensure overfilling does not occur.
- The point of transfer, where connections and disconnection are made will be sited in a well-ventilated position.
- Flexible hoses used for conveying fuel oil to and from truck into fixed vessels will:
    - Have a means of identification.
    - Be examined for kinks and wear on every occasion prior to use. Hose fittings will be similarly examined,
    - Periodically checked for electrical continuity and written records of the tests should be maintained.
    - Properly used so that the hose will not be physically damaged or adversely affected by the weather when not in use or when being conveyed.
    - Have means for protecting and fittings against damage or ingress of foreign material.

- Loading hoses should be earth and should also be bonded with the wagon.
- Replaced or repaired when damaged or worn-out.
- Properly used so that the hose will not be physically damaged or adversely affected by the weather when not in use or when being conveyed.
- Have means for protecting and fittings against damage or ingress of foreign material.
- Loading hoses should be earth and should also be bonded with the wagon.
- Be replaced or repaired when damaged or worn-out.

- In order to minimize the risk of accidental movement, the tanker will stand on a level site during loading or unloading. Checks will be placed against the vehicles wheels or other means provided to prevent vehicle movement prior to loading/unloading. These will only be removed when transfer is complete. The ground beneath the tanker will have a shallow gradient to a safe place to prevent any spillage from remaining under the vehicle.
- The loading/unloading operation will only be carried out when it is safe to do so and where practical be separated from other traffic movement. Where vehicles or pedestrian are likely to pass by, physical barrier will be provided to deter them approaching the transfer operation.
- Consideration will be given to the provision of a driveway protection device such as self-sealing, breakaway, coupling connected to the flexible hose, means to shut emergency isolation valves on the fixed plant, etc.

8.3.7 Fire Detection & Protection System

A comprehensive fire detection and protection system is envisaged for the complete power station. This system shall generally be as per the recommendations of TAC (INDIA)/ IS: 3034 & NFPA-850. The following protection systems are envisaged:

- Hydrant system for complete power plant covering main plant building, boiler area, turbine and its auxiliaries, coal handling plant, all pump houses and miscellaneous buildings of the plant. The system shall be complete with piping, valves, instrumentation, hoses, nozzles, hose boxes/stations etc.
- Automatic high velocity water spray system for all transformers located in transformer yard and transformers having rating 7.5 MVA and above located within the boundary limits of plant, Main and unit turbine oil tanks and purifier, Oil canal, generator seal oil system, lube oil system for turbine driven boiler feed pumps, boiler burner fronts, fuel oil station in boiler, etc. This system shall consist of QB detectors, deluge valves, projectors, valves, piping & instrumentation.
- Automatic medium velocity water spray system for cable vaults and cable galleries of main plant, switchyard 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 coal conveyors, transfer points, Stacker reclaimer, consisting of QB detectors, linear heat sensing cables, deluge valves, nozzles, piping, instrumentation, etc.

- Automatic medium velocity water spray system for LDO tanks consisting of QB detectors, deluge valves, nozzles, piping, instrumentation, etc.
- Automatic fire detection cum sprinkler system for crusher house along with alarm valves, sprinkler nozzles, piping, instrumentations etc.
- Automatic Foam injection system for fuel oil / storage tanks consisting of foam concentrate tanks, foam pumps, in-line inductors, valves, piping & instrumentation etc.
- For protection of Central control room, Control equipment room, Programmer room, UPS room, etc. Inert Gas extinguishing system as per NFPA-2001 would be opted.
- Fire detection and alarm system - A computerized analogue, addressable type Fire detection and Alarm system shall be provided to cover the complete power plant. Following types of fire detection shall be employed.
    - Multi sensor type smoke detection system
    - Photo electric type smoke detection system.
    - Combination of both multisensor type and photo electric type smoke detection systems.
    - Linear heat sensing cable detector.
    - Quartzoid bulb heat detection system.
    - Infra red type heat detectors (for selected coal conveyors)
- Portable and mobile extinguishers, such as pressurized water type, carbon-dioxide type, foam type, dry chemical powder type, will be located at strategic locations throughout the plant.
- CW blow down shall be used for supply of fire water. An alternate connection from raw water line shall also be provided as a back-up source for fire water. It is proposed to provide two numbers of Steel tanks for storage of fire water system. Fire water pumps shall be located in the fire water pump house and horizontal centrifugal pumps shall be installed in the pump house for hydrant and spray system and the same shall be driven by electric motor and diesel engines as per the regulations of TAC. The water for foam system shall be tapped off from the hydrant system network.
- For the above fire water pumping station, automatic pressurization system consisting of jockey pumps shall be provided.
- Complete Instrumentation and Control System for the entire fire detection and protection system shall be provided for safe operation of the complete system.

8.3.8 Electrical Protection System

Emergency Power Supply System

For the safe shutdown of the plant under emergency condition and in case of total power failure, diesel generating sets shall be installed for feeding certain essential applications like battery chargers, emergency lighting, essential air conditioning/ventilation and all auxiliaries necessary for barring operation of main and BFP turbines etc. The unit emergency switchgear section shall be fed by one diesel generator of adequate capacity. One Diesel Generator (DG) set per unit along with one standby DG set common for two units shall be provided as indicated in the single line diagram.

Protective Relaying

The necessary protective relaying system according to established norms shall be provided for EHV switchyards, over head lines, generators, transformers, motors, auxiliary system etc., to minimize damage to equipment in case of fault and abnormal conditions.
The generator would have winding temperature recorders and instruments for measuring coolant temperature, flow, pressure, conductivity and purity, with alarm and trip contacts as necessary. The protection against stator overheating would be provided by the generator temperature monitoring system. Limiters for stator current, V/f, Rotor current and under excitation would be included in Automatic Voltage Regulator. One Disturbance/fault recorder (DFR) – microprocessor based shall be provided for each generator. It shall have the facility of fast scan as well as slow scan to record transient as well as dynamic performance of the system.

Protection of Switchyard Equipment & Outgoing Lines

- **Busbar Protection:** Each busbar will have a separate three phase differential protection along with area zone bus wire supervision and hand reset relays.
- **Breaker Failure Protection:** All circuit breakers shall be provided with breaker failure protection to take care of stuck breaker condition. If in the event of fault, a breaker fails to trip on receipt of a trip command, the breaker failure protection shall de-energize that particular bus to which the faulty breaker is connected and also send trip impulse to the remote end breaker to isolate the fault.
- **Line Protection:** Each EHV line shall be provided with duplicated Numerical Distance Protections (Main I and II) based on different hardware platforms. These shall be of three zone carrier aided distance protection operating on permissive under-reach principle. Each line shall also be provided with a two stage over voltage protection
- **Power Line Carrier Communication:** Power line carrier communication equipment complete for speech transmission line protection and data channels shall be provided for the transmission line at both end of the line. For the purpose of matching of frequency of transmission and receivers at the two ends of the line, the equipment at both ends of the line shall be arranged by appropriate transmission agency. Only wave trap and PLCC battery feeders have been considered for cost purposes.
- **Metering System:** 0.2 accuracy class Availability Based Tariff (ABT) energy meters along with metering Master Station and software, for export & import of active and export and import of reactive energy meters shall be provided for each outgoing lines, generator /Station transformer feeders. Static meters of 0.2 Accuracy class have been considered for active energy measurement at other locations for energy accounting/trend analysis. ABT based tariff meters shall be provided at all outgoing line feeders and EHV side transformers by PGCIL (CTU) as per relevant process of metering regulations.

Control Philosophy for Switchyard

The control, protection and data acquisition including SOE data for 400 kV switchyard bays shall be accomplished by Substation Automation System with Distributed Architecture comprising of Bay

Control Units, Bay protection Units, Operators Workstation, engineering Workstation, Large Video Screen (LVS) etc. The Bay Control Units and Bay Protection Units shall be located suitably in bay kiosks. The adoption of Distributed Architecture shall help in reducing the cost by reduction of cables, cabling and related civil works and shall also provide better tariff accuracy. The SA system will be based on standard communication protocol IEC 61850. The Substation Automation System shall facilitate following functionality:

- Dynamic display of switchyard mimic, real time measurement values, etc.
- Monitoring ON/OFF status and remote closing/ synchronizing of circuit breakers, isolators and earth switches
- Display of Switchyard alarms, events and trends
- Interlocking functions
- Sequential Event Recording
- Communicating with protection relay IEDs for settings and Disturbance Recording functions
- System self supervision
- Hard copy printing and other network functions

As already described in control philosophy for CCR, it is also proposed to provide two numbers of OPC compliant gateways in the station level network such that desired interface with main plant DCS can be achieved. Two more redundant gateways along with associated RTU and modems shall be provided in the station level network for sharing information with RLDCs through PLCC link. These two would communicate through IEC: 60870:5:101 standard protocols. Two more gateways shall be configured for suitable OPC link to Central OS control room.

8.3.9 Preventive Measures for Men & Material

For the safety of man and material, various preventive measures will be taken. These are:

- Periodical checking of electrical wiring, fittings, and equipment.
- Immediate removal of all combustible and flammable material from the vicinity of sources of ignition.
- All welding/cutting operations will be carried out taking suitable precautions under permit procedure in consultation with the office-in-charge of the plant and the Fire and Safety division.
- All the pipelines and vessels will be clearly marked for its content and quantity and will also be colour coded for easy identification.
- All plant equipment, lines, vessels and storages will be inspected in all shifts for leakage and release of inflammable liquids. Any such leakage, if found will be stopped and attended to at once.
- All the hazardous areas will be marked with prominent display symbols.
- Areas where spontaneous combustion is possible due to storage of material or in scrap yard will be inspected regularly for immediate control of fire on its outbreak.

- Stacked material, which can generate heat or can spontaneously ignite, will be inspected regularly to detect any fire. Material will be stacked with sufficient space in between the rows to permit free circulation of air and remove any heat if generated.
- Plant and machinery will be operated under close supervision. Any malfunction will be attended to at once before it can lead to breakdown, fire or any such dangerous occurrence.
- Air-conditioning equipment will be inspected regularly and defects are to be attended at once.
- Dry grass and vegetation will be cut as and when required.
- Smoking will be prohibited in the plant premises. It may be allowed in the safe locations outside the plant area. All persons will be checked at plant gate for matches, lighters, beedi, cigarettes and other smoking materials.
- Safety display boards should be provided wherever hazardous chemicals are stored.

8.3.10 Responsibilities

THDC INDIA LTD. recognizes, and accepts its responsibility for establishing and maintaining a safe working environment for all its employees. This responsibility arises from:

- Company's moral responsibility to its employees, to provide the best practicable conditions of work from the point of view of health and safety.
- The obligation to consult with its staff and their representative to implement policies and procedures developed as a result of discussions.
- Statutory responsibility in respect of health, safety and welfare of employees emanating from relevant legislations such as the Factories Act. The Indian Electricity Act. The Explosive Act, the Boiler Act etc.

Responsibilities of THDC INDIA LTD

The Company shall take all such steps which are reasonably practicable to ensure best possible conditions of work, and with this end in view the company shall do the following:

- To allocate sufficient resources to provide and maintain safe and healthy conditions of work
- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment
- To ensure that adequate safety instructions are given to all employees
- To provide wherever necessary protective equipment, safety appliances and clothing, and to ensure their proper use
- To inform employees about materials, equipment or processes used in their work which are known to be potentially hazardous to health and safety
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up to date knowledge
- To provide appropriate facilities for first aid, prompt treatment of injuries and illness at work

- To provide appropriate instruction, training, retraining and supervision in health and safety and first aid and ensure that adequate publicity is given to these matters
- To ensure proper implementation of fire prevention and an appropriate fire fighting service, together with training facilities for personnel involved in this service
- To ensure that professional advice is made available wherever potentially hazardous situations exist or might arise
- To organize collection, analysis and presentation of data on accident, sickness and incident involving personal injury or injury to health with a view to taking corrective, remedial and preventive action
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees
- To publish/notify regulations, instructions and notices in the common language of employees
- To prepare separate safety rules for each type of occupation/process involved in a project
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipments, work places and operations
- To co-ordinate the activities of the company and of its contractors working on the Company's premises for the implementation and maintenance of safe systems of work, to comply with their legal obligations with regard to the health, safety and welfare of their employees.

Responsibilities of the Employees

The establishment and maintenance of best possible conditions of work is, no doubt, the responsibility of management. However, it is also necessary that each employee follows prescribed safe methods of work. He should take reasonable care for the health and safety of himself and his fellow employees and of other persons who may be affected by his action at work. With this in mind, employees should be health and safety conscious and:-

- **Report:** Potential hazards
- **Observe:** Safety rules, procedures and codes of practice.
- **Use:** With all reasonable care the tools, equipment, safety equipment and protective clothing provided by the Company; these items should be kept in good condition.
- **Participate:** In safety training courses when called upon to do so.
- **Make Use:** Of safety suggestions schemes.
- **Take:** An active and personal interest in promoting health and safety at work.

Responsibility for Implementation

- The ultimate responsibility for ensuring the implementation of the policy on health and safety at work rests on the THDC INDIA LTD. Management - Corporate Human Resources Division at the corporate level and the concerned General Managers at the Project/Station level. The Officers in charge of Safety will be functionally responsible to the Corporate

Center for ensuring that the policy is promulgated, interpreted and carried out in the manner expected.

- Immediate responsibility for safety at work is that of the Manager/ Executives of each department/section who are primarily responsible to prevent accidents involving members of their staff and other persons. It is their responsibility to issue clear and explicit working instructions, compliance with which will ensure safe working and to require the effective use of approved equipment.
- Accepted rules, procedures and codes of practice which are formulated with proper regard to health and safety consideration must be strictly observed by all concerned. Contracting Agencies executing works should be made responsible, through various measures including appropriate provisions in the contract, for discharging their safety obligations.
- In designated areas of particular hazard the concerned executives are required to authorize, in writing, the commencement of any work and, before doing so, personally satisfy themselves that all necessary safety precautions have been carried out. Such executives must themselves be authorized, in writing as competent to perform these duties.
- Safety Officers are appointed to advise management on questions of safety at work including advice on the application in particular local situations of the system of work, implementation of Company's Rules and Relevant Codes of Practices in consultation with Area Engineer. They will be consulted in the interpretation of rules and codes being formulated by the corporate management and shall advise management in the investigation and analysis of accidents and circulation of appropriate statistics.

8.3.11 Reporting of Incidents

Major Site Incidents

The General Manager at each Project/Station is required to ensure that plans are devised for action in the event of fire, major site incident or necessity for evacuation procedure. These plans must be communicated to all staff and rehearsed from time to time.

- Fire fighting training and the formation of fire-fighting team on a voluntary basis will be encouraged by the Project/Station Management.
- All accidents and dangerous occurrences will be reported immediately to the General Manager who will implement an established procedure to ensure that an investigation takes places and recommendations are made to prevent recurrence.

Reporting of Accidents and Dangerous Occurrences

With a view to ensure prompt reporting of accidents and dangerous occurrences to comply with requirements/obligations under different statutes; and to inform the concerned authorities within the organization for keeping complete information of accidents for record and analysis and to take necessary preventive actions, a procedure for reporting of accidents dangerous occurrences has been framed. Separate procedures have been formulated for accidents causing injuries/ fatalities and for dangerous occurrences.

8.4 SOCIAL IMPACT ASSESSMENT, R&R ACTION PLAN

8.4.1 Background

THDCIL (formerly known as Tehri Hydro Development Corporation India Limited) has been given the responsibility by the Government of Uttar Pradesh (GoUP) to develop commission and operate Khurja Super Thermal power Project (STPP) in the district Bulanshahr, Uttar Pradesh. Khurja Super Thermal Power Project (2x660 MW) is to be implemented with ultimate capacity of 1320 MW. The present proposal of Khurja STPP is planned as a base load, coal fired thermal power project based on super critical boiler parameters. The project is to be implemented on the land already acquired by UPSIDC. The implementation of land and consequent displacement will have potential impacts on the social, economic, cultural and environmental attributes of the affected population with specific impacts on their productive assets, sources of income, habitat, community structure, social relations, cultural identity, traditional authority and also their potential for mutual help.

The present report comprises the findings of the Social Impact Assessment and presents a Rehabilitation Action Plan (RAP) for the affected and displaced population prepared in conformity with the provisions of the Draft Resettlement and Rehabilitation Policy of the STPP and the World Bank operational policies. THDCIL will implement the RAP through non-governmental agency (NGO) and in coordination with various line departments.

Khurja Super Thermal Power Project

The plant is proposed to be setup near village Dushehra-Kherli in between Khurja & Aligarh. A total area of around 1201 acres has been identified for the proposed plant. The site is located approximately 11 km from Khurja town and 30 km from Aligarh district, a major town of Uttar Pradesh. The proposed site is surrounded by Village Dushehra Kherli, Jahanpur, Naiphal (Unchagaon) and Rukanpur. The site is approachable from NH-91. Total 1360 acres of land is required for the proposed project. The Howrah-Delhi railway line (via Kanpur & Aligarh) passes near the Western side of the site approximately at 5 km distance.

8.4.2 Measures for Minimizing Impacts

Efforts were made to minimize the adverse impacts of the project. Measures adopted for minimizing included the following:

- Site selection for construction of infrastructure and other facilities were done in such as manner which involved minimal land acquisition of private land (16.46%)
- During the design stage additional care is taken to avoid cultural and religious properties and public property
- Efforts are made to avoid displacement of habitation/settlements centres and the project activities are planned in such a way that they do not disturb the main habitation centres
- The project infrastructure locations are planned in such a way that the existing approach roads are used and laying of new approach roads is kept bare minimum to avoid land

acquisition.

8.4.3 Social Impact Assessment

The loss of properties and consequent displacement has made social impact assessment an important input into the project design while initiating and implementing developmental interventions. An understanding of the issues related to social, economic and cultural factors of the affected people is critical in the formulation of an appropriate rehabilitation plan. A detailed social impact assessment therefore was carried out incorporating social analyses and participatory processes into project design and implementation to make it responsive to social development concerns. SIA also helped in enhancing the project benefits to poor and vulnerable people while minimizing or mitigating concerns, risks and adverse impacts. Further as the project implementation entails a large number other social issues such as influx of labour during construction and others, a systematic assessment provided the basis to prepare a Social Management Plan.

8.4.4 Objectives of the Study

The main objective of the study is to ensure that the project addresses the adverse impacts on the livelihood of the people and that nobody is left worse off after implementing RAP and those affected have access to project benefits, both during project construction as well as operation. In specific, the objectives of the study are:

- To carry out a socio-economic, cultural and political/institutional analysis to identify the project stakeholders and social issues associated with the project;
- To assess the extent of land acquisition/appropriation and other losses and undertake the census of potential project affected people;
- To develop a Resettlement Action Plan (RAP) in consultation with the affected people and project authorities;
- To identify likely occurrence of HIV/AIDS resulting from the influx of outside labourers and others and develop a strategy to reduce their incidence; and
- To develop a consultation framework for participatory planning and implementation of proposed mitigation plan.

8.4.5 Scope of the Study

The study began with the identification of social issues and stakeholders and communities, including socially and economically disadvantaged communities. The focus of SIA was on identifying local population likely to be affected by the project, undertake census of those affected directly by the proposed project interventions. The scope of the study in particular included the following:

- Identifying key social issues associated with the proposed project and specify the project's social development outcomes;

- Assessing potential social and economic impacts both during the construction phase and in the operation phase;
- Reviewing policies, regulations and other provisions that related to land acquisition, resettlement and rehabilitation of project affected people and other social issues;
- Social screening of various project components and likely impacts in terms of land acquisition (loss of land, houses, livelihood, etc.), and resultant involuntary resettlement and provide inputs (in terms of magnitude of impacts and likely costs for mitigation) in preparing appropriate mitigation plans;
- Screen the social development issues in the project area and its vicinity and design the social services that may be provided by the project in order to improve the quality of life and achieve the projects economic and social goals;
- Update the profile of the population and available infrastructure facilities for services in the project affected area;
- Based on the assessment of potential social and economic impacts establish criteria that will assist in the formulation of strategies; to the extent possible maximize project benefits to the local population and minimize adverse impacts of the project interventions on the affected communities;
- Inform, consult and carry out dialogues with the project stakeholders on matters relating to project design, objectives, and implementation and provide specific recommendations to avoid/minimize high social risks;
- Screen the social development issues in the project area and its vicinity and accordingly design the social services that may have to be provided by the project in order to improve the quality of life;
- Identify likely loss of community assets (e.g. school, panchayat building) including the religious structures and common property resources (e.g. forest, grazing land) the impacts of their loss on the local population;
- Assess the impact of influx of construction workers and others (both during civil works and operation of the project) on the incidence of HIV/AIDS and other diseases and develop a strategy to control them;
- Assess the capacity institutions and mechanisms for implementing social development aspects of the project implementation including the social safeguard plans and recommend capacity building measures; and,
- Develop monitoring and evaluation mechanism to assess the social development outcomes;

8.4.6 Focus Areas of the Study

The study specifically focused on the following:

Stakeholders analysis- (i) identifying key stakeholders – project decision makers, beneficiaries, affected community, project influencers (e.g. NGOs and civil society), project implementers (project functionaries), project facilitators (other agencies) and identifying their stakes in the project; (ii) identifying key formal and informal institutions operating at village and sub-regional levels and assessing their role in community decision making processes; and (iii) assessing local capacities in

terms of participation in planning, implementation, supervision and monitoring.

Review of relevant national and state legislations and regulations pertinent to the land acquisition, resettlement and involvement of project stakeholders. Attention was paid (i) to the laws and regulations governing the social safeguards and project implementation, (ii) on the access to and exclusion of groups to the services and opportunities provided by the project.

The living patterns of vulnerable population (including tribes, scheduled castes, women, landless, etc.) in the project area and assess whether they are involved in community decision-making process.

8.4.7 Approach and Methodology

Approach and methodology mainly consist of quantitative and qualitative tools and techniques. The study was conducted in three phases.

- **PHASE – I: PRE SURVEY ACTIVITIES**

Collection and review of project literature

This phase intends to familiarize with the concerned and important stakeholders to identify and collect the available literature and to scope the activities. This involved two pronged approach (a) discussions with Project Implementing authorities and other concerned, b) collection of available Project Affected Persons database and other relevant project literature. Consultations were held with concerned village revenue officials to update the ownership of land and its utilization pattern by referring to Records of Right (ROR) or *Jamabandi* Registers. Literature review and consultations formed the basis for identification of key stakeholders.

Rapid reconnaissance survey to familiarize field activities

Following to the review and consultations, rapid preliminary field visits were conducted as part of ground truthing exercise. This is primarily observatory exercise and entails briefings by the concerned. This enabled to cross verify the issues identified in the Environmental Assessment report prepared by Mantec Consultant. This has provided the basis for field research preparation and helped in testing the questionnaires and checklists.

Scoping and other Pre survey activities

Both the review and rapid reconnaissance survey helped in finalizing the study instruments and inception report detailing the final methodology and work plan.

- **PHASE II: SURVEY ACTIVITIES**

Census and socio-economic household survey for all affected persons

The census survey of all the project-affected persons available is conducted in this phase. The survey, inter alia, has assessed the impacts of the project, the socio-economic conditions, and living standards of affected persons due to the project implementation. The following were collected during the survey:

- Socio economic conditions of affected persons
- Family structure and number of family members
- Educational levels
- Occupation and income levels
- Asset levels
- Loss of assets due to the project
- Accessibility to the community resources
- Perceptions on the resettlement and rehabilitation measures
- Perceived income restoration measures
- Grievances of affected persons
- Awareness and knowledge levels on HIV/AIDS

Qualitative Survey

Quantitative surveys may not always reveal the facts. This is particularly true when assessed for poor and vulnerable sections. Qualitative surveys were conducted for evaluation of both affected population and implementation capacities. The qualitative survey included focus group discussions and in depth interviews with various sections of people such as women, knowledgeable persons, community leaders basically to elicit their expectations and suggestions, which will support and provide additional information collected through quantitative survey.

Assessment of Livelihood Losses

The study made an attempt to identify people losing their livelihood directly or indirectly. For this the consultations were conducted among:

- People losing properties/resources
- Knowledgeable persons
- Village heads

As the resources are used commonly to specify their losses that would help in categorizing the impacts and to develop appropriate entitlements to mitigate the impacts an analysis is undertaken for the resources available and the resources lost. Also through consultations the rehabilitation strategies for those losses by way of training requirements for income generation and other remedial and restoration measures were identified.

Review of Legal Policy Provisions and Implementation Capacity

Relevant national and state legislations and regulations pertinent to the land acquisition,

resettlement were reviewed. To study implementation arrangements and its capacity in delivering the R&R services verification of these arrangements and in-depth interviews with authorities both at head office and field level were conducted.

8.4.8 ANALYSIS AND REPORTS

The information collected through structured interviews and questionnaires is systematically coded, validated, analyzed and tabulated. Wherever required, the observations are supported from the information collected through desk research.

Preparation of Social Impact Assessment Report

This is the outcome of all the above activities and also results in the preparation of social impact assessment and RAP report, which provide the socio economic risks involved and strategy to minimize the risks of the programme particularly on the vulnerable, and develop participative monitoring mechanism.

Research Tools and Instruments

Various social research tools are employed to ensure that, all issues relating to the study are adequately addressed so that a meaningful package of deliverables is developed. The entire exercise is carried out through an appropriate mix of social research techniques including desk research through review of information available with THDC, concerned other government departments and project authorities. Structured and semi-structured interviews, group discussions with the affected people and relevant government agencies and community were undertaken.
The study used various instruments to collect information for the different stakeholders involved under the project.

8.4.9 Profile of Project Area & Project Affected Population

Introduction

Proposed site near Khurja town of Uttar Pradesh is situated at 28°10.417’ to 28°08.586’ Northern latitude and between 77°55.373’ & 77°53.783’ Eastern longitude. The proposed site is situated at a distance of 11km (approx) from Khurja town and 36 km from Aligarh, one of the major towns of Uttar Pradesh. The proposed plant site is surrounded by villages Dushhara Kherli, Jahanpur, Naiphal (Unchagaon) and Rukunpur. The proposed plot is approachable from National Highway (NH-91). The Upper Ganga Canal passes through the North Eastern side of the plant. The Northern Railway main line passes near the Western side of the site. The nearest railway station is Danwar which is about 5 kms from the site. The nearest major Railway Station is at Khurja at a distance of about 11km on northern side. The nearest airport is at New Delhi at a distance of approx. 90km.

Project State-Uttar Pradesh

Uttar Pradesh is a state located in northern India. It was created on 1 April 1937 as the United Provinces, and was renamed Uttar Pradesh in 1950. Lucknow is the capital and Kanpur is the

commercial capital and the largest city of Uttar Pradesh. On 9 November 2000, a new state, Uttarakhand, was carved from the mountainous Himalayan region of Uttar Pradesh. The state lies between Longitude 770 34' 27" to 810 02' 22" E and Latitude 280 53'24" to 310 27'50" N. The state is bordered by Rajasthan to the west, Haryana and Delhi to the northwest, Uttrakhand

and the country of Nepal to the north, Bihar to the east, Jharkhand to the southeast, Chhattisgarh to the south and Madhya Pradesh to the southwest. It covers 93,933 square miles (243,290 km^2), equal to 6.88% of the total area of India, and is the fifth largest Indian state by area. With over 200 million inhabitants as of 2011, it is the most populous state in the country as well as the most populous country subdivision in the world. Hindi is the official and most widely spoken language in its 75 districts. Uttar Pradesh is the fourth largest Indian state by economy, with a GDP of 7080 billion (US$110 billion). Agriculture and service industries are the largest parts of the state's economy. The service sector comprises travel and tourism, hotel industry, real estate, insurance and financial consultancies.

Figure 25: State Map of Uttar Pradesh

Profile of Project District- Bulandshahr

The District of Bulandshahar is in Meerut division of Utter Pradesh located between Ganga and Yamuna rivers. This is situated between 28°10.417' to 28°08.586' Northern and 77°55.373' And 77°53.783' eastern longitudes. The District is about 84 km in length and 62 km is breadth. The

district is 237.44 meters above sea level. The river Ganga in the east separates this District from Moradabad and Badaun district and in the west river Yamuna separates the district from Haryana state and Delhi. In the north of district is Ghaziabad and in southeast are the borders of Aligarh district. The geographical area of the district is 4353 sq km which is about 1.48 percent of the total Uttar Pradesh area. The urban area of the district is 122.8 sq km and rural area as 4230.2 sq km. This district is near to Delhi and is in the national capital region. The nuclear atomic power plant is located at Narora town of the district. Near Sikandrabad town is located the national level satellite earth station. This is also an important grain producing agriculture District. Administratively the district is divided in to seven sub divisions Dibai, Anoopshahr, Khurja, Shikarpur, Siyana, Bulandshahar and Sikandrabad. For development purposes there are sixteen development blocks Bulandshahar, Gulaothi, Lakhaowati, Shikarpur, Khurja, Pahasu, Arniya, Sikandrabad, Anoopshahr, Dibai, Danpur, Siyana, B.B.nagar, Jahagirabad, Uncha Gaon and Aganta blocks.

An official Census 2011 detail of Bulandshahar has been released by the Directorate of Census Operations in Uttar Pradesh. Enumeration of key persons was also done by census officials in Bulandshahar District. In 2011, Bulandshahar had population of 3,499,171of which male and female were 1,845,260 and 1,653,911respectively. In 2001 census, Bulandshahar had a population of 2,913,122 of which males were 1,550,326 and remaining 1,362,796 were females. Bulandshahar District population constituted 1.75 percent of total Uttar Pradesh population. In 2001 census, this figure for Bulandshahar District was at 1.75 percent of Uttar Pradesh population. There was change of 20.12 percent in the population compared to population as per 2001. In the previous census of India 2001, Bulandshahar District recorded increase of 18.17 percent to its population compared to 1991. The data released by census India 2011, shows that density of Bulandshahar district for 2011 is 667 people per sqkm. In 2001, Bulandshahar district density was at 656 people per sq. km. Bulandshahar district administers 4,512 square kilometers of areas. Average literacy rate of Bulandshahar in 2011 were 68.88 compared to 59.50 of 2001. If things are looked out at gender wise, male and female literacy were 80.93 and 55.57 respectively. For 2001 census, same figures stood at 74.44 and 42.47 in Bulandshahar District. Total literate in Bulandshahar District were 2,031,656 of which male and female were 1,253,314 and 778,342 respectively. In 2001, Bulandshahar District had 1,408,082 in its district. With regards to Sex Ratio in Bulandshahar, it stood at 896 per 1000 male compared to 2001 census figure of 879. The average national sex ratio in India is 940 as per latest reports of Census 2011 Directorate. In 2011 census, child sex ratio is 854 girls per 1000 boys compared to figure of 867 girls per 1000 boys of 2001 census data. In census enumeration, data regarding child under 0-6 age were also collected for all districts including Bulandshahar. There were total 549,796 children under age of 0-6 against 542,329 of 2001 census. Of total 537,624, male and female were 296,558 and 253,238 respectively. Child Sex Ratio as per census 2011 was 854 compared to 867 of census 2001. In 2011, Children under 0-6 formed 15.71 percent of Bulandshahar District compared to 18.70 percent of 2001. There was net change of -2.99 percent in this compared to previous census of India. As per 2011 census, 75.21 % population of Bulandshahar districts lives in rural areas of villages. The total Bulandshahar district population living in rural areas is 2,631,742 of which males and females are 1,390,490 and 1,241,252 respectively. In rural areas of Bulandshahar district, sex ratio is 893 females per 1000 males. If child sex ratio data of Bulandshahar district in rural area is considered, figure is 850 girls per 1000 boys. Child population in the age 0-6 is 422,617 in rural areas of which males were 228,

415 and females were 194, 202. The child population comprises 16.43 % of total rural population of Bulandshahr district. Literacy rate in rural areas of Bulandshahar district is 68.71% as per census data 2011. Gender wise, male and female literacy stood at 82.10 and 53.90 percent respectively. In total, 1, 517, 979 people were literate of which males and females were 954, 110and 563, 869 respectively.

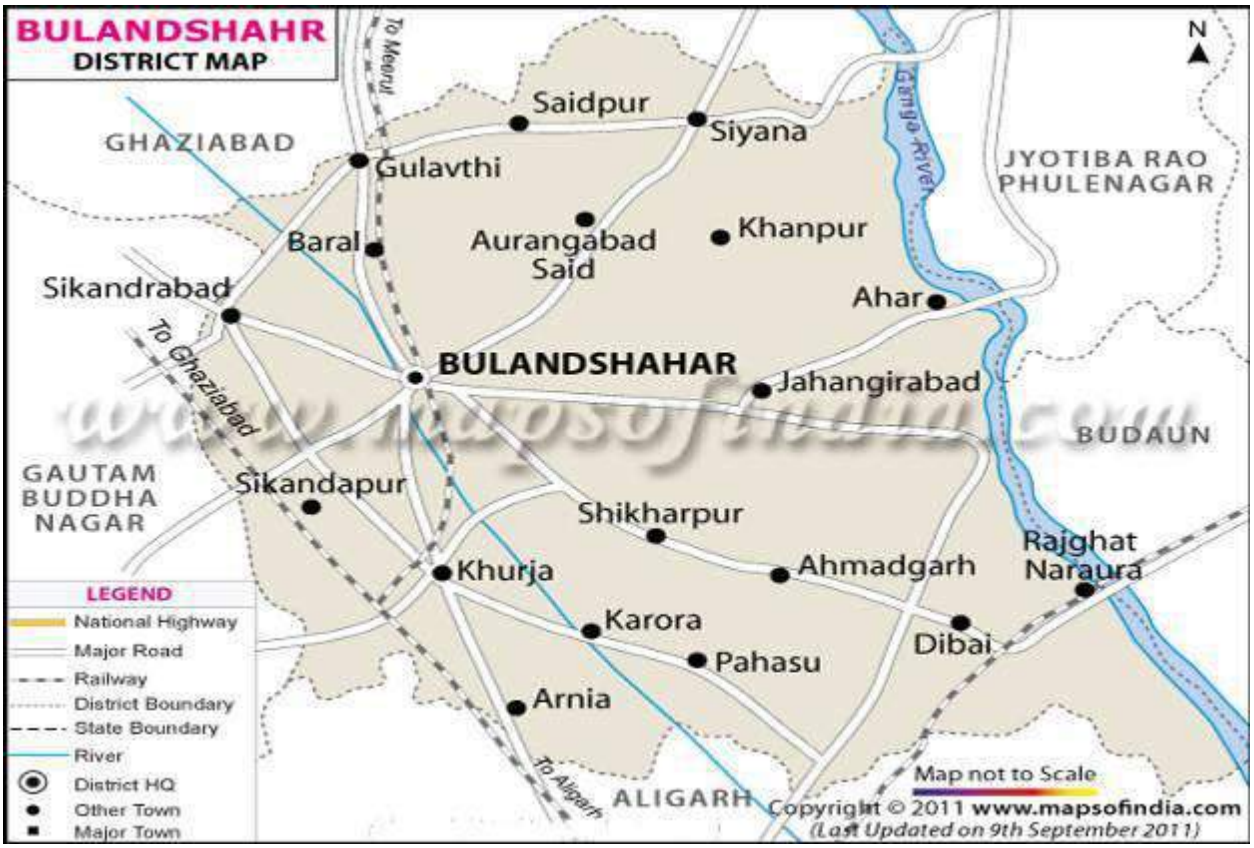

Figure 26: District Map of Bulandshahar

Socio-Economic Profile of the Project Affected Village

The demographic status of village falling in affected zone as per socio – economic survey indicate that 4 village of tehsil Khurja of district Bulandshahar will be affected. The details of affected settlement and population like demographic information, livestock and other household assets have been obtained through door to door field survey at household levels. The detail of land likely to be acquired in different village has been obtained from the concerned Revenue Authorities and the project proponent, Khurja Super Thermal Power Project.

Identification of Project Affected Families

In the present study, all the families whose land has been acquired for the project are defined as "Affected families". Further, all the displaced families, i.e., families losing their homested, due to the land acquisition, have been defined as "Directly Affected families". According to the land records **1081** families in the four villages namely Rukanpur, Dashara, Jahanpur and Unchagaon are affected

and 88 families in Nangla Rukanpur villages are directly affected (displaced) due to acquisition of land for the project. Out of the total affected families (including directly affected families), 604 families were surveued and interviewed during the study.

Profile of Project Area and Project Affected Population

- **Land Acquisition for the Project**

Also field survey for demographic profile of affected villages revealed that out of the four villages **486.262 ha.** of private and gram-sabha land has been acquired. The details of the village wise land acquired for the implementation of Khurja Super Thermal Power Project (2 x 660 MW) are given in the **Table-82** & pie chart **Figure-28.**

Table- 82: Details of the Village-wise Land Acquired for Project Implementation

S.No.	Village	Private Land acquired (ha)	Gramsamaj land acquired(ha)	Total Land acquired(ha)
1.	Rukanpur	144.32	21.562	165.882
2.	Dashara	117.692	52.724	170.416
3.	Jahanpur	68.566	18.296	86.862
4.	Naiphal Unchagaon	61.868	1.234	63.102
	GRAND TOTAL	**392.446**	**93.816**	**486.262**

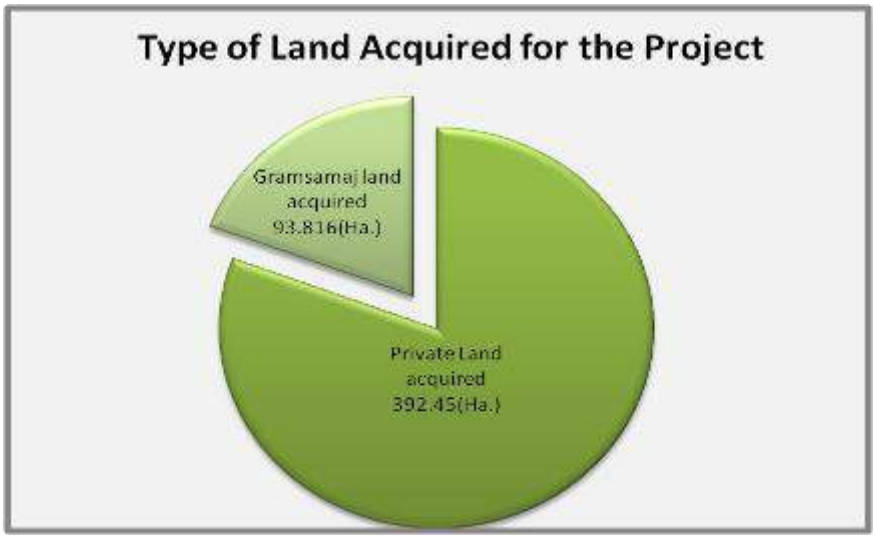

Figure 27: Type of Land Acquired for the Project

Population

The total population of the affected families is **4171** persons, comprising 805 females per 1000 males. Amongst the scheduled castes, there are 754 females/ 1000 males. Social structure of the

affected families, based on the Village survey conducted in October 2013 is presented through Tables 83 & 84.

Table- 83: Gender-wise Population Status of the Project Affected Families

Sl. No	Name of the Village	Population			SC Population			Females/1000 males	
		Total	Male	Female	Total	Male	Female	Total	SC
1	Dashahara Kherli	1176	621	555	296	170	126	894	741
2	Jahanpur	582	320	262	39	22	17	550	773
3	Naiphal Urf Uchangaon	811	480	331	610	330	280	690	848
4	Rukanpur	1602	890	712	830	490	340	800	694
		4171	**2311**	**1860**	**1775**	**1012**	**763**	**805**	**754**

(Source: Village survey October 2013)

Out of the total affected families, 42.5% belong to Schedule Caste. There are no schedule tribefamilies in the affected villages.

Table- 84: Social Structure of the Project Affected Families

Village	Number of Family	Population			Proportion (%)		Sex Ratio, Female per 1000 Male		
		Total	SC	ST	SC	ST	Total	SC	ST
Dashahara Kherli	287	1176	296	0	26.29	0	894	741	0
Jahanpur	153	582	39	0	6.37	0	550	773	0
Naiphal Urf Uchangaon	219	811	610	0	75.21	0	690	848	0
Rukanpur	422	1602	830	0	51.81	0	800	694	0
TOTAL	**1031**	**4171**	**1775**	0	42.50	0	**805**	**754**	0

(Source: Village survey October 2013)

Literacy status of the study area

The total number of literate within the Project Affected Families is 3339, comprising **80.05%** of total affected population. Male literates form 89.70% of affected male population, and female literates form 68.06% of affected female population.Villagewise status of literacy amongst the project affected families is givenbelow in **Table-85** & pie chart **Figure-29**

Table- 85: Literacy Status of the Project Affected Families

Village	Total Literacy			Literates % of Affected Population		
	Total	Male	Female	Total	Male	Female
Dashahara Kherli	961	577	384	81.71	92.91	69,19
Jahanpur	455	278	177	78.18	86.88	67.56

Naiphal Urf Uchangaon	620	397	223	76.47	82.71	67.37
Rukanpur	1303	821	482	81.34	92.25	67.70
TOTAL	**3339**	**2073**	**1266**	**80.05**	**89.70**	**68.06**

(Source: Village survey October 2013)

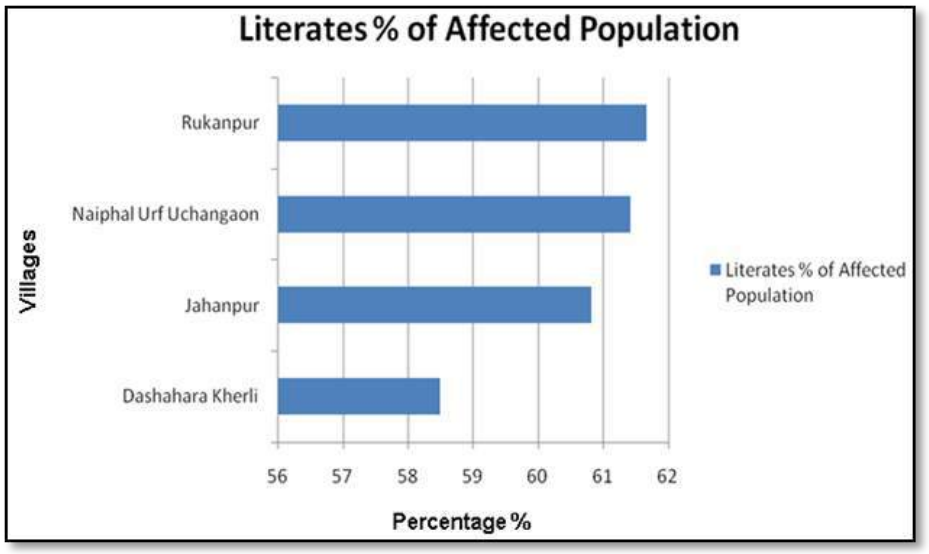

Figure 28: Literacy Status of the Project Affected Families

Occupational structure

The occupational structure of the population in the Project Affected Families has been studied with reference to the total workers and non-workers. Further total workers grouped into two categories, main workers and marginal workers. Main workers have been grouped into four categories namely Cultivators, agricultural laborers, household workers and other workers. The details of these groups are discussed below-

Total workers

Work is defined as participation in any economically productive activity with or without compensation, wage. Such participation may be physical and/ or mental in nature. Work involves not only actual work but also include supervision and direction of work. It even includes part time help or unpaid work on farm, family enterprise or its economic activity. All persons engaged in 'work' as defined above are workers. Detailed status of occupational structure is given below in **Table-86, 87, 88** & pie chart **Figure-30.**

There are total **2156** no. of workers are Project Affected Families which is **51.69 %** of total population Out of which **61.09%** is male and only **38.91%** is female. Total workers further divided into main workers and marginal workers.

Main workers

Those workers who had worked for the major part of the reference period (i.e. 6 months or more) are term main workers. Total number of main workers in the study area is **1015** which are **47.08%** of total workers and **24.33%** of total population.

Marginal Workers

The marginal workers are those workers, who are engaged in some work for a period of less than six months, during the reference year prior to the census survey. Total number of marginal workers in Project Affected families is **1141** which is approx**. 52.92%** of the total workers.

Table- 86: Total workers, Main Worker & Marginal Worker in the Project Affected Families

Village	Total Worker			Main Worker			Marginal Worker		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Dashahara Kherli	555	374	181	236	162	74	319	172	147
Jahanpur	450	269	181	201	136	65	249	134	115
Naiphal Urf Uchangaon	521	314	207	241	154	87	280	156	124
Rukanpur	630	360	270	337	189	148	293	173	120
TOTAL	**2156**	**1317**	**839**	**1015**	**641**	**374**	**1141**	**635**	**506**

(Source: As per survey October 2013)

Cultivators

A person is classified as cultivator if he or she is engaged in cultivation of her/his own land or from government land or held from private persons or institutions for payment in money, kind or share. Cultivation work includes effective supervision or direction in cultivation. A person who has given out her/his land to another person or institution(s) for cultivation for money, kind or share of crop and who does not even supervise or direct cultivation process is not treated as cultivator. Similarly, a person working on another person's land for wages in cash or kind or combination of both is not treated as cultivator. Total cultivators in Project Affected area are 5580, which forms 57.14% of the total main workers.

Non Workers

The non-workers include those engaged in unpaid household duties, students, retired persons, dependants, beggars etc. The total number of non-workers population is **2015** which is **48.31 %** of the total population. Out of the total non-workers, **49.33%** are males and **50.67%** are females. Male non-workers comprise 43.01% of male population and female non-workers comprose 54.89% of female population.

Table- 87: Occupational Pattern in the Project Affected Families

Village	Total population			Total Worker			Non Worker		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Dashahara Kherli	1176	621	555	555	374	181	521	247	374
Jahanpur	582	320	262	450	269	181	132	51	81
Naiphal Urf Uchangaon	811	480	331	521	314	207	290	166	124
Rukanpur	1602	890	712	630	360	270	972	530	442
TOTAL	**4171**	**2311**	**1860**	**2156**	**1317**	**839**	**2015**	**994**	**1021**

(Source: As per survey October 2013)

Agricultural Laborer

Agricultural Laborers Persons working on the land of others for wages or share in the yield have been treated as agricultural laborers. The total workers of this category are about **215** in which forms 21.18% of total main workers.

Other Workers

All workers, i.e., those who have been engaged in some ecs onomic activity during the last one-year are other workers. The type of workers that come under this category is government servants, municipal employees, teachers, factory workers, plantation workers, those engaged in trading, transport, banking, mining, construction, political or social work, priests, entertainment artist, etc. In effect, all workers except cultivators or agricultural laborers or household industry workers are other workers. The total workers of this category are 512, which is 21.67% of total main workers.

Table- 88: Break-up of Main Workers in the project Affected families

Village	Main Workers	Cultivators	Agricutural labourers	Other Workers
Dashahara Kherli	236	188	6	42
Jahanpur	201	114	66	21
Naiphal Urf Uchangaon	241	162	21	58
Rukanpur	337	116	122	99
Total	**1015**	580	215	220

Source: As per survey October 2013)

Infrastructural Facilities and Amenities in the Project Affected Families

A review of infra structural facilities and amenities existing in the area has been done on the basis of the information given in census Data of 2011. Infra structural facilities and amenities like education, Health, Drinking Water, Electricity. And transport and communication network are though existent yet their number is not lucrative.

- **Medical Facilities**

According to the village survey October 2013, there are No hospital, Dispensaries Maternity home, Health welfare Centers, and Nursing homes. However, there are 3 Private and Subsidized Medical Practitioners and 8 Community Health Workers in the Study area. The status of Project Affected Families is given in **Table-89.**

Table- 89: Medical Facilities of the Project Affected Families

MEDICAL FACILITIES	Number
Allopathic Hospital	NIL
Ayurvedic Hospital	NIL
Allopathic Dispensary	NIL
Child Welfare Centers	NIL
Health Center	NIL
Primary Health Center	NIL
Primary Health Sub Center	NIL
Family Welfare Center	NIL
T.B. Clinic (with Dots Center)	NIL
Nursing Home	NIL
Registered Private Medical Practitioners	1
Subsidized Medical Practitioners	2
Community Health Workers	8
Total Numbers	**11**

(Source: village survey October 2013)

Educational Facilities

There are 4 Primary / elementary school, 4 Middle school and 1other education facilities in the project affected area. However there is no training school found in the Project Affected Families. The educational facilities within the Project Affected area are presented in **Table-90.**

Table- 90: Education Facilities of the Project Affected Families

EDUCATIONAL FACILITIES	NO. OF INSTITUTION
Primary / Elementary school	4
Middle school	4
Secondary School/ Senior Secondary School	NIL
College	NIL
Industrial School	NIL

(Source: village survey October 2013)

Drinking Water

As per village survey Data of 2013 all the village in the Project Affected Families has one of other Source of drinking water. The major source of drinking water in the Project Affected Families is hand pump (4 villages) followed by tube well 3 villages 2 villages have tap water facility. During summer, the drinking water facilities within the Project Affected area are presented in **Table-91.**

Table- 91: Drinking Water Facilities of the Project Affected Families

DRINKING WATER FACILITIES	NUMBER
Hand pump	35
Tube well	6
Tap water	NIL
Well Water	NIL
Canal Water	1

River Water	NIL
Tank	NIL
Lake	2

(Source: village survey October 2013)

Post and Telegraph

Out of the 4 villages in the Project Affected Families one village have post office facility. The post and telegraph facilities in the Project Affected Families depicted in **Table-92.**

Table- 92: Post & Telegraph Facilities of the Project Affected Families

FACILITIES	VILLAGES
Post Office	1
Telephone center	1
Telephone connection	2
Density of Telephone	NIL
Density of Telephone	NIL
PCO STD	2
PCO Rural	2

(Source: village survey October 2013)

Power Supply

Out of the 4 villages in the Project affected families all the four villages have power supply. The number of villages having electricity for domestic, agriculture and for all purpose is shown in **Table-93.**

Table- 93: Electricity Facilities of the Project Affected Families

CATEGORIES	VILLAGES
For domestic Use	40%
For Agriculture Use	60%

(Source: village survey October 2013)

Transport

The mode of transport in the Project Affected families is mainly Private tempos / autos along with state transport / private bus services. As per survey of 2013, out of the 4 villages in the Project Affected families have bus services.

Banking and Credit Society Facility

As per the census Data 2011, banking facility is available in the form of one Commercial Bank, one Rural Bank, and no Co-Operative Bank in the study area district shown in **Table-94**.

Table- 94: Banking Facilities of the Project Affected Families

BANKING COMMERCIAL	NUMBERS
Commercial Bank	1
Rural Bank	1
Co-Operative Bank	NIL

(Source: village survey October 2013)

8.4.10 Resettlement and Rehabilitation Action Plan

Introduction

Rehabilitation and Resettlement Plan (R & R Plan) is one of the most important aspects in EIA studies because it fulfills the aspiration of local people and establishes the relationship between local people and project developers. The importance of Rehabilitation and Resettlement Plan in the state like Uttar Pradesh is much more as compared to other states as livelihood of most of the inhabitants depends mostly on Agriculture. The R & R plan has therefore been aimed to fulfill the aspiration, rights and privileges of local people and comprehensive social development plan Apart from the National Policy on Rehabilitation & Resettlement (2007), there are many other policies applicable to various states and sectors, which suggest more relief packages for the project affected families. The Purposed R & R plan is aimed to fulfill the aspiration of local inhabitants and ensures good share of jobs in the projects. The main objective of the new policy is to provide appropriate and adequate compensation to the affected families against the diversion of land, , to minimize the displacement, to provide adequate infrastructure facilities at rehabilitation site, to improve the living standard of affected zone and to facilitate the harmonious relationship between requiring body and inhabitants of affected zone.

The site for rehabilitation and resettlement has been identified. The proposed R & R plan for the affected persons or families of Khurja Super Thermal power Project follows the guidelines of land acquisition, Rehabilitation and Resettlement act-2013. Though, the policy was compared with NPRR (2007) and the provisions not included in the former policy were also mentioned in proposed plan to provide better packages.

Methodology

Rehabilitation and Resettlement Plan has emphasized that the project shall play a positive role in their socio-economic upliftment and also for betterment of quality of life of rehabilitees. In addition to the rightful compensation, the provisions of Rehabilitation, Relief, Local Area Development Programme has been proposed for the Khurja Super Thermal power Project in Bulandshahar

district. The individual land holding in the affected area was lacking, therefore, survey was carried out for community lands and displaced households. All families, having the right of exploitation on community land, were considered as affected families. The surveys and preparation of the plan included the following procedure:

- Due to the non availability of revenue records, the land for the acquisition was identified by the project authority with panchayat members concerned.
- Door to door socio-economic survey of the project-affected families/owner was conducted to collect the base line data. Data was collected on various parameters of Quality of life, Income patterns, Land holdings, Amount of land loss due to this project, etc. This detailed information has been used in preparation of the R&R plan.
- The existing socio-economic profile of the project-affected area has been given in the EIA report.
- Discussion was held with all project affected families/persons, who have expressed their willingness to accept the project.

Brief Socio-Economic Profile

The proposed Khurja Super Thermal power Project under the jurisdiction of Khurja Tehsil district Bulandshahar in Uttar Pradesh. Detailed socio-culture and economic profiles of all administrative units, affected villages and affected families are given in EIA report of Khurja Super Thermal power Project. A brief description for the same is given below. The total population of Uttar Pradesh is 199812341 with a sex ratio of 912 (Census, 2011). Average literacy in Uttar Pradesh is 57.25% with maximum in males (59.64%). Administratively, Uttar Pradesh is divided into 71 districts. According to Census (2011) the total population of Bulandshahar district is 3,499.171 with sex ratio of 896. The scheduled tribe (ST) population accounts for 0.006% of the total population in the district. The district recorded a total literacy rate of 68.88%.Total population of Khurja Tehsil is 401,579 comes from 63,667 households (Census, 2011). Sex ratio of the Tehsil is 892 Khurja circle is in habited by 0% of tribal population. Literacy rate of Khurja Tehsil is 68.72%.

- **Affected Families** Total population of affected families is **4171**. All families belong to General and Scheduled Caste. Average literacy rate in the affected families is **60.58**% with maximum in male population. About **79.55**% people among the project affected families are employed in various works. Majority of the persons are engaged in the cultivation followed by labourer works and government/private jobs. The livestock population of the project affected families comprise of cow, Goat, sheep, pigs and chicken. Buffalo is the main source of milk in the surrounding. Nearly 60% of the families come under the category of BPL. About 20% of the families are consumers of LPG while all families use wood as main fuel. In general, the living standard is not satisfactory, the area requires economic upliftment.
- **Directly Affected Village** A part of Rukanpur villages (Nagla) is directly affected due to the various activities of Khurja Super Thermal power Project. The directly affected families is **88** and directly affected population is **452**, coming from **88** families. The 88 affected families of Nagla village are not land owners. Average sex ratio among the directly affected families is **907**. Literacy rate in directly affected village are **54.42%** which is maximum in male population. In the directly affected villages cultivation is the main occupation of the

people here. The agricultural practices are poorly developed in the area. Maize, millets and rice are main crops in the area. Detailed status of social structure is given below in **Table-95** & bar chart **Figure-29.**

Table- 95: Social Structure of the Directly Affected Families

Village	Family	Population	Male	Female	SC	ST	Literate	Sex Ratio, Female per 1000 Male
Rukanpur	88	452	237	215	452	0	246	907

(Source: As per survey October 2013)

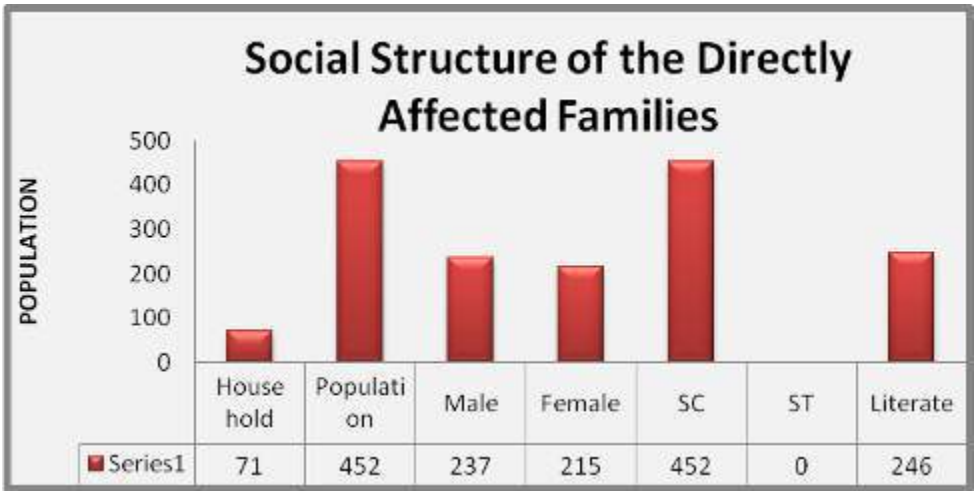

Figure 29: Social Structure of the Directly Affected Families

Occupational structure

The occupational structure of the population in the study area has been studied with reference to the total workers and non-workers .Further total workers grouped in to two categories, main workers and marginal workers. Main workers have been grouped into four categories namely Cultivators, agricultural laborers, household workers and other workers. The details of these groups are discussed below. Detailed status of occupational status is givenbelow in **Table-96** & pie chart **Figure-30**

Table- 96: Occupational Structure of the Directly Affected Families

Village	Main Worker	Marginal Worker	Non Worker
Rukanpur	79	97	276

(Source: As per survey October 2013)

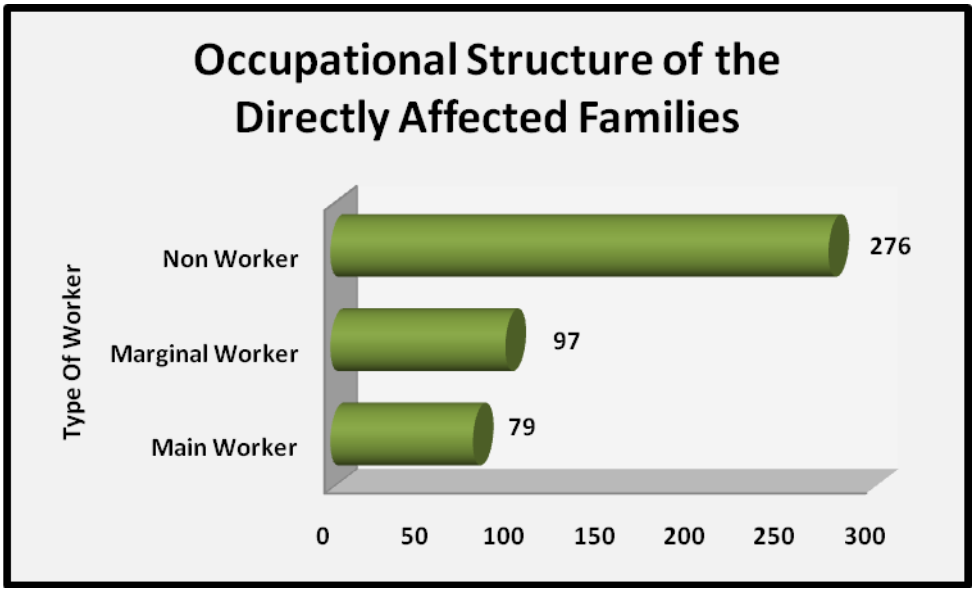

Figure 30: Social Structure of the Directly Affected Families: Occupational Structure of the Directly Affected Families

RESETTLEMENT POLICY AND LEGAL FRAMEWORK

Resettlement and Rehabilitation Package

Resettlement and rehabilitation package is primarily based on the Rehabilitation and Resettlement Policy of Uttar Pradesh Government (2011), supplemented by National Policy on the Resettlement and Rehabilitation (2007) and Rehabilitation and Resettlement act-2013.

Definitions

The various terms which are relevant to the proposed project are described in following paragraphs. The definition of the various expressions used in this policy is the same as defined under the chapter III of NPRR (2007) except 'Community' 'Affected area'

a)"Administrator for Rehabilitation and Resettlement" means an officer not below the rank of District Collector or commissioner in a State appointed for the purpose of rehabilitation and resettlement of affected persons.

b)"Affected family" means:

i) A family whose primary place of residence or other property or source of livelihood is adversely affected by the acquisition of land for a project or involuntary displacement for any other reason or

ii) Any tenure holder, tenant, lessee or owner of other property, who on account of Acquisition of land (including plot in the abadi or other property) in the affected area or otherwise, has been involuntarily displaced from such land or other property; or

iii) any agricultural or non-agricultural labourer, landless person (not having homestead land, agricultural land, or either homestead or agricultural land), rural artisan, small trader or self-employed person; who has been residing or engaged in any trade, business, occupation or vocation continuously for a period of not less than three years preceding the date of declaration of the affected area, and who has been deprived of earning his livelihood or alienated wholly or

substantially from the main source of his trade, business, occupation or vocation because of the acquisition of land in the affected area or being involuntarily displaced for any other reason.

c)"Affected area" means area of village or locality notified by the state government under paragraph of 7.1.2 of the R & R policy of State Government under paragraph 6.1 of NPRR (2007);

d)"Agricultural land" includes lands being used for the purpose of

I) Agriculture or horticulture;

ii) Dairy farming, poultry farming, pisciculture, breeding of livestock or nursery growing medicinal herbs;

iii) Raising of crops, grass or garden produce; and

IV) Land used by an agriculturist for the grazing of cattle, but does not include land used for cutting of wood only;

e)"Appropriate Government" means,-

i) In relation to the acquisition of land for the purposes of the Union, the Central government;

ii) In relation to a project which is executed by the Central Government agency or under taking or by any other agency on the orders or directions of the Central Government, the Central government;

iii) In relation to the acquisition of land for purposes other than (i) and (ii) above, the State Government; and

IV) In relation to the rehabilitation and resettlement of persons involuntarily displaced due to any other .reason, the State Government;

f)"BPL family" The below poverty line (BPL) families shall be those as defined by the Planning Commission of India from time to time and included in a BPL list for the time being in force.

g)"Commissioner for Rehabilitation and Resettlement" means the Commissioner for Rehabilitation and Resettlement appointed by the State Government not below the rank of Commissioner ' or of equivalent rank of that Government.

h)"Family"includes a person, his' or her spouse, minor sons, unmarried daughters, minor brothers, unmarried sisters, father, mother and other relatives residing with him or her and dependent on him or her for their livelihood; and includes "nuclear family" consisting of a person , his or her spouse and minor children.

I)"Holding" means the total land held by a person as an occupant or tenant or as both.

j)"Land acquisition" or "acquisition of land" means acquisition of land under the Land Acquisition Act, 1894 (1 of 1894), as amended from time to time, or any other law of the Union or a State for the time being in force.

K)"Notification" means a notification published in the Gazette of India or, as the case may be the Gazette of a State.

j)"Occupiers" means member of the Scheduled Tribe in possession of forest land prior to the 13thday of December, 2005;

m)"Project" means a project involving involuntary displacement of people, irrespective of the number of persons affected;

n)"Requiring body" means a company, a body corporate, an institution, or any other organization for whom land is to be acquired by the appropriate Government, and includes the appropriate Government if the acquisition of land is for such Government either for its own use or for subsequent transfer of such land in public interest to a company, a body corporate, an

institution, or any other organization, as the case may be, under lease, license or through any other system of transfer of land;
o)"Community" means the resident of a village as a whole, clan, sub-clan or kindred.

Objectives of the National Rehabilitation and Resettlement Policy

The main objective of the study is to ensure that the project addresses the adverse impacts on the livelihood of the people and that nobody is left worse off after implementing NRARP and those affected have access to project benefits, both during project construction as well as operation in specific, the objectives of the Project Affected area.

Policy Objectives

- To provide appropriate compensation, social and physical resettlement services as well as community services.
- To improve their life style and resettle the PAF according to the preference of Village unit, village group or families.
- To ensure the environment sustainability as per transparency and partnership.

R&R PLAN Requisites

- To provide compensation of land, house, standing crops and other properties
- Identification of land for Rehabilitation and Resettlement
- Planning and Development of R&R site for housing and other civic amenities such as road, drainage, water supply, electricity, sanitation, school and health care etc.
- To provide homestead land for resettlement for house and agricultural land as per availability at R&R site
- To provide employment opportunities in Project
- Identification of educational and vocational training programme that could be imparted to the affected population for employment, self-employment etc
- To established a co-operative society of affected people (displaced)
- To build up a clear understanding of social, cultural and ethnic tribe of the people
- Relocation and construction of Temple and other religious monuments
- Extension of project facilities such as educational and health care to the affected people
- Development of Entrepreneurial capabilities and capacity buildings
- Better living standard on sustainable basis for oustees
- Monitoring and evaluation of R&R plan Sufficient provision in the project cost for R&R plan

Entitlement Framework

According to the National rehabilitation and resettlement Policy-2007, SIA is required only when the number of families affected is equal to or more than 400 in Plain Area or 200 in case of tribal or hilly area. However, for affected families proper R&R plan shall be prepared based on the number of affected people and their assets.

According to the National rehabilitation and resettlement Policy -2007, whereas Option 3 is based on negotiated settlement. Of the affected families from which land and/or houses will be acquired, have a chosen Option 1 Option 2& Option 3. The following is a summary of the three options.

Option-1

- As per the category of affected families, eligible families are entitled to a Rehabilitation Grant ranging from Rs. 50,000 to Rs. 100,000 plus a Subsistence Grant of 300 days of minimum agricultural wages (MAW)
- The amount paid for land would include the compensation amount, solarium (30% of the compensation amount), interest (12% from the date of award), and R&R assistance.

Option -2

Which is based on negotiated settlement involves the following:

- Khurja Super Thermal power Project will seek a negotiated settlement with the affected community. The unit of negotiation is one fiftieth of a hectare equivalent to 200 sq. m the negotiated amount will be based on the prevailing market rate and will also consider the post project value of the land, and interest of 12% from the date of award
- Any negotiated land compensation amount above the government Circle Rate will be paid by Khurja Super Thermal power Project.
- Even if any project affected person (PAP) has a landholding of less than one fiftieth of a hectare equivalent to 200 sq. m.

Option -3

- Further, in cases of involuntary displacement of two hundred or more Scheduled Tribes families from the Scheduled Areas, the concerned Tribes Advisory Councils (TACs) may also be consulted.
- Each affected family of Scheduled Tribe followed by Scheduled Caste categories shall be given' preference in allotment of land-for-land, if Government land is available in the resettlement area.

Land Acquisition, Rehabilitation And Resettlement Act, 2013

According to the land acquisition, rehabilitation and resettlement act, 2013 if any Family is affected by this project then the R & R act, 2013 will be implemented.

1. **Provision of housing units in case of displacement**

(a) If a house is lost in rural areas. A constructed house shall be provided as per the Indra Awas Yojana specification. If a house is lost in urban area a constructed house shall be provided which will be not less than 50 sq mts in plinth area

(b) If any affected family in rural areas so prefers. The equivalent cost of the house may be offered in lieu of the constructed house.

2. **Allotment of Developed Land:** In cases where the land is acquired for urbanization purposes 20% of the developed land will be reserved and offered to land owning project

affected families in proportion to the area of their land acquired and at a price equal to the cost of acquisition and the cost of development

3. **Allotment of Residential plots:** If a person becomes landless, a 40 sq. meter residential plot shall be given free.
4. **Choice of Annuity:**
   The appropriate government shall ensure that the affected families are provided with the following options.

(a) Onetime payment of five lakhs rupees per affected family.

(b) Annuity policies that shall pay not less than two thousand rupees per month per family for twenty years with appropriate indexation to the consumer price index for agricultural labourers.

5. **Subsistence grant for displaced families for a period of one year:**

(a) Each affected family which is displaced from the land acquired shall be given a monthly subsistence allowance equivalent to three thousand rupees per month for a period of one year from the date of award. In addition to this amount, the scheduled castes and the scheduled tribes displaced from scheduled areas shall receive an amount equivalent to fifty thousand rupees.

(b) In cases of displacement from the scheduled areas as far as possible the affected families shall be relocated in a similar ecological zone, so as to preserve the economic opportunities language, culture and community life of the tribal communities.

6. **Transportation cost for displaced families:** Each affected family which is displaced shall get a one – time financial assistance of fifty thousand rupees as transportation cost for shifting of the family, building material, belongings and cattle.
7. **One time Resettlement Allowance:** Each affected family shall be given a one- time "Resettlement Allowance" of fifty thousand rupees only.
8. **Stamp duty and registration fees:**

(1) The stamp duty and other fees payable for registration of the land or house allotted to the affected families shall be borne by the requiring body.

(2) The land for house allotted to the affected families shall be fees from all encumbrances.

(3) The land or house allotted may be in the joint names of wife and husband of the affected family.

Peripheral Development Plan

The peripheral development plan is proposed here to improve the quality of life and infrastructure in the area. The plan is primarily applicable in the influence zone; inhabited by a total population of **4171** (Village Survey 2013) comes from **1727** families of four villages. Entire area is inhabited by affected families, so that emphasis has been given to vulnerable persons and BPL families. The following provisions have been made towards the peripheral development.

Scope

The project authorities directly as well as through their contractors would ensure that local population gets good number of jobs. The jobs, however, would be determined by the qualifications

and experience of the persons willing to be employed. It will also provide an opportunity to many unskilled youth to become skilled. By gaining technical knowledge and experience, their chances of gainful employment will be greatly enhanced. Enhancing the local people's skills and opportunities for employment the project would result in uplifting the standard of living and the existing quality of life of the local inhabitants. This would go a long way in making the area economically self-sustaining.

Besides generating local employment for the skilled and un-skilled labourers, the project would also provide an opportunity for the local people to compete for various contracts related to project works, depending on their economic status. The participation in this process would, however, be guided by the usual process of tendering. The project authority would ensure as far as possible, to engage local labourers in various skilled/non-skilled jobs depending on a candidate's qualifications and experience. In addition, local people would be beneficiaries of the following facilities, established in the periphery.

The area is poor in the education facilities. The project authorities would establish educational institutions in the area for children/ wards of their project employees. These institutions shall also be open to the children of the local inhabitants. At some places, grant should be provided for the maintenance and up gradation of existing educational institutions which would be a great benefit for the local residents.

The project authorities would establish healthcare facilities in terms of healthcare centers and primary health centre at a few affected villages and for their employees. These centers shall extend services to the local people. Project authorities would provide mobile vans for emergency services in the area.

The project authorities would construct and establish club/playgrounds for the project employees/ sports competitions and sports meets would be organized between the local players and project employees which would ensure the local participation. This will also provide them necessary facilities for excelling in sports of their choice. These facilities would go a long way in honing and nurturing the local talent in the field of sports and competitive games.

In addition to education, health and sports facilities, the requiring body would play a vital role in strengthening the communication and transportation facilities. The various others programmes like skill up gradation, merit scholarship programme, training programme etc. will be run in the area Provision of green belt in the periphery of the reservoir, landscaping and establishment of botanic gardens/butterfly parks will enhance the scenic beauty and tourist spots of the area and attract the local and outside tourists.

Proposed Plan of Action

Considering the peripheral development plan of nearby Khurja Super Thermal power Project following provisions have been made in this contribution.

Education Facilities: The area is poor in the education facilities. The project authorities would establish educational institutions in the area for the children/wards of their project employees. These institutions shall also be open to the children of the local inhabitants. At some places, grant

should be provided for the maintenance and up gradation of existing educational institutions which would be a great benefit for the local residents.

Medical Facilities: The project authorities would establish healthcare facilities in terms of healthcare centers and primary health centre at a few affected villages and for their employees. These centers shall extend services to the local people. Project authorities would provide mobile vans for emergency services in the area.

Sanitation Facilities: The area is poor in having the Sanitation facilities, which can be attributed to the sparse population.

Training Programme: Following the clause 7.13.2 of NPRR, the affected persons shall be offered the necessary training facilities for development of entrepreneurship, technical and professional skills for self employment.

Training on the mushroom cultivation, computer courses, apiculture, vermiculture, ecotourism, poultry farming, dairy farming, knitting, sewing etc. could open new areas of self employment in the region.

Magnitude and Significance Of Impacts

Land Acquisition and Impacts

Introduction

The THDC has acquired public and private land from title holders located in 4 villages. The acquisition of land and consequent displacement will have potential impacts on the social, economic, cultural and environmental attributes of the affected population with specific impacts on their productive assets, sources of income, habitat, community structure, social relations, cultural identity, traditional authority and also their potential for mutual help. The present chapter deals with the assessment of land acquisition and other assets and their impacts on Project Affected Population.

Loss of Land

The land requirement for Khurja STPP is about 486.262 Ha. Private & government land is about to be acquired from four villages, namely Rukanpur, Dashara, Jahanpur, and Naiphal Unchagaon, which is likely to affect about 4171 persons. In addition, during construction of Khurja STPP, there could be indirect impacts due to immigration of work force.

Socio-Demographic Features Of Vulnerable Groups

Impact Of Displacement On Vulnerable

A part of Rukanpur village is vulnerable group affected due to the various activities of Khurja Super Thermal power Project. The vulnerable groups affected families are 88 and vulnerable groups population is 452, coming from these 88 families. The resultants PAFs as per the R&R Policy are 88. The number of PAFs (88) affected under vulnerable group of Women Headed Families do not necessarily are from the respective number of families identified as affected, and include all the other PAFs who are women and identified in families which are not headed by a women. Similar is the case with the other vulnerable group of SCs. Population wise a total of 452 represent the

vulnerable group. The 88 families of Nagla village who will be displaced due to project are not authorized land owners of the Nagla village.

Impact of Project on Local Infrastructure

The project site is about 11 km. from Khurja town and well connected to the Bulandshahar City through National Highway (NH-91). The study area has moderate levels of infrastructural facilities and basic amenities, which will improve further after commissioning of Khurja STPP. The project will have a permanent Township over an area of 100 acres, consisting of residential buildings of different categories for THDC Staff and CISF, non-residential buildings like field hostel, trainee's hostel, guest house, hospital, shopping center, schools, recreation center, auditorium, stadium, petrol pump, police station, etc. Further, the plant and township areas shall be provided with approach roads and internal roads, water supply system, drainage and sewerage systems, sewage treatment plant, horticulture and landscaping plans etc. Therefore, there will be no adverse impacts on the local infrastructure. In fact, the local people will benefit from the infrastructure developed by THDC. Impact on health, if any, could be due to air pollution, water pollution, noise pollution and solid waste disposal. Implementation and efficient operation of various pollution control measures to restrict the pollution as well as ambient environmental conditions to regulatory standards will ensure minimum impact on human health. Implementation of Environmental Management Plan and Disaster Management Plan shall ensure that the probability of undesired events and consequence

Mitigation Measures

A detailed socio-economic survey of the Project Affected Persons (PAPs) due to land acquisition and an area within 10 km radius of the project site has been undertaken through Mantec Consultants Pvt, Ltd. The study was completed in October 2013. For rehabilitation of Nagla villagers (88 Families) the land requirement has been assessed as around 1.2118 hectare. THDCIL along with the district administration have identified 1.367 ha Gram Sabha land for rehabilitation of Nagla villagers outside the Plant boundary. The land has also been visited by Distt. Magistrate, Bulandshahr who have found the same suitable for rehabilitation of Nagla villagers. Approval from competent authority has been obtained for construction of EWS (Economical Weaker Section) accommodation on above land through UPRNN after acquiring the land thorough Distt. Administration. THDCIL will soon start the work regarding contruction of EWS after physical possession of 1.367 hact Gram Sabha land to them.

Also, based on the various findings and recommendations of the socio-economic survey, a Draft Rehabilitation and Resettlement (R&R) Plan has been formulated for the Project Affected Persons (PAPs) as per Government of Uttar Pradesh (UP) R&R Policy circulated vide U.P. Govt. Order No-632/1-13-11-20(29) 2004 dated 02.06.2011 and Land Acquisition Act-2013. The Draft R&R Plan is subject to its finalization in consultation with the stakeholders. In addition to the infrastructural development within the premises of THDCIL, THDCIL has also planned various community development and infrastructural development activities in the surrounding areas under R&R Plan, such as provision of drinking water and sanitation, roads and drains, community/ play grounds, street lights etc. The common property resources acquired shall be restored at the cost of THDCIL. During the construction phase, temporary hutments will be constructed for the labour force. The

labour colony shall be provided drinking water and sanitation facilities. Temporary toilets will be constructed for the work force during construction period. Suitable septic tanks and soak pits of appropriate capacities will be constructed for treatment of sewage before disposal.

Grievance Redress Mechanism

For redress of grievances of affected persons in all respects to Land Acquisition (LA) and payment of compensation various provisions under LA act enable to represent their cases to Land Acquisition Officer or even refer to court for redress and seek higher compensation. However, as this process is time consuming and does not cover the issues related to rehabilitation assistance, which result in delay of implementation of projects. This section present the details of grievance redress system adopted to address the grievances of the PAPs under the project

As per the Draft R&R Policy of the project the grievance redress system adopted for the project is simple and involves bottom up approach where in the aggrieved person on not being satisfied with the admissible benefit firstly approaches the local Village Developing Advisory Committee constituted under each village under the project. In case the aggrieved person is not satisfied by action taken by the VDAC then he represents his case to the Project Social Group. In case if he is not satisfied by the decision of the PSG he will represent his case to the Head of the Project. The concerned NGO engaged for RAP implementation will assist the aggrieved person in representing his case. If the aggrieved person is not satisfied by the action taken by the Head of the Project he can represent his case to the Executive Director (THDC) of the region. At this stage the Project Social Group will assist the aggrieved person in representing the case. Based on merits of the case the decision taken by the Executive Director will be final and binding on the part of the aggrieved person. However it is suggested a separate Grievance Redressal Cell can be set which should be headed by a person of repute from the district viz., a retired district judge or principal of the college etc.

CHAPTER-9: PROJECT BENEFITS

9.1 Improvement in Power Supply

The project will improve the power supply position in Uttar Pradesh, which is vital for economic growth as well as improving the quality of life. The improved power supply will reduce the dependence of general public and commercial establishments on DG Sets thereby reducing the noise pollution as well as air pollution at local levels.

9.2 Improvement in Infrastructure

Establishment of large developmental projects improve the availability of the physical infrastructures (like approach roads, drainage, communication and transportation facilities etc.) and social infrastructures (like education and health care system). The following infrastructure facilities will improve due to proposed project.

- Road Transport facilities
- Educational facilities
- Water supply and sanitation
- Banking facilities
- Post offices and Communication facilities
- Medical facilities
- Recreation facilities
- Business establishments
- Community facilities

9.3 Social Benefits

The THDC policy states that after a reasonable transition period, the affected families improve or at least regain their previous living standards, earning capacity and production levels through a process in which they participate through their own social and cultural institutions. Therefore, the process of R&R is developmental and participatory with emphasis to ensure that development fosters full respect for their dignity of human right and cultural uniqueness. PAPs nos. will be collected, based on records and categories as per THDC R&R policy, State Government R&R policy and duly authenticated by the district administration.

9.4 Employment Generation

The project shall provide employment potential under unskilled, semi-skilled and skilled categories. The employment potential shall increase with the start of construction activities, reach a peak during construction phase and then reduce with completion of construction activities. During operation phase also, there will be employment opportunities, mainly in service sector, although its magnitude will be much less.

The direct employment opportunities with THDC India Ltd. are extremely limited and the opportunities exist mainly with the contractors and sub-contractors. These agencies will be persuaded to provide the jobs to local persons on a preferential basis wherever feasible.

9.5 Other Tangible Benefits

- Due to the project, there would be an overall development of the area and job opportunities, which may improve the quality of life in the region.
- Proposed project would help to fulfill the gap between demand and supply of fuel within the country and particularly in the region
- Development in industries, power supply, electrification and transport in the study area.

CHAPTER-10: ENVIRONMENTAL MANAGEMENT PLAN

10.1 INTRODUCTION

Environmental Management Plan (EMP) reviews the adequacy of various pollution control measures envisaged for the project mitigating various environmental impacts identified and assessed. Additional mitigation measures, if required to ensure sustainable power development are also suggested. EMP has been prepared separately for construction and operation phases. It describes administrative aspects of ensuring that mitigation measures are implemented and their effectiveness is monitored. It also includes green belt development plan. Environmental monitoring programme has already been included in the report.

Each of the mitigation measure has been assessed with respect to:

- Adoption of state of art technological measures
- Identification of human resources for its effective implementation
- Allocation of financial resources for its effective implementation and
- Effectiveness of mitigation measure in mitigation of impacts

EMP specifies various technological measures for pollution prevention, waste minimization, end-of-pipe treatment, attenuation etc. proposed to be undertaken to mitigate the environmental impacts on each sector of environment during each phase of the project, i.e. construction phase and operation phase. The responsibility for implementation for all mitigation measures rests with THDC. Most of the mitigation measures are integral part of the main plant package and are commissioned simultaneously with the commissioning of the main plant packages.

10.2 CONSTRUCTION PHASE

The impacts during the construction phase would be of transient nature and prevail for a shorter duration. However, the control of pollution during construction phase is of considerable importance. Following control measures are recommended to mitigate the probable adverse impacts:

- Sites for construction and workers camp should be clearly demarcated to prevent occupational hazards. Ensure provision for necessary basic needs and infrastructure facilities such as water supply, sanitary facilities, housing, domestic fuel etc.
- Preparation of site will involve excavation and transport of substantial quantities of earthen material and generation of large quantities of waste material. Site grading operations will also involve stockpiling of backfill materials. Due care needs to be taken to avoid water pollution problems during rainy season due to washout of waste material from dump sites
- Blasting operations, if involved for deeper foundations, these should be conducted with due care as per prevailing safety regulations
- Where, gases or fumes are likely to be present in trenches/foundations, sufficient mechanical/artificial ventilation to protect the health and safety of persons working there,

shall be provided. If necessary, the personnel working there shall be provided with respiratory protective equipment when work in such unhealthy conditions is to be carried out

- At the site of construction, where petroleum powered equipments are used and temporary storage of petroleum products (Highly inflammable) is done, these may cause fire hazard, if safety norms are not strictly followed. Care should, therefore, be taken to avoid all sources of ignition at such places
- During dry weather conditions, it is necessary to control the dust emissions arising out of the excavation, leveling, transportation and stockpiling activities by water sprinkling
- It should be ensured that diesel powered vehicles are properly maintained to minimize the exhaust emissions as well as noise generation
- Though the effect of noise on the nearby inhabitants due to construction activity will be negligible, noise prone activities should be restricted to the extent possible during daytime in order to have minimum noise impact during nighttime.
- Onsite workers should strictly use noise protection devices like earmuffs. The construction machinery should be maintained to minimize the noise levels generated
- Accidental spillages of oil from construction equipment and storage sites should be prevented
- Combustible wastes should be burnt in a controlled manner and other category of wastes should be disposed off at identified dump site
- Hazardous materials such as petrol, diesel, lubricating oil, compressed gases, paint and varnishes as also explosives for blasting operations required at the site during construction phase should be stored properly as per the safety regulations
- Tree plantation (large size species) should be undertaken at the time of preparation of the site so that they would grow to considerable size by the time of commissioning of the proposed project
- Construction workers should be provided with domestic fuel so as to prevent cutting of trees for fire wood
- As soon as construction is over, surplus quantity of excavated soil should be utilized to fill up low-lying areas, rubbish need be cleared and all un-built surfaces be reinstated

10.3 OPERATIONAL PHASE

The proposed plant unit would add to the industrial base in the region. In order to mitigate the adverse environmental impacts due to operation of proposed 2x660 MW power plant, following measures have been delineated for implementation by THDC Pvt. Ltd.

10.3.1 Air Environment

The major pollutants emitted from the stacks of coal based thermal power plants are fly ash, sulphur dioxide, oxides of nitrogen, carbon monoxide and mercury. Fugitive emissions include coal dust from various operation in coal storage, processing and handling, and dust from the ash handling and disposal areas. The following control and mitigative measures will be employed to reduce the impacts on air quality:

- Electrostatic precipitators (ESP) with 99.89% efficiency would be installed to control the emission of fly ash particles. The precipitators would be designed to limit the particulate emission to 30 mg/Nm^3.
- Flue gas desulphurization system, with lime stone scrubbing, shall be provided to limit SO_2 concentration in flue gases to below 100 mg/Nm^3.
- Flue gas selective catalytic reduction system shall be provided to limit NOx concentration in flue gases to below 100 mg/Nm^3.
- Stack of 275m height would be constructed as per MoEF, GoI guidelines for dispersion of pollutants.
- For the control of fugitive coal dust emission within and around the coal handling plant, coal dust extraction and suppression systems would be provided.
- Ambient air quality monitoring system would be provided as per CPCB guidelines.
- All the internal roads will be of concrete/asphalt to reduce the fugitive dust generated due to the vehicular movement.
- Green belt will be developed all around the plants and within the township.

The general arrangement of the pollution control systems proposed for control of pollutants in the flue gases from the boilers will be in the following sequence.

1. Super-critical boiler with Low NOx burners
2. Economizer
3. SCR System
4. Air Pre-heater
5. Electrostatic precipitator
6. FGD System
7. Re-heater
8. Stack (Chimney)

10.3.2 Water Environment

An effluent management scheme, consisting of collection, treatment, recirculation and disposal of effluents shall be implemented in order to optimize the make-up water requirement as well as liquid effluent generation. The liquid effluents shall be collected and treated/ recycled as per the following design philosophy:

- The filter backwash water of PT Plant shall be collected and recycled back to the inlet of clarifiers.
- The sludge from clarifiers of Water PT Plant shall be collected in a sump/ pit and shall be pumped to bottom ash slurry sump for disposal to bottom ash dyke.
- The waste effluents from neutralization pits of DM Plant and Condensate Polishing Plant shall be collected in the respective neutralization pits and neutralized before pumping to the Central Monitoring Basin before final disposal.
- Re-Circulating type Cooling Water (C.W) system with cooling towers, with C. W. blow down from cold water side to ensure no thermal pollution.

- Part of CW system blow down would be used for service water system, fly ash handling, bottom ash handling and coal dust suppression. The unused low down shall be led to Central Monitoring Basin after treating through clarifiers/ tube settlers. The sludge from clarifier/ tube settler shall be disposed off in bottom ash dyke along with bottom ash slurry.
- A coal particle settling pond shall be provided to remove coal particles from coal handling plant waste. Decanted water shall be pumped back to the coal dust suppression system.
- Service water effluent collected from plant drains shall be led to a sump. From the sump the service water shall be pumped upto tube settler/ clarifier for treatment of suspended solids. Treated service water shall be sent back to service water tank to the extent possible for re-use.
- The plant shall have two different systems for ash disposal – conventional wet slurry disposal with ash water re-circulation for bottom ash and High Concentration Slurry Disposal (HCSD) for fly ash. HCSD system will require less quantity of water and there will be no effluent from the fly ash disposal site.
- RO system for ZERO discharge concept: Reverse Osmosis (RO) plant is proposed to produce 400 cum/hr permeate. Cooling tower blow down (CTBD) water shall be used as feed water to RO plant. The purpose of RO system is to remove the dissolved solids from the water to produce specified quantity of CW make up and DM plant feed. Reject water from RO trains shall be led to CHP dust suppression tank.

An independent plant effluent drainage system would be constructed to ensure that plant effluents do not mix with storm water drainage. Efficient operation of various treatment schemes shall be ensured so that the quality of treated effluent from CMB conforms to relevant standards, prescribed by regulatory agencies.

The sewage from plant and township shall be treated in a sewage treatment plant. The treated sewage conforming to prescribed standards shall be utilized for plantation to the extent possible. The balance effluent shall be discharged.

CW Treatment System

It is proposed to provide suitable chemical treatment programme of acid dosing and scale cum corrosion inhibitor for the CW system for control of CW system water chemistry at two locations. It is proposed to provide acid & chemical storage tanks and respective dosing pumps shall as a part of CW treatment system. The plant shall be provided with neutralization pits, disposal pumps with required corrosion measurement rack, instrumentation for interlocks and controls, control panels etc. to facilitate safe & reliable operation.

Effluent Treatment System

The liquid effluents shall be collected and treated / recycled generally as per the following design philosophy.

- The filter backwash water of PT Plant shall be collected and recycled back to the CW system clarifier.
- The sludge from clarifiers of Water PT plants shall be collected and sent to ash slurry sump for disposal to ash dyke.
- The waste effluents from neutralization pits of DM plant and Condensate Polishing Plant shall be collected in the respective neutralization pits and neutralized before pumping to ash slurry sump or to the central monitoring basin before final disposal.
- The Power cycle effluents sent to CW make up with the help of pumps.
- CW system blow down would be used for coal dust suppression system and Ash handling Plant, Service water system.. Excess CW blow down shall pass through RO system for reuse. Water after RO system shall be sent to CW makeup & DM plant feed.
- A coal settling pond shall be provided to remove coal particles from coal handling plant waste. Decanted water shall be pumped back to the coal dust suppression system
- Service water effluent drains from various areas shall be separately routed to a sump. From the sump the service water shall be pumped up to lamella clarifier for treatment of suspended solids. Treated service water shall be sent back to service water tank to the extent possible for re-use.
- All the plant liquid effluents shall be mixed in CMB (if RO system is not working) and finally disposed off from central monitoring basin up to the final disposal point using carbon steel pipe and three numbers of 2 x 100% capacity pumps.

10.3.3 Noise Environment

The major noise generating sources are the turbines, turbo-generators, compressors, pumps, fans, coal handling plant etc. from where noise is continuously generated. Acoustic treatment/ equipment design shall be done to control the noise level below 90 dB (A). Wherever required, the workers shall be provided with protective equipment such as ear plugs/ ear muffs.

10.3.4 Solid-waste Management

Ash will be the major solid waste generated from the power project. An ash management scheme shall be implemented consisting of dry collection of fly ash, supply of ash to entrepreneurs for utilization and promoting ash utilization to maximum extent and safe disposal of unused ash. The plant shall have two different systems for ash disposal – conventional wet slurry disposal with ash water re-circulation for bottom ash and High Concentration Slurry Disposal (HCSD) for fly ash. HCSD system will require less quantity of water.

Bottom Ash Disposal system

The bottom ash and coarse ash slurry from both the units shall be transported from bottom ash slurry pump house by BA slurry duty pumps to BA ash pond located adjacent to the plant. There shall be one working stream and two standby stream. All the pumping streams shall be provided with its individual disposal pipes. No crossover is being envisaged in the disposal piping.

It is proposed to provide ash water re-circulation system to meet optimize the make-up water requirement as well as to meet the environmental norms. Decanted water from the ash pond shall

be led to the plant area using 2x 100 % capacity ash water recirculation pumps and the same shall be conveyed through pipes from ash dyke to plant area. This water will be used further in the ash handling system. Blow down of ash water from the system shall be carried out to maintain the system scale free. Normal make up to the ash water system shall be from CW blow down water. However provision shall also be kept for operating ash water system on "Once Through" mode also i.e. when ash water is not available for recirculation. During "Once Through" mode operation, additional makeup shall be met from the plant raw water supply.

Fly Ash Utilization

The Ministry of Environment & Forests Notification on Ash Utilization dated14.09.1999 and its amendments dated 27.08.03 and 03-11-09 stipulate target of ash utilization for new project to the tune of 50% of ash generation within 1 year, 70% within 2 years, 90% within 3 years and 100% within four years from date of commissioning of the units.

The unutilized fly ash in relation to the target during a year, if any, shall be utilized within next two years in addition to the targets stipulated for those years and the balance unutilized ash accumulated during first four years shall have to be utilized progressively over next 5 years in addition to 100%utilization of current generation of ash.

THDC India Limited, a socially conscious organization, considers utilization of ash produced at its coal based power station as a thrust area of its activities. Accordingly, a market survey study for utilization of fly ash was made in the year 2012 (***Enclosed as Annexure 13***). Based on the study, the ash utilization scheme has been formulated. The ash to be generated by Khurja STPP (2x660 MW) shall be utilized in various application areas so as to meet the requirements of Gazette Notification for Ash Utilization. The following actions are proposed to be taken up by THDC:

- THDC shall provide system for 100% extraction of dry fly ash along with suitable storage facilities. Provision shall also be kept for segregation ofcoarse and fine ash, loading this ash it to closed/open trucks and also for loading of rail wagons. This will ensure availability of dry fly ash required for manufacture of Fly Ash based Portland Pozzolana Cement (FAPPC), asbestos cement products; ash based building products another uses of ash.
- There are cement plants within 100-150 km of proposed project. These Cement plants shall prefer to lift fly ash from proposed project as this source of fly ash will be comparatively at less distance with respect to power plants located in far located clusters. THDC shall make all efforts for entering into agreement for supply of fly ash to the cement industries so as to have sustainable ash utilization in this segment.
- The company shall make efforts to motivate and encourage entrepreneurs to set up ash based building products such as fly ash bricks, blocks, tiles, etc.
- THDC shall also set up Fly ash brick manufacturing plant at proposed project and fly ash bricks produced shall be utilized in in-house construction activities.
- To promote use of ash in agriculture/ wasteland development – showcase project shall be taken up in the vicinity of proposed thermal Power Station.
- THDC shall also explore possibilities of transporting fly ash in bulk quantity to urban/ metro cities to achieve ash utilization in line with the notification.

- All government/ private agencies responsible for construction / design of buildings, development of low lying areas, and construction of road embankments etc. within 100 km of the plant area shall be persuaded to use ash and ash based products in compliance of MoEF's said Gazette Notification.

With all the efforts mentioned above, it is expected that fly ash generated at proposed STPP shall be utilized in the areas of cement, concrete and asbestos cement products manufacturing, bricks manufacturing, road construction,land development, mine filling etc. However, in order to prepare realistic road map for 100% Ash utilization, a detailed market study shall be carriedoutto update the study conducted earlier. Based on recommendations of the study, detailed Road map for 100%Ash Utilization in line with MoEF Gazette Notification shall be prepared for submission to regulatory authorities.

Unutilized Fly Ash Disposal

The unutilized fly ash collected in HCSD silos shall be mixed with water in an agitator tank at controlled rate to obtain the desired high concentration. This high concentration slurry shall be further pumped to Fly ash pond located adjacent to the plant. There shall be four working and two standby HCSD stream for all units. Each stream will consist of one HCSD pump. All the pumping streams shall be provided with its individual disposal pipes. All HCSD pumps & HCSD silo aeration blowers shall be located in HCSD pump house.

Ash Pond Fugitive Dust Suppression System

Suppression of fugitive dust from Bottom ash pond is envisaged by spraying decanted ash water using sprinklers mounted in banks at intervals along the periphery of ash dyke. Water will be pumped from the ash water recirculation pump house through dust suppression water header to the sprinkler nozzles. 2 x 100 % pumps are provided for this purpose to cater to the requirements of both lagoons. The sprinklers shall be of swiveling type mounted at a height to ensure sufficient coverage for mitigating the fugitive dust problem. One working & one standby seepage recirculation pumps are provided to pump the seepage water from ash dyke back into ash pond. The pumps will be located in seepage water pump house in ash disposal area.

10.3.5 Green Belt

Implementation of afforestation program is of paramount importance for any industrial development. In addition to augmenting green cover, it also checks soil erosion, makes the climate more conducive, restores water balance and makes the ecosystem more complex and functionally more stable. The green belt helps to capture the fugitive emissions and to attenuate the noise generated in the plant, apart from improving the aesthetics of the plant site. The main objective of the green belt is to provide a barrier between the plant and the surrounding areas.

The main objectives of the proposed green belt development program are as follows:

1. Reduce air pollution;
2. Attenuate noise generated by various machines;
3. Attenuate the effect of accidental release of toxic gases;

4. Reduce the effect of fire and explosion;

5. Improve the general environment and aesthetics of the area;

6. Provide suitable habitat for fauna.

A green belt of about 100m width has been planned all around the main plant area except the switchyard side. Approximately 2000 trees will be planted per Ha. In addition, extensive afforestation and plantation activities shall be undertaken in all available spaces within the main plant, around plant boundary and township areas. Further, avenue plantation will be undertaken along roadside in Plant and Township areas. The characteristics of plants for green belt are given below and the list of species proposed for green belt is given in **Table-97**.

- The species will be permeable to help create air turbulence and mixing within the belt
- There will be no large gaps for the air to spill through
- Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces
- Ability to withstand conditions like inundation and drought
- Soil improving plants (Nitrogen fixing rapidly decomposable leaf litter)
- Attractive appearance with good flowering and fruit bearing
- Bird and insect attracting tree species
- Sustainable green cover with minimal maintenance

Table- 97: List of Tree Species for Green Belt Plantation

S.No.	Botanical Name	S.No.	Botanical Name
1.	*Acacia catechu*	15.	*Bauhinia variegata*
2.	*Ailanthus excelsa*	16.	*Caesalpinia bonduc*
3.	*Azadirachta indica*	17.	*Cassia siamea*
4.	*Cassia fistula*	18.	*Albizia chinensis*
5.	*Dalbergia sissoo*	19.	*Syzygium cumini*
6.	*Magnifera indica*	20.	*Alstonia macrophylla*
7.	*Psidium guajava*	21.	*Carissa carandas*
8.	*Tamarindus indica*	22.	*Nerium indicum*
9.	*Tectone grandis*	23.	*Plumeria alba*
10.	*Terminalia arjuna*	24.	*Artocarpus heterophyllus*
11.	*Terminalia bellerica*	25.	*Ficus benjamina*
12.	*Aegle marmelos*	26.	*Morus alba*
13.	*Ziziphus mauritiana*	27.	*Bauhinia acuminata*
14.	*Dalbergia lanceolaria*		

Plantation programme

Manager (Horticulture), under control of Manager (EHS), will be responsible for development and maintenance of green belt. The greenbelt development program shall be started with the start of construction activities, i.e., immediately after the project is accorded environmental and other statutory clearances. The green belt development programme shall be completed within 3 years. The activities at the initial stage will consist of the following.

1. Appointment of expert/consultant for preparing a detailed plan in consultation with local Forest department authorities
2. Survey of the area for plantation of trees and plants and preparation of detailed map
3. Identification of locations for plantation of saplings of different species
4. Digging of trenches and soil conditioning
5. Planting of saplings (during monsoon season)
6. Surveillance, maintenance and irrigation of the saplings to achieve a targeted survival rate of more than 60%.

The work plan for the second year is as follows:

1. Maintenance and irrigation of species planted earlier
2. Survey of the area to identify the locations for re-plantation of saplings
3. Plantation of saplings at the identified locations
4. Development of lawns and gardens in vacant areas within the premises
5. Maintenance and irrigation to achieve a targeted survival rate of 85%.

The work plan for the third year is as follows:

1. Maintenance and irrigation of species planted earlier
2. Survey of the area to identify the locations for re-plantation of saplings
3. Plantation of saplings at the identified locations
4. Identification of any remaining area within premises for afforestation and plantation of saplings at identified locations
5. Development of lawns and gardens in vacant areas within the premises
6. Maintenance and irrigation to achieve the targeted survival rate of 100%.

The work plan for the subsequent years comprises

1. Irrigation and maintenance of saplings/trees on routine basis
2. Cleaning of afforested areas to remove undesirable species
3. Replacement of dead species with new ones.

10.4 Rain Water Harvesting System

There will be generation of surface run-off from the proposed plant facility during monsoon season. The run-off from the paved surfaces of the proposed facility will be routed through a carefully designed storm water drainage network and collected in storm water collection sump. For

augmenting the ground water resources in the proposed plant, a number of rainwater harvesting pits/bore wells will be constructed and surface run-off water will be diverted to these harvesting pits/bore wells. These structures will facilitate percolation of water into the ground, thus augmenting the groundwater sources. This will result in increase in groundwater tables. To facilitate water harvesting, collection and storage of rainwater and also reduction in water consumption, the following measures will be adopted:

- The storm water treatment facility will be located at an appropriate location on the site keeping in view the slope contours and collection point;
- Use of low flow fixtures and appliances for reduced water consumption such as low flush water closets and cistern will be considered;
- Sewage generated will be treated in the sewage treatment plant and reused for green belt to reduce the fresh water requirement;
- The storm water from paved areas and rain water from the roof tops of various buildings will be treated for the removal of oil & grease, sediments and routed to the water harvesting structures to recharge the ground water table;
- The storm water from the previous area will also be routed to the rainwater harvesting structures;
- The storm water in rainy season will be stored to the maximum extent and utilized in fire fighting facility and balance will be routed to Rain Water Harvesting structure after treatment; and
- In general, dry cleaning methods would be practiced in workshop and maintenance areas for cleaning. High-pressure hoses will be used for area cleaning, only where required.

Storm Water Management

The plant water management system will be designed to minimize the potential for storm water contamination occurring at the site. This will be achieved by incorporating the following features into the storm water management system:

- Run-off from upstream areas will be diverted to river through garland drain around the plant site ;
- The quantity of contaminated run-off generated will be minimized by diverting runoff from areas external to the plant to storm water discharge points;
- Hazardous material and fuel storage areas will be bounded and drains will be provided to around these facilities to prevent entering of run-off water; and
- Run-off from area external to process areas of the plant will be contained within a storage system.

10.5 INSTITUTIONAL SETUP

The post operational monitoring programme will be under the supervision of the Environmental Management Group (EMG) at the project site. The station will be equipped with all necessary instrumentation/ equipment and manpower required for ensuring effective monitoring. The EMG

at site will interact with State Pollution Control Board on all environmental issues during operation of the station.

As per the present set-up the environmental groups in THDCIL have a three-tier organization structure, as shown in **Table-98**. The organizational structure of Social and Environment department is depicted in **Figure-31**. Institutional setup of Environmental Management Cell at Project level is shown in **Figure-32** in the following pages.

Table- 98: Organizational Structure of THDC for Environmental Management

Corporate Center	Engineering	Environmental Engineering
	Operations	Environmental Management
	Human Resources	Rehabilitation & Resettlement
		Horticulture
		Corporate Social Responsibility and Community Development
		Medical & Public Health
		Safety
Regional Headquarters	Environmental Management	As Coordinator
Projects	Coordinator	Environmental Management
	Operation & Maintenance	Chemistry
		ESP Maintenance
		Ash Handling & Disposal
		Safety
	Human Resources	Community Development Group
		Rehabilitation & Resettlement
		Horticulture
		Medical & Public Health

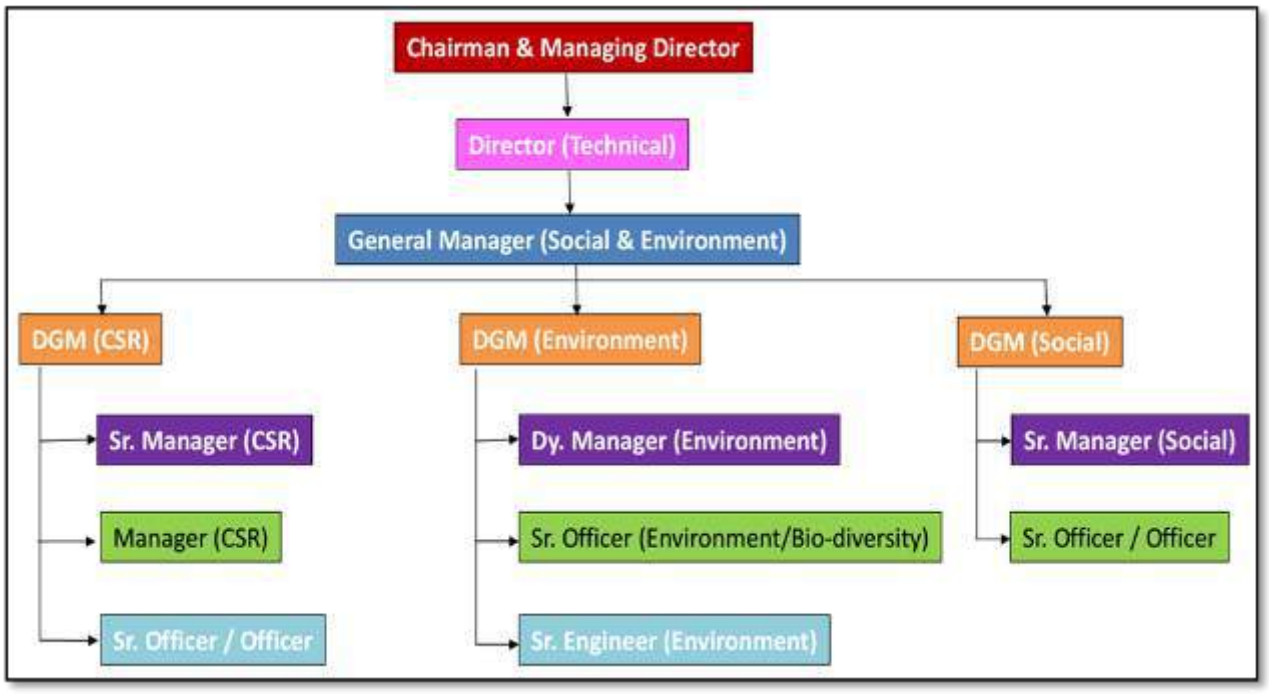

Figure 31 Structure of Social & Environment Department

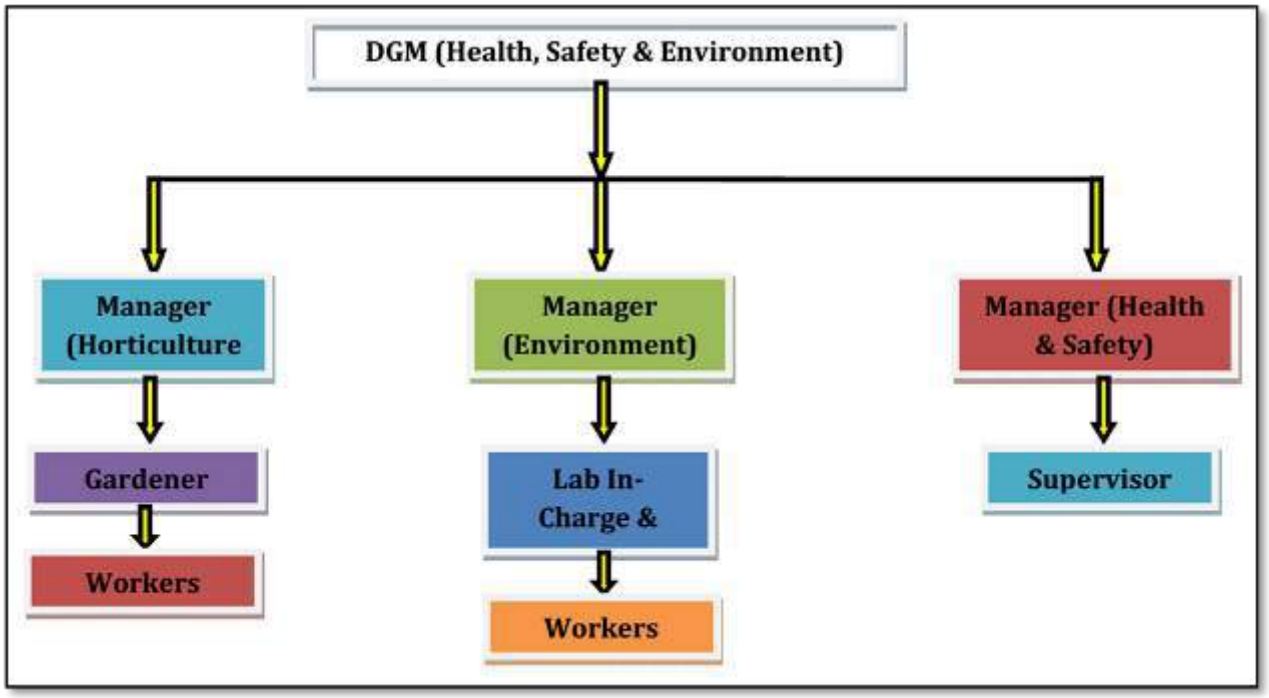

Figure 32 Setup of Environmental Management Cell at Project Level

The responsibility of environmental management of an operating station lies mainly with Environmental Management Groups at site, which acts as coordinator for environmental matters. This group acts as a nodal agency for various groups at project, regional headquarters and

corporate level as well as outside agencies like Uttar Pradesh State Pollution Control Board. However, this group draws support from Environmental Engineering Group, Environmental Management Group and Rehabilitation & Resettlement Groups at Corporate Centre. The functions of main groups are summarized in following sections.

Functions of Environmental Group at Corporate Center

Environmental Engineering Group (EEG)

- Associating in site selection for new projects with engineering services
- EIA studies for new project sites and obtaining clearances
- Finalization of specification of equipment for pollution monitoring
- Special studies relating to environmental problems
- Interaction with MoEF, Pollution Control Boards and funding agencies for new projects
- Provide assistance to sites in overcoming specific technical problems related to environment

Environment Management Group (EMG)

- Coordination and monitoring with stations, regions, Engg. Division and other concerned agencies on all environmental matters concerning operating stations
- Maintenance of an environment data base, trend analysis of pollution monitoring data and prepare exception reports
- Environmental Audit of Power Stations
- Providing operational feedback to Engineering for carrying out necessary modifications in existing / future systems, overseeing implementation of modification / improvement programmes
- Providing corporate support to stations through organization of meetings on Environment Management, obtaining management approvals
- Organizing Training workshops, Seminars etc.

Rehabilitation and Resettlement (R&R) Group

- Socio-economic studies
- R&R aspects of EIA, finalization of R&R plans for new projects
- Policy review and ensuring implementation
- Collection and collation of various statistics on R&R measures
- Providing these statistics to various agencies
- Finalization of the training programme in R&R

Functions of Environmental Groups at site

Environment Management Group

- Obtaining Consent order from SPCB
- Environmental monitoring
- Analysis of environment data, reports, preparations and transmission of report to statutory authorities, Corporate Center etc.
- Compliance with guidelines and statutory requirements
- Coordination with statutory bodies, functional groups of the station, regional head quarters, Corporate EMG / Engg etc.
- Interaction for evolving and implementation of modification programmes to improve the availability / efficiency of pollution control devices / systems
- Environmental Appraisal (Internal) and Environmental Audit

Rehabilitation and Resettlement Group

- Preparation, implementation and follow-up of Rehabilitation Action Plan and Remedial Action Plan
- To strengthen the public image of the company in respect of social aspects and maintain good relationship with the community in the vicinity

Environment Policy

Environment Policy of THDC Pvt. Ltd. is enclosed as **Annexure-12**.

10.6 Occupational, Health & safety

For large plants/industries, where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance; the men, materials and machines are the basic inputs. Along with the boons, industrialization generally rings several problems like occupational health and safety.

The industrial planner, therefore, has to properly plan and take steps to minimize the impacts of industrialization and to ensure appropriate occupational health and safety including fire plans. All these activities again may be classified under construction indirection, and operation and maintenance.The facilities to be provided for protection of health and ensuring safety to the workers will include the construction workers, truck drivers as well as operation and maintenance personnel during operation phase. The contractors will be advised to abide by the statutory instructions of Factories Act 1948 and amendments thereof in order to ensure safety of their workmen. The following paragraphs outline the various measures to be taken by the Company and infrastructural facilities to be provided to its work force both in construction and operation phase for ensuring safety and proper work environment.

Some workplace hazards have the potential to cause so much injury or disease that specific regulations or codes of practice are warranted. These regulations and codes, adopted under state and territory OH & S Acts, explain the duties of particular groups of people in controlling the risks associated with specific hazards. Codes of Practice provide advice on how to meet regulatory requirements. As such, codes are not legally enforceable, but they can be used in courts as evidence that legal requirements have or have not been met.

Safety in the workplace is critical to the success of running a business, no matter what size it is. As a small business owner one has certain rights and responsibilities regarding health and safety in the workplace. Even without any employees, one must ensure that the business doesn't create health and safety problems for the customers and the general public.

All safety gears will be provided to workers and care will be taken by EMC that these are used properly by them. All safety norms will be followed

Manager (Health & safety), under overall control of Supervisor (Health & safety), shall look after the preventive measures to be practiced for the safety and health aspects of the workers. Manager (H&S) will prepare Safety Codes to be followed for the various types of jobs and make available sufficient copies of the same to the concerned persons. The Cell will also display posters to highlight the safety measures to be followed in different areas. Training courses will be organized regularly to educate the workers about the importance and procedures of safety measures. Posters indicating the list of toxic substances, their tolerance limits, effects, and first-aid measures shall also be displayed in various plants and sections. Fire hydrants shall be provided in all the sections and areas of the plants. Protective boots, aprons, garments, gloves, earplugs, etc. will be made available, in sufficient numbers, in all sections of the plant.

A First Aid Post shall be located within the factory for attending the cases of minor injuries. The first-aid-post shall be manned by a Pharmacist and a dresser for attending to minor injuries and health problems of the employees. Proper medical and hospitalization facilities shall be made available through referral clinics and hospitals at Chittorgarh.

All employees shall be subjected to regular health check-up.

Safety & Fire Fighting

Organization & Functions

A suitable Safety and Fire-fighting Cell, under Manager (OH&S), shall be established within the proposed project since the very beginning of the construction phase, for taking suitable measures for implementation and observation of safe procedures for prevention and control of accidents and disasters. Main functions of the department are as follows:

- Inspection of different sections of the plant and imparting advice regarding unsafe practices
- Procurement and maintenance of personal protection and fire-fighting equipment
- Organizing safety motivation programs through competitions on safety and housekeeping and through posters, cartoons, boards and pamphlets
- Organizing safety and fire-fighting training programs to cover all employees, including contractors'workforce
- Implementation of Safety Work Permit system
- Organizing safety auditing through third parties
- Investigation of causes of accidents and recommending preventive/remedial measures

- Maintaining safety and accident statistics
- Actions for compliance with statutory safety and fire-fighting requirements
- Conducting work zone environmental surveys.

Safety Appliances

All types of personal protection equipments shall be made available in the plant for use by employees. Ambient fluoride detectors with alarms will be provided at important locations. Equipment for monitoring of working environment shall be maintained and operated.

Codes and Standards

The fire protection system will be designed in accordance with the requirements of the National Fire Protection Association. The national codes and standards will be applied to materials, fabrication and testing of the equipment. Within all installations, the threading on all hose and hose equipment will conform to a single plant standard. Standards for all similar items, i.e., hydrant wrenches, hose type, etc., also will be uniform.

Fire Fighting Facilities

A comprehensive fire protection system covering all risk areas of the plant shall be provided. The fire protection system shall consist of the following:

- Fire pumps.
- Hydrant system.
- Spray system.
- Sprinkler system.
- Foam system.
- Fire alarm system.
- CO2 system.
- Portable and mobile fire extinguishers.

All the systems shall be designed in such a way so as to make the system complete and acceptable to Tariff Advisory Committee for Insurance Companies of India and enable the project proponent to obtain maximum rebate on insurance premium available.

10.7 Corporate Social Responsibility

THDCIL philosophy for sustainable development is based on the simple principle that “no organization can survive until unless it spreads happiness among its stakeholders”. Year by Year THDCIL has proven its commitment towards upliftment of society by executing Resettlement & Rehabilitation of Project Affected Persons (PAPs) with human face and implementing various schemes under Corporate Social Responsibility.

In 2008, THDCIL had framed a Policy on Corporate Social Responsibility (CSR) known as 'Scheme for Corporate Social Responsibility – Community Development (CSR-CD)', which was adopted from financial year 2008-09.

Consequent on issue of guidelines by DPE in April, 2010, 'THDC CSR-CD Scheme 2010' was introduced. Subsequently, a separate policy on Sustainable Development was framed in 2012, which was based on DPE guidelines issued in September, 2011.

Because of the close linkage between the concepts of Corporate Social Responsibility and Sustainable Development, DPE issued combined guidelines on Corporate Social Responsibility and Sustainability for CPSEs effective from 1st April 2013. In accordance with the said guidelines THDCIL CSR & Sustainability policy-2013 was issued with the approval of the Board.

New rules and guidelines are being followed since April-2014. As required under Companies Act and CSR Rules, the company has formulated CSR and Sustainability Policy-2015 incorporating the new rules/ guidelines. CSR and Sustainability Programmes of the Company are steered through Below Board Level (BBLC) & Board Level (BLC) CSR Committees.

Implementation of all CSR works of company have been entrusted to company sponsored NGO i.e. SEWA-THDC. CSR budget has been utilized mostly in the vicinity of THDCIL's various project locations /business area as per the Companies Act 2013 and DPE guidelines on CSR & Sustainability 2014 effective from 1st April 2014. The major thrust areas under CSR are health & sanitation, promoting education, vocational skills & livelihood projects, women empowerment, environmental sustainability & ecological balance, rural development of backward areas. Overall it has been ensured to have inclusive growth and upliftment of the marginalized and under-privileged sections of the society (**Copy of THDCIL CSR and Sustainability Policy 2015 is enclosed as Annexure - 10**).

CSR Initiatives under Khurja STPP

M/s Mantec Pvt. Ltd. has carried out a socio-economic survey in the project affected / influenced area under Social Impact Assessment to assess the current livelihood conditions, literacy rate etc. The demographic status of village falling in affected zone as per socio-economic survey indicate that 04 village of Tehsil Khurja of District Bulandshahar will be affected.

THDCIL proposes to allocate approximately Rs. 33.20 Crores of the total project cost towards Corporate Social Responsibility activities during construction phase and in operation phase, money on CSR activities shall be invested as per the Government policy and norms.

The CSR initiatives will primarily focus on the issues of education, health, women empowerment, energy, environment protection etc. in keeping with the Millennium Development Goal (MDG) of the United Nations to eradicate poverty, malnutrition and food insecurity, to provide better standards of education and health, and to achieve gender equality.

The CSR initiatives proposed under CSR is broadly categorized under following: ***Education***

Development (THDCIL Jagriti)

As a responsible corporate citizen THDCIL strives to contribute and promote education among needy external stakeholders. The activities proposed under education development are as under:

- Renovation / addition / construction of school building;
- Sponsoring meritorious scholarship for students;
- Providing water supply, furniture, computers, library, books school bags, sport kits etc.

Health and Veterinary Care (THDCIL Niramaya)

As per the SIA report, no hospital, dispensaries maternity home, health welfare centers and nursing homes are located in the 04 project affected villages. However, 14 allopathic hospitals, 274 allopathic dispensaries, 10 child welfare centers, 61 health centers, 08 nursing homes, 308 private and subsidized medical practitioners and 118 community health workers are in the project influence areas. To further strengthen the health services, following measures are proposed under CSR:

- Organizing periodic multispecialty health camps;
- Organizing health awareness camps;
- Support to primary health centers for additional rooms, necessary medical equipment's furniture's;
- Supporting family planning schemes;
- Providing ambulance facility;

Sanitation (THDCIL Swacchta Abhiyan)

Under this following initiatives are proposed:

- Support for constructing individual toilets matching with support under Govt. Scheme;
- Construction of Community toilets;
- Repair / renovation / construction of drains systems etc.

Rural Development (THDCIL Utthan)

THDCIL proposed to frame a holistic development plan for project affected village. Whole plan will have conceptualized towards endowing sustainable livelihood opportunity to community, and overall development of society. Major initiatives propose to be taken up under the project are as under:

- Construction of new community centers / renovation of existing community halls, panchayat bhawan etc;
- Construction of CC roads, pathway, recarpeting etc;
- Construction / repair of existing facilities (night shelters / old age homes), small bridges and culverts in villages, bus shelters, chabootras etc;
- Providing street light fixtures, solar street lights etc;
- Promotion of off seasonal vegetable by distribution of Hybrid seeds;
- Horticulture- Distribution of fruit plants in villages;
- Organizing awareness programme through experts - Kissan Gosthies and Block level meetings for convergence with Govt. schemes (ie; RKVY, MNREGA, KVKetc);
- Promoting use of sprinkler, drip and solar pump set for irrigation;
- Augmentation of drinking water through bore wells including laying pipelines, overhead tanks, RO plants, desilting of ponds, pondages for cattle, etc;

- Promotion and Strengthening of Farmer Self Help Groups;
- Poly Houses for increased productivity;
- Providing assistance to the animal husbandry centers;
- Promoting artificial insemination in animals.

Women Empowerment (THDCIL Samarth)

Under this project it is propose to form Self Help Groups (SHGs) of women and providing training to these SHGs on various activities such as tailoring, beautician, poultry etc. Financial support as revolving fund and necessary infrastructure i.e. sewing machines etc. shall also be made available to these SHGs. It is also proposing to distribute Bicycles to girls in villages.

Livelihood Generation and Skill Development Initiatives (THDCIL Daksh)

Under THDC Daksh initiative of THDCIL it is propose to join hands with different institutes, training centers such as National Skill Development Center (NSDC), Construction Industry Development Council (CIDC), ITI etc. to deliver placement linked Skill Development programs for the youth of the Project Affected Areas and to alleviate poverty in rural areas.

Environment protection Initiatives (THDCIL Prakriti)

Under THDCIL Prakriti, following initiatives are proposed:

- Social Forestry, tree plantation etc.;
- Ground water recharge (rainwater harvesting);
- Seminar / conference / awareness programme on sustainable development;
- Distributing solar lamps and LED bulbs etc.

CSR Budget:

THDCIL proposes to allocate Rs. 33.20 crores (approx.) of the total project cost towards Corporate Social Responsibility activities during construction phase and in operation phase, money on CSR activities shall be invested as per the Government policy and norms.

The tentative budgetary allocation for CSR activities are given in table:

Items / Major heads	Budget (in Lakhs)
Education Development (THDCIL Jagriti) • Sponsoring meritorious scholarship for students • Renovation / addition / construction of school building as well as provision of water supply, furniture, computers, library, books, school bags, sport kits etc.	Rs. 390 Lakhs
Health and Veterinary Care (THDCIL Niramaya) • Support to primary health centers for additional rooms, necessary medical equipment's furniture's	Rs. 300 Lakhs

as well as organizing periodic multispecialty health & awareness camps. • Providing ambulance facility.	
Sanitation (THDCIL Swacchta Abhiyan) • Support for constructing individual toilets matching with support under Govt. Scheme. • Construction of Community toilets and repair / renovation / construction of drain system etc.	Rs. 230 Lakhs
Rural / Slum Development (THDCIL Utthan) • Construction of new community centers / renovation of existing community halls, panchayat bhawan, CC roads, pathway, recarpeting, repair of existing bridges and providing street light fixtures, chabootras etc. • Organizing awareness programme through experts - Kissan Gosthies and Block level meetings for convergence with Govt. schemes (ie; RKVY, MNREGA, KVK etc). • Promotion and Strengthening of Farmer Self Help Groups, promoting use of sprinkler, drip and solar pump set for irrigation.	Rs. 1220 Lakhs
Women Empowerment (THDCIL Samarth) • SHG formation and training • Bicycle (to girls in villages)	Rs. 190 Lakhs
Livelihood Generation and Skill Development Initiatives (THDCIL Daksh) • Skill Development programs for youth with different institutes and training centers.	Rs. 750 Lakhs
Environment protection Initiatives (THDCIL Prakriti) • Social Forestry, tree plantation, rain water harvesting for ground water recharge, distributing solar lamps, & LED bulbs etc. • Seminar / conference / awareness programme on sustainable development.	Rs. 240 Lakhs
Total	**Rs. 3320 Lakhs**

Monitoring of CSR Projects:

As per the THDCIL CSR and Sustainability Policy – 2015, monitoring of CSR and Sustainability programmes will be done concurrently with implementation to assess the progress vis-à-vis planned. To ensure transparency and effective implementation of the CSR programmes undertaken, a robust monitoring mechanism will be instituted, providing for periodic monitoring at different levels using Monthly Progress Report, Quarterly Progress Report, Video Conferencing, Site Visits, Documentary evidence including photographs, films and videos, Other in – house monitoring

mechanisms, as determined by the CSR Committee and by engaging Third Party monitoring with due care to eliminate conflict of interest.

Reporting of CSR Projects:

- Monthly Progress Report will be submitted to the Director In-charge of CSR & Sustainability.
- Quarterly progress report on CSR and Sustainability will be placed before the Board after consideration by the Board Level CSR Committee.
- The Board's report in the Annual Report shall include Annual Report on CSR and the same shall be displayed in the THDCIL's website.
- A brief narrative on the action taken for implementation of DPE guidelines on sustainability initiatives shall also be included in the Board's Report on CSR.
- Annual Sustainability Report will be published and displayed on Company's web site as per the 'THDCIL's CSR Communication Strategy'.

Impact Assessment of CSR Projects:

Impact assessment of all CSR & Sustainability programme above Rs 5.00 lakhs will be done through specialized external agencies and the report containing the success/failure shall be submitted to Board Level CSR Committee.

10.8 COST OF EMP

The cost of project (current) as of 2nd Qtr 2016 is as given below:

Project Cost excluding IDC	:Rs. 9747.5 Crore
Interest During construction (IDC)	:Rs.1876.9 Crore
Project Cost including IDC	:Rs.11624.5 Crore
Working Capital margin (WCM)	:Rs.285.5 Crore
Project cost including IDC &WCM	:Rs.11909.57 Crore
Cost/MW (Incl. IDC & WCM)	:Rs.9.02 Crore

A cost provision of approximately Rs.1783.5 Crore has been kept towards providing environmental measures.

Table- 99: Cost Breakup of EMP Cost (in Crore)

S. No.	Item	Cost, Crore Rs.		
		FC	IC	Total
1.	Electrostatic Precipitator	0.00	221.3	221.3
2.	FGD &De-NOx systems	297.0	693.0	990.0
3.	Chimney	0.00	76.0	76.0
4.	Cooling Tower incl civil works	0.00	118.6	118.6
5.	Ash Handling	0.00	255.9	255.9
6.	Ash Dyke (first 9 years)	0.00	51.5	51.5

7.	Ash Water Recirculation (incl ETP)	0.00	44.7	44.7
8.	Dust Extraction & Suppression System	0.00	5.0	5.0
9.	DM Plant Waste Treatment System	0.00	5.0	5.0
10.	Sewerage Collection, Treatment & Disposal	0.00	4.0	4.0
11.	Environmental Lab Equipment	0.00	1.5	1.5
12.	Green Belt, Afforestation & Landscaping	0.00	5.0	5.0
13.	RO System for Treatment of CT Blowdown	0.00	3.5	3.5
14.	Rainwater Harvesting System	0.00	1.5	1.5
TOTAL		297.0	1486.5	1783.5

CHAPTER-11: DISCLOSURE OF CONSULTANTS

M/s Mantec consultants Pvt. Ltd, New Delhi was engaged as environmental consultant for preparing EIA & EMP report for this project. Names of the EIA coordinator, Functional Area Experts and other Team Members engaged with their brief resume and nature of consultancy rendered is provided below:

Project EIA Coordinator: Mr. S.B. Sinha (M.Sc. Chemistry, 45 Years of Experience)

Table- 100: List of Experts Engaged For This Project

S.No.	Name of Consultant	Qualification & Years of Experience	Nature of Consultancy Rendered
1.	Mr. S.B. Sinha	M.Sc. (Chemistry), 45 Years	Consultancy provided in functional area of Water Pollution (WP), Air Pollution (AP), Air Quality & Meteorology (AQ)
2.	Dr. Vivek N. Singh	PhD. (Botany), 12 Years	Consultancy provided in functional areas of Soil Conservation (SC)& Ecology & Biodiversity (EB)
3.	Mr. A.S. Brara	B.Sc. Engg. (Mechanical), 48 Years	Consultancy provided in functional area of Noise only
4.	Mr. B.M. Sinha	M.Sc. (Applied Geophysics), 38 Years	Consultancy provided in functional area of Geology (GE)
5.	Mr. Anil Kumar	M.A. (Sociology), 9 Years	Consultancy provided in functional area of Socioeconomic (SE)
6.	Mr. Deepak Srivastav	M.Sc (Applied Geology) 7 Years	Consultancy provided in functional area of Land Use (LU)
7.	Mr. R. K. Khanna	Civil Engg. 43 Years	Consultancy provided in functional areas of Hydrology, Ground Water & Water Conservation (HG)

Table- 101: List of AFAEs Engaged for This Project

S.No.	Name of the Consultant	Qualification& Year of Experience	Nature of Consultancy rendered
1.	Ms. Nirjhar Raturi	M.Tech (Energy & Environment Management) 3 Years	Assisting functional area experts of Air Pollution (AP), Air Quality & Meteorology (AQ)
2.	Mr. Manoj Kr. Singh	M.A. (Geography), M.Sc. (Geoinformatics) 3 Years	Assisting functional area experts of Landuse (LU)
3.	Mr. Muzaffar Ahmad	M.Sc. (Environmental Science) 3 Years	Assisting functional area experts of Air Pollution (AP), Water Pollution (WP)
4.	Mr. Sumit Verma	M.Tech (Environmental Engineering & Management) 3 Years	Assisting functional area experts of Water Pollution (WP), Solid & Hazardous Waste (SHW)
5.	Mr. Gaja Nand Mallick	M.Sc. (Ecology & Environment) 12 Years	Assisting functional area experts of Ecology & Biodiversity (EB)

Declaration by the Head of the Accredited Consultant Organization:

I, Arvinder S Brara, hereby, confirm that the above mentioned experts prepared the Final Environment Impact Assessment (EIA) Report of THDC STPP Khurja (2x660MW), UP.

Signature 

Name: Arvinder S Brara
Designation: CMD
Name of the EIA Consultant Organization: Mantec Consultants Pvt. Ltd, New Delhi

Annexure-I
ToR Prescribed by MoEF

TOR

J-13012/100/2011 - IA. i. (.
Government of India
Ministry of Environment & Forests

Paryavaran Bhavan, C.G.O. Complex,
Lodi Road, New Delhi -110003.
Dated: October 27, 2011.

To

M/s THDC India Ltd.
Plot No. 20, Sector-14,
Kaushambi, Ghaziabad,
U.P - 201 010.

Sub: ***2x660 MW Super Critical Coal Based Khurja Super Thermal Power Plant at villages Dashashra Kherli, Jahanpur, Naiphal and Rukanpur, in Khurja Taluk, in Bulandshahar Distt., in Uttar Pradesh – reg TOR.***

Sir,

The undersigned is directed to refer to your letter dated 19.08.2011 on the above mentioned subject.

2. It is to inform that the proposal was considered by the Expert Appraisal Committee during its 32nd Meeting held during September 12-13, 2011, for determination of the Terms of Reference (TOR) for undertaking detailed EIA study in accordance with the provisions of the EIA notification dated September 14, 2006.

3. Based on the information provided by you with regard to the above mentioned project proposal, the Committee has prescribed the following Terms of Reference (TORs) for preparation of the Environmental Impact Assessment (EIA) Report and Environment Management Plan (EMP), in respect of your above mentioned project.

i) Vision document specifying prospective long term plan of the site, if any, shall be formulated and submitted.

ii) Status of compliance to the conditions stipulated for environmental and CRZ clearances of the previous phase(s), as applicable, shall be submitted.

iii) Executive summary of the project indicating relevant details along with recent photographs of the approved site shall be provided. Response to the issues raised during public hearing and to the written representations (if any), along with a time bound action plan and budgetary allocations to address the same, shall be provided in a tabular form, against each action proposed.

iv) Harnessing solar power within the premises of the plant particularly at available roof tops and other available areas shall be formulated and status of implementation shall be submitted to the Ministry.

v) The coordinates of the approved site including location of ash pond shall be submitted along with topo sheet (1:50,000 scale) and confirmed GPS readings of plant boundary and NRS satellite map of the area, shall be submitted. Elevation of plant site and ash pond with respect to HFL of water body/nallah/river shall be specified, if the site is located in proximity to them.

vi) Layout plan indicating break-up of plant area, ash pond, area for green belt, infrastructure, roads etc. shall be provided.

vii) Layout shall be revised keeping 500 m distances on either side of the National Highway.

viii) Land shall be restricted to 850 acres.

ix) Land requirement for the project shall be optimized and in any case not more than what has been specified by CEA from time to time. Item wise break up of land requirement and revised layout (as modified by the EAC) shall be provided.

x) Present land use as per the revenue records (free of all encumbrances of the proposed site, shall be furnished. Information on land to be acquired) if any, for

coal transportation system as well as for laying of pipeline including ROW shall be specifically stated.

xi) The issues relating to land acquisition and R&R scheme with a time bound Action Plan should be formulated and clearly spelt out in the EIA report.

xii) Satellite imagery or authenticated topo sheet indicating drainage, cropping pattern, water bodies (wetland, river system, stream, nallahs, ponds etc.), location of nearest villages, creeks, mangroves, rivers, reservoirs etc. in the study area shall be provided.

xiii) Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes / wildlife corridor, if any, within 10 km of the project site shall be specified and marked on the map duly authenticated by the Office of the Chief Wildlife Warden of the area concerned.

xiv) Topography of the study area supported by toposheet on 1:50,000 scale of Survey of India, alongwith a large scale map preferably of 1:25,000 scale and the specific information whether the site requires any filling shall be provided. In that case, details of filling, quantity of fill material required; its source, transportation etc. shall be submitted.

xv) A detailed study on land use pattern in the study area shall be carried out including identification of common property resources (such as grazing and community land, water resources etc.) available and Action Plan for its protection and management shall be formulated. If acquisition of grazing land is involved, it shall be ensured that an equal area of grazing land to be acquired is developed alternatively and details plan shall be submitted.

xvi) A mineralogical map of the proposed site (including soil type) and information (if available) that the site is not located on economically feasible mineable mineral deposit shall be submitted.

xvii) Details of 100% fly ash utilization plan as per latest fly ash Utilization Notification of GOI along with firm agreements / MoU with contracting parties including other usages etc. shall be submitted. The plan shall also include disposal method / mechanism of bottom ash.

xviii) Water requirement, calculated as per norms stipulated by CEA from time to time, shall be submitted along with water balance diagram. Details of water balance calculated shall take into account reuse and re-circulation of effluents which shall be explicitly specified.

xix) Water body/nallah (if any) passing across the site should not be disturbed as far as possible. In case any nallah / drain has to be diverted, it shall be ensured that the diversion does not disturb the natural drainage pattern of the area. Details of diversion required shall be furnished which shall be duly approved by the concerned department.

xx) It shall also be ensured that a minimum of 500 m distance of plant boundary is kept from the HFL of river system / streams etc.

xxi) Hydro-geological study of the area shall be carried out through an institute/ organisation of repute to assess the impact on ground and surface water regimes. Specific mitigation measures shall be spelt out and time bound action plan for its implementation shall be submitted.

xxii) Detailed Studies on the impacts of the ecology including fisheries of the river/estuary/sea due to the proposed withdrawal of water / discharge of treated wastewater into the river/creek/ sea etc shall be carried out and submitted alongwith the EIA Report. In case of requirement of marine impact assessment study, the location of intake and outfall shall be clearly specified along with depth of water drawl and discharge into open sea.

xxiii) Source of water and its sustainability even in lean season shall be provided along with details of ecological impacts arising out of withdrawal of water and taking into account inter-state shares (if any). Information on other competing sources downstream of the proposed project. Commitment regarding availability of requisite quantity of water from the Competent Authority shall be provided along with letter / document stating firm allocation of water.

xxiv) Detailed plan for carrying out rainwater harvesting and its proposed utilisation in the plant shall be furnished.

xxv) Feasibility of zero discharge concept shall be critically examined and its details submitted.

xxvi) Optimization of COC along with other water conservation measures in the project shall be specified.

xxvii) Plan for recirculation of ash pond water and its implementation shall be submitted.

xxviii) Detailed plan for conducting monitoring of water quality regularly with proper maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface / ground water) shall be submitted. It shall be ensured that parameter to be monitored also include heavy metals.

xxix) Socio-economic study of the study area comprising of 10 km from the plant site shall be carried out by a reputed institute / agency which shall consist of detail assessment of the impact on livelihood of local communities.

xxx) Action plan for identification of local employable youth for training in skills, relevant to the project, for eventual employment in the project itself shall be formulated and numbers specified during construction & operation phases of the Project.

xxxi) If the area has tribal population it shall be ensured that the rights of tribals are well protected. The project proponent shall accordingly identify tribal issues under various provisions of the law of the land.

xxxii) A detailed CSR plan along with activities wise break up of financial commitment shall be prepared. CSR component shall be identified considering need- based assessment study. Sustainable income generating measures which can help in upliftment of poor section of society, which is consistent with the traditional skills of the people shall be identified. Separate budget for community development activities and income generating programmes shall be specified.

xxxiii) While formulating CSR schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest government institute of repute in the region shall be prepared. The project proponent shall also provide action plan for the status of implementation of the scheme from time to time and dovetail the same with any Govt. scheme(s). CSR details done in the past should be clearly spelt out in case of expansion projects.

xxxiv) R&R plan, as applicable, shall be formulated wherein mechanism for protecting the rights and livelihood of the people in the region who are likely to be impacted, is taken into consideration. R&R plan shall be formulated after a detailed census of population based on socio economic surveys who were dependant on land falling in the project, as well as, population who were dependant on land not owned by them.

xxxv) Assessment of occupational health as endemic diseases of environmental origin shall be carried out and action plan to mitigate the same shall be prepared.

xxxvi) Occupational health and safety measures for the workers including identification of work related health hazards shall be formulated. The company shall engage full time qualified doctors who are trained in occupational health. Health monitoring of the workers shall be conducted at periodic intervals and health records maintained. Awareness programme for workers due to likely adverse impact on their health due to working in non-conducive environment shall be carried out and precautionary measures like use of personal equipments etc. shall be provided. Review of impact of various health measures undertaken at intervals of two years shall be conducted with an excellent follow up plan of action wherever required.

xxxvii) One complete season site specific meteorological and AAQ data (except monsoon season) as per MoEF Notification dated 16.11.2009 shall be collected and the dates of monitoring recorded. The parameters to be covered for AAQ shall include SPM, RSPM (PM10, PM2.5), SO_2, NO_x, Hg and O_3 (ground level). The location of the monitoring stations should be so decided so as to take into consideration the pre-dominant downwind direction, population zone, villages in the vicinity and sensitive receptors including reserved forests. There should be at least one monitoring station each in the upwind and in the pre - dominant downwind

direction at a location where maximum ground level concentration is likely to occur.

xxxviii) A list of industries existing and proposed in the study area shall be furnished.

xxxix) Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be well assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours should be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The wind roses should also be shown on the location map as well.

xl) Radio activity and heavy metal contents of coal to be sourced shall be examined and submitted along with the laboratory reports.

xli) Fuel analysis shall be provided. Details of auxiliary fuel, if any, including its quantity, quality, storage etc should also be furnished.

xlii) Quantity of fuel required, its source and characteristics and documentary evidence to substantiate confirmed fuel linkage shall be furnished.

xliii) Details of transportation of fuel from the source (including port handling) to the proposed plant and its impact on ambient AAQ shall be suitably assessed and submitted. If transportation entails a long distance it shall be ensured that rail transportation to the site shall be first assessed. Wagon loading at source shall preferably be through silo/conveyor belt.

xliv) For proposals based on imported coal, inland transportation and port handling and rolling stocks /rail movement bottle necks shall be critically examined and details furnished.

xlv) Details regarding infrastructure facilities such as sanitation, fuel, restrooms, medical facilities, safety during construction phase etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase should be adequately catered for and details furnished.

xlvi) EMP to mitigate the adverse impacts due to the project along with item - wise cost of its implementation. A time bound manner shall be specified.

xlvii) A Disaster Management Plan (DMP) along with risk assessment study including fire and explosion issues due to storage and use of fuel should be carried out. It should take into account the maximum inventory of storage at site at any point of time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be invariably provided.

xlviii) The DMP so formulated shall include measures against likely Tsunami/Cyclones/Storm Surges/Earthquakes etc, as applicable. It shall be ensured that DMP consists of both on-site and off-site plan, complete with details of containing likely disaster and shall specifically mention personnel identified for the task. Smaller version of the plan shall be prepared both in English and local languages.

xlix) Detailed plan for raising green belt of native species of appropriate width (50 to 100 m) and consisting of at least 3 tiers around plant boundary (except in areas not possible) with tree density of 2000 to 2500 trees per ha with a good survival rate of about 80% shall be submitted. Photographic evidence must be created and submitted periodically including NRSA reports.

l) Over and above the green belt, as carbon sink, additional plantation shall be carried out in identified blocks of degraded forests, in close consultation with the District Forests Department. In pursuance to this the project proponent shall formulate time bound action plans along with financial allocation and shall submit status of implementation to the Ministry every six months.

li) Corporate Environment Policy

a) The company to have a well laid down Environment Policy approved by its Board of Directors.

b) The Environment Policy must prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions.

c) The hierarchical system or Administrative Order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions must be furnished.

d) To have proper checks and balances the company should have a well laid out system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large.

All the above details should be adequately brought out in the EIA report and in the presentation to the Committee.

iii) Details of litigation pending or otherwise with respect to project in any court, tribunal etc. shall invariably be furnished.

4. Besides the above, the following general points will be followed:

a. All documents to be properly referenced with index, page numbers and continuous page numbering.

b. Where data is presented in the report especially in table, the period in which the data was collected and the source should invariably be indicated.

c. Where the documents provided are in a language other than English, an English translation should be provided.

d. The Questionnaire for environmental appraisal of thermal power projects as devised earlier by the Ministry shall also be filled and submitted.

e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI) / National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/ EMP reports prepared by them and data provided by other organization / Laboratories including their status of approvals etc. In this regard circular no. F.No. J-11013/77/2004-IA-II (I) dated 2nd December, 2009 is posted on the Ministry's website http://www.moef.nic.in may be referred.

In addition to the above, information on the following may also be incorporated in the EIA report.

1. Is the project intended to have CDM intent?

(i) If not, then why?
(ii) If yes, then

a. Has PIN (Project Idea Note) [or PCN (Project Concept Note)] submitted to the ?NCA? (National CDM Authority) in the MoEF?
b. If not, then by when is that expected?
c. Has PDD (Project Design Document) been prepared?
d. What is the Carbon intensity? from your electricity generation projected (i.e. CO_2 Tons/MWH or Kg/KWH)
e. Amount of CO_2 in Tons/year expected to be reduced from the baseline data available on the CEA?s web-site (www.cea.nic.in)

2. Notwithstanding 1(i) above, data on (d) & (e) above shall be worked out and reported.

3. **The Environmental clearance shall be applied only after firm fuel and water linkages are obtained.**

6. After preparing the Draft EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned issues, the same shall be submitted to the SPCB for conducting the public hearing as per procedure of EIA notification 2006. The issues raised during public hearing shall be further incorporated in the Draft EIA/EMP report. The final EIA/EMP report along with public hearing report and the requisite documents (*including written objections, if any*) shall be submitted to the Ministry for appraisal by the Expert Appraisal Committee for consideration of awarding environmental clearance under the provisions of Environmental Impact Assessment notification dated September 14, 2006.

7. The TORs prescribed shall be valid for a period of two years for submission of EIA/EMP reports, after public consultation.

Yours faithfully,

(Dr. P.L. Ahujarai)
Director

Copy to

1. The Secretary, Department of Environment, Govt. of Uttar Pradesh.
2. The Chairman, Uttar Pradesh Pollution Control Board, IIIrd Floor, PICUP Bhawan, Vibhuti Khand, Gomti Nagar, Lucknow – 226 010
3. The Chief Conservator of Forests, Ministry of Environment & Forests, Regional Office (CZ), Kendriya Bhawan, 5th Floor, Sector-H, Aliganj, Lucknow – 226020.
4. Guard File.

(Dr. P.L. Ahujarai)
Director

Annexure-II
ToR Extension Letter

J-13012/100/2011- IA. II (T)
Government of India
Ministry of Environment, Forests and Climate Change

3rd Floor, Vayu Block,
Indira Paryavaran Bhawan, Jor Bagh Road,
Aliganj, New Delhi-110003

Dated: 15th January, 2015.

To

M/s THDC India Ltd.
Plot No. 20, Sector-14,
Kaushambi, Ghaziabad- 201010
Uttar Pradesh.

Tel. No; 020-2816900-901; Fax: 020-2776499

Sub: 2x660 MW Super Critical coal based Khurja Super Thermal Power Plant at Villages Dashashra Kherli, Jahanpur, Naiphal and Rukanpur, Khurja Taluk, Bulandshahar Distt., Uttar Pradesh by M/s. THDC India Ltd. reg. amendment and extension of validity of ToR.

Sir,

This has reference to your letters dated 15.12.2014 and 24.12.2014 on the above subject. It is noted that Terms of Reference (ToR) for preparation of EIA/EMP was accorded for the above project vide this Ministry's letter of even no. dated 27.10.2011 and extension of ToR was accorded vide letter of even no. dated 03.12.2013 for TOR validity upto 26.10.2014.

2. The matter was placed before the Expert Appraisal Committee (Thermal Power) in its 28th Meeting held during 22nd & 23rd December, 2014. In acceptance of the recommendation of the EAC and based on the information/clarification furnished by you with respect to the above mentioned power project, the validity period of the ToR is extended for one more year i.e. till 26.10.2015 for submission of final EIA/EMP reports and other requisite documents for consideration of environmental clearance.

3. Further, an amendment in ToR is accorded for the layout of the project by utilizing entire plot of 1200.843 acre land, with provision of future expansion by additional 1x660 MW Unit subsequent to re-routing of NH-91.

4. This issues with the approval of the Competent Authority.

Yours faithfully,

(Dr. Saroj)
Scientist 'F'

Copy to:

1. The Secretary, Ministry of Power, Shram Shakti Bhawan, Rafi Marg, New Delhi 110001.
2. The Chairman, Central Electricity Authority, Sewa Bhawan, R.K. Puram, New Delhi-110066.
3. The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032.
4. The Secretary, Department of Environment, Government of U.P.
5. The Chairman, U.P. Pollution Control Board, PICUP Bhawan, 3rd Floor, B-Block, Vibhuti Khand, Gomti Nagar, Lucknow-226010.

6. The Chief Conservator of Forests (C), Ministry of Environment and Forests, Regional Office (Central Region), Kendriya Bhavan, 5th Floor, Sector – H, Aliganj, Lucknow.
7. The Collector, District Bulandshahar, U.P.
8. Guard file.

(Dr. Saroj)
Scientist 'F'

Annexure-III
Public Hearing Minutes

क्षेत्रीय कार्यालय

दूरभाष : 05732-259035
फैक्स : 5732-259035
ई-मेल : robulandshahar@uppcb.com

उत्तर प्रदेश प्रदूषण नियन्त्रण बोर्ड
Uttar Pradesh Pollution Control Board

शिवपुरी, (स्टेट बैंक के सामने), रेलवे रोड, बुलन्दशहर-203001

संदर्भ : 1598/टीएचडीसी/खोन प्रकल्प/15 दिनांक : 18.08.15

सेवा में,

मुख्य पर्यावरण अधिकारी (वृत्त-4),
उ0प्र0 प्रदूषण नियंत्रण बोर्ड,
लखनऊ।

विषय– मै0 टीएचडीसी इण्डिया लि0, खुर्जा कोल बेस्ट सुपर थर्मल पावर प्रोजक्ट (2x660 मेगावाट) की कोयला आधारित विद्युत उत्पादन परियोजना की स्थापना राष्ट्रीय राजमार्ग सं0 91 के किनारे स्थित ग्राम चार गांव दरेरा खेडली, जहानपुर, नैफल (ऊंचागांव) और रूकनपुर, तहसील खुर्जा, जनपद बुलन्दशहर में किये जाने के सम्बन्ध में लोक सुनवाई हेतु अपर जिलाधिकारी (प्रशासन), बुलन्दशहर की अध्यक्षता में दिनांक 01.08.2015 को प्रातः 11:00 बजे तहसील सभागार, खुर्जा, जनपद बुलन्दशहर में आयोजित लोक सुनवाई का कार्यवृत्त प्रेषित करने के सम्बन्ध में।

महोदय,

कृपया उपरोक्त विषयक बोर्ड मुख्यालय के पत्रांक: एफ63593/सी–8/एनओसी/159/4/15 दिनांक 24.06.2015 एवं पत्रांक: एफ63743/सी–8/एनओसी/159/6/15 दिनांक 26.06.2015 का संदर्भ ग्रहण करने का कष्ट करें। इस सम्बन्ध में कार्यालय द्वारा उपरोक्त परियोजना की सम्पन्न करायी गयी लोक सुनवाई का कार्यवृत्त, लोक सुनवाई के सम्बन्ध में समाचार पत्रों में कराये गये विज्ञापन की प्रति, कार्यवाही की सीडी एवं उपस्थित सदस्यों व जनसमुदाय की उपस्थिति पंजिका आदि पत्र के साथ संलग्न कर आपके अग्रिम आवश्यक कार्यवाही हेतु सादर प्रेषित है।

संलग्नक– उपरोक्तानुसार।

भवदीय

(आशुतोष चौहान)
क्षेत्रीय अधिकारी(प्र0)

मै0 टीएचडीसी इण्डिया लि0, खुर्जा कोल बेस्ट सुपर थर्मल पावर प्रोजेक्ट (2x660 मेगावाट) की कोयला आधारित विद्युत उत्पादन परियोजना की स्थापना राष्ट्रीय राजमार्ग संख्या–91 के किनारे स्थित ग्राम चार गांव दसेरा खेडली, जहानपुर, नैफल (उंचगांव) और रूकनपुर, तहसील खुर्जा, जनपद बुलन्दशहर में किये जाने के सम्बन्ध में लोक सुनवाई हेतु अपर जिलाधिकारी (प्रशासन), बुलन्दशहर की अध्यक्षता में दिनांक 01.08.2015 को प्रातः 11:00 बजे तहसील सभागार, खुर्जा, जनपद बुलन्दशहर में आयोजित लोक सुनवाई का कार्यवृत्त :–

उपरोक्त सदर्भित कोयला आधारित विद्युत उत्पादन परियोजना की पर्यावरण स्वीकृति प्राप्त करने विषयक मै0 टीएचडीसी इण्डिया लि0, खुर्जा कोल बेस्ट सुपर थर्मल पावर प्रोजेक्ट (2x660 मेगावाट) की कोयला आधारित विद्युत उत्पादन परियोजना की स्थापना राष्ट्रीय राजमार्ग संख्या–91 के किनारे स्थित ग्राम चार गांव दसेरा खेडली, जहानपुर, नैफल (उंचगांव) और रूकनपुर, तहसील खुर्जा, जनपद बुलन्दशहर के आवेदन पत्र के सम्यक् विचारोपरान्त बोर्ड द्वारा पत्र संख्या–एफ62072/सी–8/एनओसी/159/2/15 दिनांक–03.06.2015, जो जिलाधिकारी महोदया, बुलन्दशहर को सम्बोधित एवं क्षेत्रीय कार्यालय उ0प्र0 प्रदूषण नियन्त्रण बोर्ड, बुलन्दशहर को पृष्ठांकित है, के निर्देशों के अनुपालन में लोक सुनवाई आयोजित करने हेतु जिलाधिकारी महोदया, बुलन्दशहर से दिनांक, स्थान एवं समय नियत करने हेतु अनुरोध किया गया। जिलाधिकारी बुलन्दशहर की अनुमति के उपरान्त अपर जिलाधिकारी (प्रशासन), बुलन्दशहर द्वारा लोक सुनवाई हेतु दिनांक 01.08.2015, समय 11:00 बजे स्थान, तहसील सभागार, खुर्जा, जनपद बुलन्दशहर नियत की गयी। पर्यावरण एवं वन मंत्रालय, भारत सरकार द्वारा पर्यावरण (संरक्षण) अधिनियम, 1986 की धारा–3 की उपधारा (1) (2) के खण्ड "अ" के अन्तर्गत पर्यावरण समाघात निर्धारण अधिसूचना संख्या– एस0ओ0–1533 दिनांक–14.09.2006 यथासंशोधित अधिसूचना संख्या–एस0ओ0–3067 (ई) दिनांक–01.12.2009 में वर्णित प्रावधानों के अन्तर्गत नियत दिनांक से एक माह पूर्व हिन्दी दैनिक समाचार पत्र "अमर उजाला" के बुलन्दशहर संस्करण में दिनांक–28.06.2015 तथा अंग्रेजी दैनिक समाचार पत्र "हिन्दुस्तान टाइम्स" के दिल्ली संस्करण में दिनांक–28.06.2015 को प्रकाशित करायी गयी।

तत्क्रम में दिनांक–01.08.2015 को जिलाधिकारी, बुलन्दशहर द्वारा नामित अपर जिलाधिकारी (प्रशासन), श्री विशाल सिंह की अध्यक्षता में लोक सुनवाई का आयोजन तहसील सभागार खुर्जा, जनपद बुलन्दशहर में आयोजित की गयी। उक्त लोक सुनवाई में निम्नांकित सदस्य मुख्य रूप से उपस्थित थे :–

1. श्री विशाल सिंह, अपर जिलाधिकारी (प्रशासन) / अध्यक्ष, बुलन्दशहर।
2. श्री इन्दु प्रकाश सिंह, उप जिलाधिकारी, खुर्जा, जनपद बुलन्दशहर।
3. श्री आशुतोष औझान, क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर।
4. श्री गीतेश चन्द्रा, सहायक वैज्ञानिक अधिकारी, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर।
5. श्री आनन्द श्रीनेत, तहसीलदार–कानिक, खुर्जा, जनपद बुलन्दशहर।
6. श्री डी0के0 गुप्ता, अवर अभियन्ता, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर।

7. श्री सतेन्द्र प्रताप सिंह, अवर अभियंता, उ0प्र0 प्रदूषण नियन्त्रण बोर्ड, बुलन्दशहर।
8. श्री राम औतार शर्मा, रजि0 कानूनगो, खुर्जा, जनपद बुलन्दशहर।
9. श्री धर्मेन्द्र कुमार, टंकण/लिपिक, उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर।
10. श्री आर0के0 भट्ट, अपर महाप्रबन्धक जनरल मैनेजर, एस.टी.पी.पी., खुर्जा जनपद बुलन्दशहर।
11. श्री अरविन्द सिंह, विसर, पराभर्शी, मैन्टेक कंसल्टेन्ट्स प्रा0लि0, नई दिल्ली।

अन्य उपस्थित सदस्यों की उपस्थिति की छायाप्रति संलग्न है।

श्री आशुतोष चौहान, क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियन्त्रण बोर्ड, बुलन्दशहर द्वारा लोक सुनवाई में उपस्थित सदस्यों एवं आसपास से आये जनसमुदाय को लोक सुनवाई के सम्बन्ध में अवगत कराते हुए प्रस्तावित परियोजना के सम्बन्ध में विवरण प्रस्तुत किया गया। श्री चौहान द्वारा उपस्थित सभी सदस्यों का स्वागत करते हुए लोक सुनवाई का अध्यक्ष महोदय की अनुमति से प्रारम्भ किया गया। अग्रेत्तर मै0 टीएचडीसी इण्डिया लि0, खुर्जा, जनपद बुलन्दशहर द्वारा नियुक्त प्रबन्धी को परियोजना सम्बन्धी विस्तृत विवरण प्रस्तुत करने हेतु आमंत्रित किया तथा उपस्थित जनसमुदाय से टीका-टिप्पणी/सुझाव प्रस्तुत करने हेतु अनुरोध किया।

श्री मुकुल शर्मा, (प्रबन्धक-डिजाईन थर्मल) द्वारा अवगत कराया गया कि मै0 टीएचडीसी इण्डिया लि0, का गठन 12 जुलाई, 1988 को हुआ था। चक्त के अन्तर्गत हाइड्रो प्रोजेक्ट व तापीय विद्युत परियोजना द्वारा राजस्थान, दिल्ली, उत्तर प्रदेश व अन्य राज्यों में भी परियोजनाओं की स्थापना कर विद्युत उत्पादन का कार्य किया जाता है। तहसील खुर्जा स्थित ग्राम दशहरा में स्थापित होने वाली 2x660 मेगावाट की तापीय विद्युत परियोजना की स्थापना के सम्बन्ध में आज दिनांक 31.08.2015 को यह लोक सुनवाई आयोजित की गयी है। उक्त तापीय परियोजना के सम्बन्ध में पर्यावरण मूल्यांकन आख्या को तैयार किये जाने हेतु पर्यावरण निदेशालय द्वारा जारी समस्त निर्देशों के अनुपालन में परियोजना के 10 किमी0 की त्रिज्या में जल, वायु, ध्वनि, मृदा, वनस्पतियों एवं अन्य अपघटकों के सम्बन्ध में लगभग 10 जगहों से अलग-अलग नमूनों को एकत्र कर जाँच की गयी तथा नमूने एकत्रीकरण का कार्य माह अक्टूबर, 2014 एवं नवम्बर, 2014 में किया गया। नमूनों की जाँचोपरान्त पाया गया कि उक्त परियोजना स्थल के चारों ओर जल, वायु, ध्वनि, मृदा, पर्यावरण मानकों के अनुरूप हैं। उक्त परियोजना के आसपास कोई संरक्षित क्षेत्र एवं कृषियुक्त भूमि है तथा कोई भी वाइल्ड लाइफ सैन्चुरी आदि स्थापित नहीं है।

अग्रेत्तर अवगत कराया गया कि मै0 टीएचडीसी इण्डिया लि0, खुर्जा कोल बेस्ड सुपर थर्मल पावर प्रोजेक्ट (2x660 मेगावाट) की कोयला आधारित विद्युत उत्पादन परियोजना ग्राम दशहरा खुर्जा, जनपद बुलन्दशहर का ईपीसी एन0टी0पी0सी0 द्वारा तैयार किया गया है, जिस हेतु लगभग 1400 एकड़ भूमि की आवश्यकता होगी। उक्त परियोजना में 2x660 मेगावाट इकाईयों से जनित उत्सर्जन के निस्तारण हेतु 275 मीटर ऊँची चिमनी लगाने का प्रावधान किया गया है तथा परियोजना हेतु

प्रयोग में लाये जाने वाले पानी हेतु सीजीडब्लूबी, नई दिल्ली से अनुमति प्राप्त किया जाना प्रविचारित है तथा कोयले की उपलब्धता हेतु रेलवे बोर्ड, नई दिल्ली से अनुमति प्राप्त की गयी है।

श्री अरविन्द सिंह बिरार, निदेशक, मैन्टेक कन्सल्टेंटस प्रा0लि0, नई दिल्ली द्वारा अवगत कराया गया कि पर्यावरण एवं वन मंत्रालय, भारत सरकार द्वारा जारी पर्यावरण स्वीकृति में आरोपित शर्तो के अनुसार परियोजना में प्रदूषण नियंत्रण हेतु उपाय किये जायेंगे तथा परियोजना के संचालन से आसपास के ग्रामवासियों को प्रत्यक्ष व अप्रत्यक्ष रूप से लाभ होगा। साथ ही अवगत कराया कि बिजली की महत्वता से आप सभी लोग विदित है तथा बिजली का उत्पादन होने पर पर्यावरण पर पड़ने वाले प्रभाव को न्यून करने के समस्त उपाय किये जायेंगे।

श्री विवेक, परामर्शी/प्रतिनिधि, मैन्टेक कन्सल्टेंटस प्रा0लि0, नई दिल्ली द्वारा उपस्थित सभी मंचासीन अधिकारियों एवं जनसमुदाय का स्वागत किया तथा अवगत कराया कि पर्यावरण विभाग द्वारा जारी निर्देशों को दृष्टिगत रखते हुए तापीय विद्युत परियोजना से जनित प्रदूषण की रोकथाम हेतु योजना बनायी गयी है, जिससे तापीय विद्युत परियोजना के संचालन से पर्यावरण पर कम से कम प्रभाव पड़े।

अग्रेत्तर अवगत कराया गया कि पर्यावरण के चारो ओर 10 किमी त्रिज्या में विभिन्न अपघटकों की जाँच की गयी है। जाचोपरान्त पाया गया कि परियोजना के आसपास के ग्रामों की भूमि उपजाऊ है तथा आसपास कोई नदी क्षेत्र, पक्षी विहार, वाइल्ड लाइफ सेन्चुरी दृष्टिगोचर नही है। समस्त प्रचालक बोर्ड मानकों के अनुरूप है, परियोजना के आसपास उष्ण कटिबन्धीय प्रजाति के पेड़–पौधे स्थित है। परियोजना का विस्तृत विवरण प्रस्तुत करने के उपरान्त लोक सुनवाई में उपस्थित जनसमुदाय को टीका/टिप्पणी/सुझाव हेतु आमंत्रित किया गया।

क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर द्वारा परामर्शी को अवगत कराया गया कि परियोजना के संचालन से जल/वायु प्रदूषण की रोकथाम के सम्बन्ध में विवरण दें।

श्री आर0के0 भट्ट, एडिशनल जनरल मैनेजर, एस.टी.पी.पी., खुर्जा, द्वारा अवगत कराया गया कि मै0 टी0एच0डी0सी0 तापीय विद्युत परियोजना 2x660 मेगावाट की इकाईयों की स्थापना हेतु यू0पी0एस0आई0डी0सी0 द्वारा भूमि अधिग्रहण का कार्य किया जाना है। तापीय विद्युत परियोजना की इकाईयों से जनित तरल/ठोस अपशिष्ट आस–पास के खुले स्थानों पर भण्डारित नहीं किया जायेगा तथा चिमनी से जनित उत्सर्जन के निस्तारण हेतु 275 मी0 ऊंची चिमनी से सम्बद्ध कर ई0एस0पी0 की स्थापना किया जाने का प्राविधान किया गया है। साथ ही अवगत कराया कि इकाईयों में स्थापित चिमनी की ऊंचाई अधिक होने के कारण धुए की सान्द्रता का प्रभाव न्यून हो जायेगा तथा सल्फर–डाई–ऑक्साइड के नियंत्रण हेतु उचित प्राविधान किया जायेगा। परिसर में चारों ओर हरित पट्टिका व धूल के नियंत्रण हेतु जल छिडकाव की भी व्यवस्था की जायेगी। अग्रेतर अवगत कराया गया कि कूलिंग वाटर, डी0एम0 प्लाण्ट, बेग हॉस व सीवेज से जनित उत्प्रवाह को उपयुक्त उपस्करों

की स्थापना कर नवीनतम पद्धति शून्य उत्प्रवाह निस्तारण को अपनाया जायेगा, जोकि एनटीपीसी द्वारा तैयार की गई डी0पी0आर0 में सम्मिलित है।

क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर द्वारा परामर्शी से पूछा गया कि इकाई के संचालन से जनित राख का निस्तारण कैसे किया जायेगा।

परामर्शी द्वारा अवगत कराया गया कि इकाई के संचालन से जनित राख का निस्तारण परिसर के अन्दर सिलेरी के माध्यम से स्थापित ऐशपॉण्ड में निस्तारित किये जाने की व्यवस्था की गयी है।

क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर द्वारा परामर्शी से पूछा गया कि ऐसपॉण्ड से जनित डिकेटेण्ट वाटर का प्रयोग कहाँ किया जायेगा।

परामर्शी द्वारा अवगत कराया गया कि ऐशपॉण्ड से जनित उत्प्रवाह को स्लरी हेतु पुनः चक्रित किया जायेगा।

क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर द्वारा परामर्शी से पूँछा गया कि इकाई के संचालन से जनित राख के निस्तारण हेतु वर्षा ऋतु के दौरान समस्या उत्पन्न होगी। क्या एण्डब्लू0आर0एस0 लगाने का प्राविधान किया गया है।

परामर्शी द्वारा अवगत कराया गया है कि राख के निस्तारण से जनित उत्प्रवाह को पुनः चक्रित करने हेतु ऐश वाटर रिसाईकिल सिस्टम की स्थापना किये जाने की व्यवस्था की जायेगी, तथा धरेलू उत्प्रवाह के शुद्धिकरण हेतु एस0टी0पी0 की स्थापना कर शुद्धिकरण धरेलू उत्प्रवाह को हरितपट्टिका को सिंचित किये जाने की व्यवस्था की गई है। अग्रेतर अवगत कराया गया कि इकाई के संचालन से जनित राख को शत-प्रतिशत निस्तारित किये जाने की व्यवस्था की गई है, तथा जनित फ्लाई ऐश को आस-पास के ग्रामीणों को उपलब्ध कराया जायेगा जिससे आस-पास के ग्रामीण इण्टरलॉकिंग ब्रिक्स व अन्य प्रकार के उत्पादों का निर्माण कर अपनी जीविका के उपाय कर सकें।

क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर द्वारा परामर्शी से पूछा गया कि तापीय विद्युत परियोजना से जनित राख के निस्तारण हेतु कितने ऐश पॉण्डों का निर्माण किये जाने का प्राविधान किया गया है।

परामर्शी द्वारा अवगत कराया गया कि उक्त इकाई के संचालन से जनित राख के निस्तारण हेतु दो ऐश पॉण्डों का निर्माण कराया जायेगा तथा ऐश पॉण्ड क्षेत्र के चारों ओर हरितपट्टिका भी विकसित की जायेगी। उक्त परियोजना के सी0एस0आर0 मद से आस-पास के ग्रामवासियों हेतु विद्यालय, सड़कें, चिकित्सालय व वृक्षारोपण आदि हेतु धनराशि व्यय की जायेगी, जिससे आस-पास के क्षेत्र का विकास होगा तथा मै0 टी0एच0डी0सी0 द्वारा अन्य स्थानों पर पूर्व से कार्यरत इकाईयों के सी0एस0आर0 मद से शत-प्रतिशत धनराशि का व्यय किया जा रहा है। इस इकाई के सी0एस0आर0 मद की धनराशि को आस-पास के ग्रामों के विकास हेतु शत-प्रतिशत व्यय किया जायेगा, जिसकी धनराशि लगभग रू0 20.00 करोड़ प्रतिवर्ष होगी।

क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियन्त्रण बोर्ड, बुलन्दशहर द्वारा परामर्शी से पूछा गया कि परियोजना के सी0एस0आर0 मद में प्रयोग किये जाने वाली धनराशि व इसका मानक क्या है।

परामर्शी द्वारा अवगत कराया गया कि परियोजना की कुल आय का दो प्रतिशत धन सी0एस0आर0 मद द्वारा आस-पास के ग्राम व ग्रामवासियों के विकास हेतु व्यय किये जाने की व्यवस्था है तथा सी0एस0आर मद हेतु भारत सरकार द्वारा प्रावधान किये गये है, जोकि परियोजना लागत का 5 प्रतिशत अंश भी है। इस परियोजना में आस-पास के ग्रामवासियों को रोज़गार उपलब्ध कराया जायेगा जिनकी संख्या लगभग 2000 होगी।

क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर द्वारा परामर्शी को निर्देशित किया गया कि किसी भी दशा में परियोजना के संचालन जनित राख को नदी/नालो में निस्तारित न किया जाये।

परामर्शी द्वारा अवगत कराया गया कि एन0टी0पी0सी0 द्वारा तैयार डी0पी0आर0 के अनुसार नवीनतम पद्धति पर इकाई की स्थापना का कार्य किया जायेगा तथा इकाई का संचालन शून्य उत्प्रवाह निस्तारण पद्धति पर किया जायेगा। परियोजना में प्रयोग में लाये जाने वाले जल को ऊपर गंगा कैनाल से लिया जायेगा तथा जल को पुनःचक्रित किया जायेगा। वर्षा ऋतु के दौरान जनित वर्षा जल को रूफटाप रेनवाटर हार्वेस्टिंग सिस्टम की स्थापना कर निस्तारित किया जायेगा, जिससे जल स्तर में बढोत्तरी होगी।

क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर द्वारा परामर्शी से पूछा गया कि प्रस्तावित इकाई में स्थापित डी0एम0 प्लाण्ट के बैक वॉश से जनित उत्प्रवाह के निस्तारण हेतु क्या उपाय किये जायेगें।

परामर्शी द्वारा अवगत कराया गया कि परियोजना से जनित किसी भी प्रकार का उत्प्रवाह परियोजना परिसर के बाहर नहीं निस्तारित किया जायेगा।

क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर द्वारा परामर्शी से पूछा गया कि प्रस्तावित परियोजना में स्थापित उत्प्रवाह शुद्धिकरण संयंत्र से जनित उत्प्रवाह को किस प्रकार निस्तारित किया जायेगा।

परामर्शी द्वारा अवगत कराया गया कि परियोजना में स्थापित उत्प्रवाह शुद्धिकरण संयंत्र से जनित उत्प्रवाह को कोल हन्डलिंग इकाई में उड़ने वाली धूल के नियंत्रण हेतु स्थापित वाटर स्प्रिंगकलर्स के माध्यम से छिड़काव किया जायेगा।

अपर जिलाधिकारी (प्रशासन), जनपद बुलन्दशहर द्वारा लोक सुनवाई में उपस्थित जन समुदाय को टीका-टिप्पणी/सुझाव प्रस्तुत किये जाने हेतु आमंत्रित किया गया।

श्री कमल सिंह खान, दशहरा द्वारा अवगत कराया गया कि परियोजना के संचालन से जनित राख, धुएं एवं अन्य उत्सर्जन से हमारे स्वास्थ्य/पर्यावरण पर प्रभाव पड़ेगा, जिससे परियोजना के

आसपास की कृषि योग्य भूमि की उर्वरक क्षमता समाप्त नष्ट होने का भी भय है। परियोजना के संचालन से जनित उत्प्रवाह को शत-प्रतिशत पुन प्रयोग में न लाये जाने से प्रदूषित वायु के कारण आसपास के कृषि योग्य भूमि प्रभावित हो सकती है।

परामर्शी द्वारा अवगत कराया गया कि तापीय विद्युत परियोजना के संचालन से जनित उत्सर्जन के निस्तारण हेतु 275 मीटर ऊँची चिमनी से सम्बद्ध कर नवीनतम पद्धति पर आधारित वायु प्रदूषण नियंत्रण व्यवस्था के रूप में ईएसपी की स्थापना किया जाना सुनिश्चित किया जायेगा, जिस कारण चिमनी से जनित उत्सर्जन न्यून होगा और आसपास के कृषि योग्य भूमि/पर्यावरण/जनमानस पर कम से कम प्रभाव पड़ेगा। इसी प्रकार परियोजना के संचालन से जनित उत्प्रवाह को शुद्धिकरण के पश्चात शत-प्रतिशत पुन चक्रित किया जायेगा एवं पुनचक्रित से अतिरिक्त शेष उत्प्रवाह को परियोजना के आसपास स्थापित की जाने वाली हरितपट्टिका के प्रयोग में लाया जायेगा। उक्त परियोजना क्षमता 2X660 मेगावाट को पर्यावरण एवं वन मंत्रालय, भारत सरकार द्वारा जारी नवीनतम मार्गदर्शिका जेड.एल.डी. पद्धति पर स्थापित की जाने वाली प्लान्ट/मशीनरी नवीनतम पद्धति के अनुसार स्थापित की जायेगी, जिसका डीपीआर एनटीपीसी द्वारा नवीनतम पद्धति पर तैयार किया गया है।

कमल सिंह, ग्राम दशहरा द्वारा पूँछा गया कि परियोजना में कोल हैण्डलिंग से जनित ऐश के उड़ने की समस्या के नियंत्रण हेतु क्या उपाय किये जायेंगे ?

परामर्शी द्वारा अवगत कराया गया कि उक्त परियोजना में प्रयोग में लाये जाने वाले ट्रकों को कवर्ड शेड ट्रकों का परिवहन किया जायेगा तथा धूल के नियंत्रण हेतु पानी का छिड़काव नियमित रूप से किया जायेगा।

राजकुमार सिंह, ग्राम दशहरा द्वारा पूँछा गया कि परियोजना में अधिगृहीत की जाने वाली भूमि के अधिकांश किसान (भू-स्वामी) की मृत्यु हो चुकी है व मालिकाना हक सूची में दर्ज नहीं किया गया है तथा उक्त हेतु किसानों को मुआवजा भी नहीं मिला है ? साथ ही अवगत कराया कि यदि 15 अगस्त, 2015 तक हम ग्रामवासियों को मुआवजा दिया जाता है तो ही हम परियोजना को स्थापना करने देंगे ? साथ ही श्री राजकुमार सिंह द्वारा श्रीकृ सुनवाई में लिखित रूप से परियोजना से जुड़ने वाले दुष्प्रभाव के सम्बन्ध में अपनी की सूची भी दी गयी (संलग्नक)।

श्री औमवीर सिंह, ग्राम दशहरा द्वारा अवगत कराया गया कि उक्त परियोजना की स्थापना हेतु अधिगृहीत की जाने वाली भूमि हेतु मुआवजा दिया जाय तथा हम ग्रामवासियों को समुचित सुविधायें दिये जाने हेतु आश्वस्त किया जाय ?

श्री राजकुमार सिंह, ग्राम दशहरा द्वारा अवगत कराया गया कि उक्त परियोजना में ग्रामवासियों को रोजगार उपलब्ध कराया जाय ?

श्री इन्दुप्रकाश सिंह, उप जिलाधिकारी, खुर्जा, जनपद बुलन्दशहर द्वारा अवगत कराया गया कि आज आयोजित लोक सुनवाई समाप्त होने के पश्चात दो कार्यदिवस के अन्तर्गत ग्राम दशहरा को छोड़कर अन्य समस्त ग्रामों के किसानों की सूची तैयार कर लिया जायेगा तथा शासन स्तर से किसी भी प्रकार का विलम्ब नहीं होगा। परियोजना की स्थापना मुआवजा उपलब्ध कराने के पश्चात ही की जायेगी।

श्री आर0के0 भट्ट, एडिशनल जनरल मैनेजर, एस.टी.पी.पी., खुर्जा द्वारा अवगत कराया गया कि मै0 टीएचडीसी तापीय विद्युत परियोजना 2x660 मेगावाट ग्राम दशहरा, खुर्जा की स्थापना हेतु अधिगृहीत की जाने वाली भूमि के सम्बन्ध में तैयार सूची के अनुसार माह अगस्त, 2015 के अन्त तक समस्त ग्रामवासियों को मुआवजा उपलब्ध कराया जाना सुनिश्चित किया जायेगा।

श्री राजकुमार सिंह, ग्राम दशहरा द्वारा अवगत कराया गया कि विगत 10 अवसरों पर समय माँगा जा चुका है तथा अन्तिम बार 16 हफ्ते का समय माँगा गया था, जिसकी अवधि कब पूरी होगी, कृपया बताया जाय ?

श्री आर0के0 भट्ट, एडिशनल जनरल मैनेजर, एस.टी.पी.पी., खुर्जा द्वारा अवगत कराया गया कि उक्त हेतु मुआवजे के सम्बन्ध में अगस्त, 2015 माह के अन्त तक सफलता प्राप्त होने सम्भावना है।

श्री कमल सिंह, ग्राम दशहरा द्वारा अवगत कराया गया कि परियोजना हेतु अधिगृहीत की जाने वाली भूमि के मूल्य में बढोत्तरी हो चुकी है, जिस हेतु अनुरोध है कि मुआवजे की धनराशि पर पुर्नविचार किया जाये तथा मुआवजे देने की अन्तिम तिथि से अवगत कराया जाय?

श्री हरि ओम सिंह चौहान, ग्राम दशहरा द्वारा अवगत कराया गया कि परियोजना की स्थापना/बाउण्ड्रीवाल की स्थापना से परियोजना के आसपास के ग्रामों के आवागमन के मुख्य मार्ग बाधित हो जायेंगे, इस सम्बन्ध में परियोजना द्वारा ग्रामों को राष्ट्रीय राजमार्ग से जोड़े जाने की क्या व्यवस्था की गयी है ? साथ ही पूँछा गया कि परियोजना अन्तर्गत आने वाले ग्राम के पोखर, मुक्तिधाम परिसर, ग्राम से निकलने वाले गन्दे नाले/बरसाती नाले, परिवार से विहीन विधवा महिलाओं की सहायता एवं पूर्व में भूमि के मुआवजे हेतु रू0 721.00 की घोषणा की गयी थी, क्या परियोजना समयानुसार उक्त मुआवजे की धनराशि बढ़ायेगी ? लिखित रूप से अवगत करायें तथा ग्रामवासियों को संतुष्ट करायें।

श्री हरिपाल सिंह, पूर्व विधायक, खुर्जा द्वारा अवगत कराया गया कि आज आयोजित लोक सुनवाई में उपस्थित 50 प्रतिशत व्यक्तियों को पर्यावरण की परिभाषा का ज्ञान नहीं है। वर्तमान समय में परियोजना हेतु अधिगृहीत की जाने वाली भूमि का सर्किल रेट रू0 7000.00 है तथा परियोजना की स्थापना हेतु समस्त विभागों से अनुमति प्राप्त करने के उपरान्त आज लोक सुनवाई आयोजित करने का क्या तात्पर्य है ?

श्री कमल सिंह, ग्राम दशहरा द्वारा अवगत कराया गया कि द्वारा प्रशासन से अनुरोध किया गया कि इस परियोजना से प्रमुख रूप से प्रभावित होने वाले पाँचों ग्रामों को मै0 टीएचडीसी गोदनामा लेकर आदर्श ग्राम बनाने का कार्य करे ? साथ ही पूँछा गया कि परियोजना से प्रमुख रूप से प्रभावित ग्राम नगला के पुनर्वास नीति के अन्तर्गत किसी भी अन्यत्र स्थान पर स्थापित किया जायेगा अथवा नहीं ?

श्री मथुर चौहान, ग्राम दशहरा द्वारा परामर्शों से पूँछा गया कि परियोजना से जनित उत्प्रवाह को शुद्धिकृत कर परियोजना के घाटों और विकसित हरितपट्टिका हेतु प्रयोग में लाया जायेगा अथवा बिना शुद्धिकृत किये ही सिंचित हेतु प्रयोग में लायेगा। साथ ही अवगत कराया गया कि परियोजना में प्रयुक्त जल से जनित उत्प्रवाह को पूर्णतया शत–प्रतिशत पुनःचक्रित किया जायेगा अथवा नहीं ?

श्री संजय खैर, एडिशनल जनरल मैनेजर, टी.एच.डी.सी. इण्डिया लि0, द्वारा अवगत कराया गया कि पर्यावरण स्वीकृति में आरोपित शर्तों व शत–प्रतिशत उत्प्रवाह को पुनःचक्रित किये जाने का प्राविधान है। आश्वस्त किया कि हरितपट्टिका में सिंचाई हेतु प्रयोग में लाया जाने वाला जल किसी भी दशा में प्रदूषित नहीं होगा।

श्री इन्द्रपाल शर्मा, ग्राम दशहरा द्वारा अवगत कराया गया कि परियोजना में कार्यरत श्रमिकों को ठेकेदारों के माध्यम से लगाया जायेगा, तो ठेकेदार आसपास के ग्रामवासियों को रोजगार क्यों देगा ?

अपर जिलाधिकारी (प्रशासन), बुलन्दशहर द्वारा लोक सुनवाई में उपस्थित समस्त जनसमुदाय का धन्यवाद दिया कि आज आपलोगों ने बड़े ही शान्तिपूर्वक ढंग से लोक सुनवाई में हुई चर्चा को सुना व अपने प्रश्नों को ज्ञापित किया। साथ ही आश्वस्त किया कि परियोजना में अधिगृहीत की जाने वाली भूमि के सम्बन्ध में दी जाने वाली मुआवजा धनराशि हेतु प्रशासन द्वारा अपना योगदान दिया गया है तथा इस संसदीय क्षेत्र के सांसद महोदय द्वारा भी अपना विशेष योगदान दिया है।

उप जिलाधिकारी, खुर्जा द्वारा उपस्थित जनसमुदाय को अवगत कराया गया कि आज आयोजित लोक सुनवाई परियोजना की स्थापना/संचालन से आसपास के पर्यावरण/जनमानस पर पड़ने वाले प्रभाव के सम्बन्ध में आयोजित की गयी है। उक्त परियोजना में अधिगृहीत भूमि के मुआवजे के समाधान हेतु प्रयास किये जा रहे हैं। साथ ही अवगत कराया कि परियोजना में आसपास के ग्रामवासियों को रोजगार उपलब्ध कराया जायेगा। अग्रेत्तर अवगत कराया गया कि

आज आयोजित लोक सुनवाई में कोई चर्चा को वीडियोग्राफी की सीडी/डी.वी.डी. व कार्यवृत्त में समस्त प्रश्नोत्तर को समावेशित कर अन्य आवश्यक प्रपत्रों के साथ अग्रसारित किया जायेगा।

कैलाश शर्मा, ग्राम सलेमपुर द्वारा अवगत कराया गया कि परियोजना से प्रभावित ग्राम सलेमपुर नगला की पुनर्वास नीति के अन्तर्गत किसी अन्यत्र स्थान पर स्थापित कराये जाने की व्यवस्था की जाये।

मै0 टी0एच0डी0सी0 द्वारा अवगत कराया गया कि भारत सरकार द्वारा जारी नीतियों के अनुसार परियोजना में प्रभावित ग्राम रूकनपुर नंगला के सम्बन्ध में कार्यवाही की जाये तथा ग्राम रूकनपुर नंगला को विकसित करने का कार्य किया जाये।

श्री कैलाश शर्मा, ग्राम रूकनपुर द्वारा पूछा गया कि परियोजना से प्रभावित आस-पास के ग्रामवासियों को लाभान्वित किया जायेगा।

मै0 टी0एच0.डी0सी0 प्रतिनिधि द्वारा अवगत कराया गया कि परियोजना से प्रभावित आस-पास के ग्रामवासियों को लाभान्वित किया जायेगा तथा प्रभावित समस्त ग्राम को राष्ट्रीय राजमार्ग से जोड़ा जायेगा।

कमल चौहान ग्राम दतावर द्वारा सुझाव दिया गया कि गुजरात राज्य में कार्यरत एन0टी0पी0सी0 के सामने से निकलने वाली सड़क/राष्ट्रीय राजमार्ग को बाई-पास नहीं किया गया।

मै0 टी0एच0डी0सी0 प्रतिनिधि द्वारा अवगत कराया गया कि पर्यावरण एवं वन मन्त्रालय, भारत सरकार द्वारा यह प्राविधान किया गया है कि राष्ट्रीय राजमार्ग से 500 मी0 की दूरी तक किसी भी प्रकार की परियोजना की स्थापना नहीं की जायेगी। इस कारण राष्ट्रीय राजमार्ग बाई पास के निर्माण किये जाने की व्यवस्था की गई है परन्तु आस-पास के ग्रामवासियों के आवागमन हेतु समुचित उपाय किये जायेंगे तथा किसी भी प्रकार के सामाजिक/धार्मिक स्थल को हताहत नहीं किया जायेगा।

उप जिलाधिकारी, खुर्जा, बुलन्दशहर द्वारा उपस्थित जन समुदाय से पूछा गया कि आज आयोजित लोक सुनवाई में पर्यावरण सम्बन्धी अन्य कोई प्रश्न/सुझाव हो तो यथाशीघ्र प्रस्तुत करें।

क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, बुलन्दशहर द्वारा उपस्थित जन समुदाय को टीका-टिप्पणी/सुझाव प्रस्तुत किये जाने हेतु पुनः आमन्त्रित किया।

उपस्थित जनसमुदाय द्वारा टीका-टिप्पणी/सुझाव समाप्त किये जाने के पश्चात क्षेत्रीय अधिकारी(प्र0), उ0प्र0 प्रदूषण नियंत्रण बोर्ड, द्वारा अनुमति उपरान्त आयोजित लोक सुनवाई के समापन की घोषणा की गयी।

(भोतेश चन्द्रा)
सहायक वैज्ञानिक अधिकारी
उ0प्र0 प्रदूषण नियंत्रण बोर्ड,
बुलन्दशहर।

(आशुतोष चौहान)
क्षेत्रीय अधिकारी(प्र0)
उ0प्र0 प्रदूषण नियंत्रण बोर्ड,
बुलन्दशहर।

(विशाल सिंह)
अपर जिलाधिकारी (प्रशासन)
जनपद बुलन्दशहर।

मै0 टीएचडीसी इण्डिया लि0, खुर्जा कोल बेस्ट सुपर थर्मल पावर प्रोजेक्ट (2x660 मेगावाट) की कोरायल आधारित विद्युत उत्पादन परियोजना की स्थापना राष्ट्रीय राजमार्ग संख्या–91 के किनारे स्थित ग्राम चार गांव दसेरा खेड़ली, जहानपुर, नैफल (सिवगांव) और ककुनपुर, तहसील खुर्जा, जनपद बुलन्दशहर में किये जाने के सम्बन्ध में लोक सुनवाई हेतु अपर जिलाधिकारी (प्रशासन), बुलन्दशहर की अध्यक्षता में दिनांक 01.08.2015 को प्रातः 11:00 बजे तहसील सभागार, खुर्जा, जनपद बुलन्दशहर में उपस्थिति आम सूचना।

क्र0 सं0	नाम व पद	पता	मो0न0	हस्ताक्षर
1				
2				
3			9412556984	
4			07195348?8	
5			7800066389	
6			7599334402	
7			9810105064	
8			7800056560	
9			9759899946	
10			9899404865	
11	Ramprakash Singh	Duhara	09557759567	
12	Kamal Singh	Basholai	09758083454	
13			9690456659	
14			2753	
15	Tarun Sharma	Rajkumpur	8394883001	
16				
17				
18			3659 8900	
19			9690000654	
20				
21				
22			9761395?2	
23			9758?3046	

24	[illegible]	[illegible]		
25	[illegible]	" "		
26	[illegible]	" "		
27	[illegible]	[illegible]	570984194	[illegible]
28	[illegible]	—"—		[illegible]
29	[illegible]	[illegible]	9927888803	[illegible]
30	[illegible]	[illegible]	9927161491	[illegible]
31	[illegible]	[illegible]		
32	[illegible]	[illegible]	8355868268	[illegible]
33	[illegible]	[illegible]		
34	[illegible]	[illegible]	8449568468	[illegible]
35	[illegible]	[illegible]		[illegible]
36	[illegible]	[illegible]	8791735151	[illegible]
37	[illegible]	[illegible]	9897566[illegible]	[illegible]
38	[illegible]	[illegible]	9837491576	[illegible]
39	[illegible]	[illegible]	8639311071	[illegible]
40	[illegible]	[illegible]		[illegible]
41	[illegible]	[illegible]	8449604362	[illegible]
42	[illegible]	" "	— —	[illegible]
43	[illegible]	[illegible]		[illegible]
44	[illegible]	[illegible]		9690670[illegible]
45	[illegible]	[illegible]		9690510[illegible]
46	[illegible]	[illegible]	9639079424	[illegible]
47	[illegible]	[illegible]	9639404040	[illegible]
48	[illegible]	[illegible]	09627114000	[illegible]
49	[illegible]	[illegible]	8837208170	[illegible]
50	[illegible]	[illegible]		[illegible]
51	[illegible]	[illegible]	9152746747	[illegible]
52	[illegible]	" "		[illegible]

53			9411846	
54			"	
55			-	
56			8057	
57				
58			9568596118	
59			9758032202	
60				
61			9759654418	
62				
63			9639153201	
64			8958675	
65			9536914	
66			975	
67			5910689	
68			7830944592	
69				
70				
71				
72				
73			-	-
74			8958988584	
75			9012469	
76			7895256301	
77			9012567388	
78			7830	
79			9634	9672
80			9634880872	
81			9997503065	

82	[illegible]	ऊँची उच्चागाँव	9758947680	[illegible]
83	[illegible]	〃	[illegible]	[illegible]
84	[illegible]	〃	78387199[illegible]	[illegible]
85	योगेन्द्र पालसिंह	〃	9719659[illegible]	[illegible]
86	[illegible]	〃	8650592360	[illegible]
87	जुगेन्द्र सिंह	कंशहरा खेरली	8923088425	[illegible]
88	[illegible]	[illegible]	[illegible]	[illegible]
89				
90	अनोपकुमार चौहान	[illegible]	8126488[illegible]	[illegible]
91	किशनपाल सिंह	〃 〃		[illegible]
92	सूबेसिंह	उच्चागाँव	9634678130	
93	[illegible]	[illegible]	9917909944	
94	हिरमल शास्त्री	उच्चगाँव	9719732281	[illegible]
95	मोरा सुन्दरमणि	उच्चगाँव		
96	[illegible]	[illegible]	9627678972	[illegible]
97	श्रीभगवानदीन	दरहरी		
98	मोहनकुमार	ऊँचा गाँव	97596·8389	[illegible]
99	[illegible]	दरहरी		
100	[illegible]	खेराहरा		
101	देवराज सिंह	जटौनपुर	8006947060	[illegible]
102	[illegible]	जटौनपुर	9696073965	[illegible]
103	विनोद रघुवंशी	〃	9690302572	[illegible]
104	पवन रघुवंश	〃	7037440402	[illegible]
105	जगदीश सिंह	[illegible]	7351273524	[illegible]
106	अर्जुन सिंह	[illegible]		[illegible]
107	[illegible]	[illegible]		[illegible]
108	भुन्ना प्रताप सिंह	दरहरी	8958463017	[illegible]
109	[illegible]	[illegible]	9267266190	[illegible]
	[illegible]	ऊँचा गाँव	[illegible]	
	[illegible]	[illegible]	[illegible]	
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आदित्य सिंह 9212	MANTEC CONSULTANTS	9868118054	Afshaan
CHAVINDER S BRARA	Jahanpur	9756599 20	Dhoul
Ranjeet Singh	बेलनपुर बंगला	9758137247	
वीरपाल	जहाँनपुर		
Gurmeet	जहानपुर	8109389389	
राजेश्वर सिंह चौहान	अटेलगढ़		
रामधीर	नवाबगंज गलगुटा		रामधीर
अतिल चौहान	21कलाश पार्क	9917273370	
साबिर हुसैन	अलीगढ़ पुर	86-50861701	साबिर हुसैन
राजेन्द्र सिंह (चौधरी)	गाजियाबाद	9120366452	
Dr. Vivek Narayan Singh, DG(H) Govt.	Mantec Consultants (P) Ltd. Noida	8882473339	
Anand Mohan Advisor THDCIL	CONSULTANT	9717870796	
Arvinder SINGH BRARA CMD, MANTEC	MANTEC CONSULTANTS (P) LTD	9868118054	Afshaan
SANJAY KHER Addl GM	PHDC India Ltd	9810404407	
ST. RADHA KRISHNAN (M/A)	THDC India Ltd.	8171204305	

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सुरेश शर्मा जिला संयोजक सूचना प्रभारी भाजपा-9411835730

अभ्युदयांक पांडे P.R.O. डा. कविता शर्मा मंत्री भाजपा सरकार
9617112000

Proceedings of Public Hearing for M/s THDC India Ltd, Khurja Coal Super Thermal Power Project's (2 x 660 MW) coal based power generation project proposed at villages along the National Highway No. 91- Dasera Khedli, Jhanpur, Naiphal (Unchagaon) and Rukanpur Tehsil Khurja, Bulandshahr district, chaired by Additional District Magistrate (Administration), Bulandshahr dated 01.08.2015 in morning 11:00 am in Tehsil auditorium, khurja, district Bulandshahar.

As referenced above regarding environmental clearance approval of coal based power generatinn project of M/s THDC India Ltd, Khurja Coal based Super Thermal Power Project's (2 x 660 MW) coal based power generation project installation in village located along the National Highway No. 91- Dasera Kedli, Jhanpur, Naiphal (Uchagaon) and Ruknpur Tehsil Khurja, Bulandshahr district has applied and Board has addressed and requested District Magistrate, Bulandshahr and Regional Office of U.P. Pollution Control Board vide letter no. F62072/C-8/NOC/159/2/15 dated 03.06.2015. In compliance with the instructions for conducting the public hearing District Magistrate, Bulanshahr has been requested to set her date, place and time for the same. After the permission received by District Magistrate, ADM, Bulandshahr conducted the public hearing on 01.08.2015 at time 11:00 am at Tehsil Auditorium, Khurja, District Bulandshahr.

In accordance with the notification of Environment & Forest Ministry, GoI 1986, section 3, its sub-section (1) & (2), clause no. A, and its provisions given in the Notification No. S.O. 1533 dated 14.09.2006 which further amended as S.O.-3067 (E) Dated 01.12.2009, the date of public hearing for the proposed project was advertized a month before the due date of Public Hearing, in Hindi daily newspaper "Amar Ujala" Bulandshahr edition dated 28.06.2015, and "Hindustan Times" Delhi edition dated 28.06.2015 in English newspaper.

Afterwards, public hearing was conducted under the chairmanship of ADM, Shri Vishal Singh as nominated by District Magistrate in Tehsil Auditorium Khurja, District Bulandshahr. Following members were present during the public hearing:

1. Sh. Vishal Singh, ADM (Admin), Bulandhshar as Chairman;
2. Sh. Indu Prakash Singh, Dy Collector, Khurja, District Bulandshahr;
3. Sh. Ashutosh Chauhan, Regional Officer, U.P. Pollution Control Board, Bulandhahr;
4. Sh. Geetesh Chandra, Assistant Scientific Officer, U.P. Pollution Control Board, Bulandhahr;
5. Sh. Anand Shrinant, Tehsildaar- Karmik, Khurja, District Bulandshahr;
6. Sh. D.K. Gupta, Junior Engineer, U.P. Pollution Control Board, Bulandhahr;
7. Sh. Satyendra Pratap Singh, Junior Engineer, U.P. Pollution Control Board, Bulandhahr;
8. Sh. Ram Avtar Sharma, Revenue Officer, Khurja, District Bulandshahr;
9. Sh. Dharmendra Kumar, Typist/Clerk, U.P. Pollution Control Board, Bulandhahr;
10. Sh. R. K. Bhat, Additional General Manager, S.T.P.P. Khurja, District Bulandshahr;
11. Sh. Arvinder Singh, Brara, Consultant, Mantec Consultants, Pvt Ltd., New Delhi

Photocopy of other attendees of the meeting is attached.

NOTARY Jagat Singh Notary Advocate Regd. No. 2281 GOVT. OF INDIA

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ADVOCATE/NOTARY
DISTT. G.B. NAGAR

29 NOV 2016

Sh. Ashutosh Chauhan, Regional Officer, UP Pollution Control Board, Bulandhahr welcomed and addressed the present members and public and brief about the project. Firstly he invited the consultant of M/s THDC India Ltd, Khurja, District Bulandshahr to explain the proposed project and insist the public to raise their opinions, comments and provide their suggestions for the same.

Sh. Mukul Sharma (Manager- Design Thermal) informed that M/s THDC India Ltd was established on 12th july 1988. THDCIL has under taken Hydro Projects and Power is being supplied to Rajasthan, Delhi, Uttar Pradesh and other States of Northern region. This public hearing is being conducted today i.e. on 01.08.2015 for the 2x660 MW Thermal Power Project which is going to be established in Village Dashera in Tehsil Khurja. The environmental Impact Assessment Report in relation to the thermal power project was prepared in compliance with all the instructions issued by the Environment Directorate for the project and almost 10 samples for water, air, noise, soil, vegetation and other has been tested and samples were collected in 10 km radius of the project during October-November 2014. After testing the samples it was found that water, air, noise, soil and environment around the project are as per the standards. There is only village land and agricultural land all around the proposed project and there is no wildlife sanctuary present.

Afterwards this was informed that DPR of Khurja, Coal Based Super Thermal Power Project (2x660 MW) coal based power project at village Dashera, Khurja, District Bulandhahr of M/s THDC India Ltd has been prepared by M/s NTPC for which 1400 acre land is required. The provision has been made to construct 275 m high Chimney to release the emission generated through 2 x 660 MW units. Also there is provision to take permission from CGWB, New Delhi for the water required for the proposed project and availability of coal has been sanctioned by Railway Board, New Delhi.

Sh. A. S. Brara, Managing Director, Mantec Consultants Pvt Ltd, New Delhi told that measures for pollution control will be adopted as per environmental clearance accorded by the Environment and Forest Ministry, GoI and nearby villagers will get benefited directly or indirectly by the project activity. Further, it was explained that everyone is well aware about the importance of the electricity and all measures to reduce the impact of thermal power project will be establish.

Sh. Vivek consultant/representative of Mantec Consultant Pvt Ltd New Delhi welcomed all the chaired members and public and made them aware that guidelines issued by the Department of Environment in view of pollution prevention has been adopted so that there will be minimal impact of the proposed thermal power project. Further it was stated that various parameters have been tested around the 10km radius of the study area. It was observed after the investigations that villages lies nearby the project area are fertile and there were no river area, bird places or wildlife sanctuary. All parameters observed are as per the standard and the vegetation around the project is of tropical climate. After the complete description about the project, public present at the public hearing was invited to provide their comments/suggestions.

Regional Officer, UPPCB, Bulandshahar had asked the consultant about the provisions to minimize the impact of water/air pollution likely to be generated by the product.

NOTARY Jagat Singh Nagar Advocate Regd. No. 2281 GOVT. OF INDIA

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JAGAT SINGH
ADVOCATE, NOTARY
GAZIT & M. DISTT. NAGAR
29 NOV 2016

Sh. R. K. Bhatt, Additional General Manager, S.T.P.P. Khurja, told that land acquisition work by M/s THDC will be done through U.P.S.I.D.C for the installation of proposed 2x660 MW units. Liquid/solid waste generated due to thermal power project will not be stored in the open lands and there is provision for the establishment of 275m high Chimney along with E.S.P to release the effluent generated. Also it was stated that due to higher height of the chimney, the impact of the smoke generated will be low and there will be appropriate mitigation measures to control the sulphur-di-oxide. Green Belt will be developed around the project area and water sprinkling will be also done to control the dust emission. Further it was told that cooling water, DM Plant and Sewage generated effluent will be treated by latest methods/technologies and zero discharge technologies will be adopted which has been mentioned in the DPR prepare by NTPC.

Regional Officer, UPPCB, Bulandshahr asked the consultant, how the ash generated by the units will get disposed off. Consultant told that there is a provision that ash generated by the units will be disposed through slurry in the ash pond within the project area boundary.
Regional Officer, UPPCB, Bulandshahr asked the consultant that where the decantents water will be used generated by the ash pond. Consultant stated that effluent/outflow generated by ash pond will be recycled in the form of slurry.

Regional Officer, UPPCB, Bulandshahr asked the consultant that ash generated from the operation of the unit for disposal would generate problems during rainy season. Is there any provision to install A.W.R.S.? Consultant stated that ash water recycle system will be installed for ash generated from the disposal of outflow and for the treatment of the domestic outflow. STP will be installed whose treated water will be used for irrigation of the green belt. Further it was stated that there is also provision for ash generated from the operation of the unit will be totally disposed off and also generated ash will be distributed to the nearby villagers so that they can utilize it for making interlocking bricks and other different products for their livelihood.

Regional Officer, UPPCB, Bulandshahr asked the consultant that how much ash ponds will be constructed for the ash generated by thermal power project. Consultant told that two ash ponds will be constructed for the ash disposal, generated from the operation of the unit and greenbelt will be developed around those ash pond areas. Under CSR scheme for the proposed project an amount will be utilized in construction of schools, roads, hospitals and also plantation will be carried out. Also M/s THDC is utilizing cent percent amount in already existing units in other areas. For this unit, CSR amount of about 20 Cr. per year will be used cent percent in the development of nearby villages..

Regional Officer, UPPCB, Bulandshahr asked the consultant that what is the amount and parameters of the CSR scheme proposed for this project? Consultant replied that two percent of the total profit after tax of the project will be utilized for the purpose of CSR which will be utilized for the development of the nearby villages also there are provisions of Government of India as per 0.5% of the cost of the project should be used for CSR purpose. By this project employment will be offered to the nearby villagers whose number will be approximately 2000.

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ADVOCATE, NOTARY
29 NOV 2016

Regional Officer, UPPCB, Bulandshahr directed the consultant that ash generated by the operation from the project should not be dump into rivers/nalla at any cost. Consultant stated that as per DPR prepared by NTPC, latest techniques will be used for the installation of units and unit will be operated at zero discharge principle. Water to be used in the project will be brought from Upper Ganga Canal and water will be recycled too. Rooftop rainwater harvesting system will be installed for collecting the water generated during the rainy season which will be discharged and raise the water level.

Regional Officer, UPPCB, Bulandshahr asked the consultant that what measures will be taken for the effluent generated from Back Wash of DM Plant? Consultant told that effluent of any type generated from the project will not be disposed outside the project's boundary.

Regional Officer, UPPCB, Bulandshahr asked the consultant that how the outflow generated from the effluent purification system will get disposed off ? Consultant stated that water will be sprinkled through water sprinklers installed in the Coal Handling Unit for effluent generated by the installed effluent purification system.

ADM (Admin), District Bulandshahr invited the public present in the public hearing to present their comments/suggestions.

Shri Kamal Singh, Village Dussehra informed that project will emit smoke, ash & other pollutants during operation that will affect environment & our health and the agriculture land nearby the project may lose its fertility. During project operation, the agricultural land may get affected by the waste generated from the plant, if it is not 100% recycled and reused.

Consultant stated that a chimney of 275m in height will be installed to reduce/control the air pollution which will be generated from the operation of thermal power plant. Installation of ESP shall also be ensured to minimize the impact of air pollutants emitted from the TPP on nearby agricultural land, environment and population. The wastewater will be completely reused after necessary treatment and the recycled water shall be used in the green belt development. The proposed project of 2x660 MW capacities will be commissioned as per the ZLD guidelines issued by MoEF, GoI and the DPR of the same is prepared by NTPC with inclusion of modern technology.

Shri Kamal Singh, Village Dussehra asked what are the provisions to be adopted to control the emission of fly ash generated from the coal handling? Consultant replied that covered trucks will be used for the transportation purpose and water sprinkling to be done regularly for dust suppression.

Shri Rajkumar Singh, Village Dussehra asked that Most of the farmers are dead whose land is acquired for the proposed project and hence, they are not registered as land owner record. Appropriate compensation has also not been given to their families so far. Also, it was informed that the project commissioning is allowed only if compensation will be given by 15.08.2015. Besides, Shri Raj Kumar Singh has submitted a written list of queries regarding negative impacts that may arise due to proposed project (Xerox copy is attached).

NOTARY
Jagat Singh Rajput
Advocate
Regd. No. 2281

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ADVOCATE, NOTARY
29 NOV 2016

Shri Omveer Singh, Village Dussehra told that proper compensation of the land acquired and all the basic facilities should be provided to the villagers.
Shri Rajkumar Singh, Village Dussehra stated that employment should be given to the villagers.

Shri Indu Prakash Singh, SDM, Khurja stated that after the completion of public hearing list of all the villagers except village Dussehra will be prepared within the next two working days without any delay. Project commissioning will be done only after compensation is given.

Shri R.K.Bhatt, AGM, STPP Khurja assured that the compensation of the land acquired for the proposed THDC STPP (2X660 MW) will be given by the end of August 2015.

Shri Rajkumar Singh, Village Dussehra told that the time duration has been extended 10 times in the past and last extension was given 16 weeks ago. Kindly inform the deadline for the compensation. Shri R.K.Bhatt, AGM, STPP Khurja replied that the compensation is likely to be distributed by the end of August 2015.

Shri Kamal Singh, Village Dussehra stated that the value of the land has been increased; hence compensation amount may be relooked into. Last date of the compensation distribution may be informed.

Shri Hariom Singh, Village Dussehra stated that due to construction of boundary wall nearby villages may be disconnected and their routes will be diverted. What are the provisions made to connect these villages from the National highway in this regard? Also, it was asked that the village sewer drains, storm drains, village ponds, Muktidham area, aid to homeless widows and the land compensation amount was declared as 721.00 INR. Will the company increase the compensation in time? Kindly inform in writing and explain to villagers.

Shri Haripal Singh, Ex-MLA, Khurja informed that almost 50% of the people sitting in the public hearing have no idea about the environment. In present scenario, circle rate of the land to be acquired is 7000.0 INR. What is the significance of conducting this public hearing after obtaining clearances from all the departments?

Shri Kamal Singh, Village Dussehra stated that it is requested to the administration that THDC shall adopt the most affected villages. And make them **Adarsh Gram**. Also, it is asked that village Nagla which is most affected from this project will be rehabilitating to some other location or not?

Shri Madhur Chauhan, Village Dussehra asked that will the discharged effluent which is used for greenbelt development be treated effluent or raw effluent? Will the treated water be reused completely or not? Shri Sanjay Kher, AGM, THDC India Ltd has replied 100% recycle and reuse condition is given in environment clearance provision. It was also ensured that water used for the greenbelt development will not be polluted one in any means.

Shri Indrapal Sharma, Village Dussehra asked that the laborers will be hired by contractors for the project then why does he give job to local people?

NOTARY Jagat Singh Kapil Advocate Regd. No. 2261 GOVT. OF INDIA

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ADVOCATE, NOTARY
29 NOV 2016

ADM (Admin) thanked all the participants for attending the public hearing with patience and raised their queries. Also, he ensured that the compensation against the land acquired for the project is being done with the help of Member of Parliament (MP) and local administration.

SDM, Khurja informed that the public hearing is conducted to listen to the environmental issues due to proposed project. Efforts are being made towards compensation for the acquired land. Also, it was informed that the employment will be given to the local people from the nearby villages. Further, it was also informed that the today's activity and questions/answers have been recorded and will be submitted to the concerned agency with CD, other relevant documents and records.

Shri Kailash Sharma, Village Rukanpur informed that project affected village Rukanpur Nagla to be rehabilitated to some other place as per R&R policy. M/s THDC has informed that the project affected village Rukanpur Nagla will be developed as per the guidelines and policy of government of India.

Shri Kailash Sharma, Village Rukanpur asked that what are the benefits from the proposed project to the local people? M/s THDC has informed that the local people will be benefitted from the proposed project and all the project affected villages will be connected to the National Highway.

Shri Kamal Chauhan, village Dussehra suggested that no bypass route is constructed for the Road/National highway in Gujarat state where NTPC plant was constructed.

M/s THDC has replied that according to MoEF, GoI; project will not be established up to 500 meters distance from the National Highway. Provision of a bypass road is also made in this regard and to facilitate transport of local people, all the necessary arrangements will be made and no place of religious/social importance will be disturbed.

ADM, Khurja, Bulandshahr asked the public to submit their any further questions / suggestion regarding environment as soon as possible regarding the public hearing.

Regional Officer, UPPCB, Bulandshahr again invited the public to present their comments/suggestions.

After comments/ suggestion by the public closure of public hearing was announced after taking permission from the Regional Officer, UPPCB.

-sd-	-sd-	-sd-
Geetesh Chandra Asst. Scientific officer U.P. Pollution Control Board Bulandshahar	Ashutosh Chauhan Regional officer U.P. Pollution Control Board Bulandshahar	Vishal Singh ADM (Admin) Distt. Bulandshahar

NOTARY * Jagat Singh Nagar Regd. No. 2281 * GOVT. OF INDIA

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JAGAT SINGH
ADVOCATE, NOTARY
29 NOV 2016

Annexure-IV
Consent from State Government

ANNEXURE - 5

उत्तर प्रदेश UTTAR PRADESH AN 491400

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (hereinafter referred to as "MOU") entered into on this [redacted] corresponding to [redacted] day of Posh of Vikram Samvat 2067 at Lucknow, amongst

A. **THDC India Limited**, a company incorporated under the Companies Act, 1956, having its registered office at Bhagirathi Bhawan, Bhagirathipuram, Tehri Garhwal – 249 001 (Uttarakhand) and its Corporate Office at Pragatipuram, Bye Pass Road, Rishikesh - 249 201 (Uttarakhand) (hereinafter referred to as **'THDCIL'** which expression shall, unless the context requires otherwise include its successors and permitted assigns), of the ***First part***.

and

B. **Energy Department, Government of Uttar Pradesh**, having its seat of Government at Lucknow, through Secretary, Energy

(S. K. Agarwal)
Director (Finance)
U.P. Power Corpn. Ltd.
LUCKNOW

D. V. SINGH
Director (Technical)
THDC India Limited

Department, Government of Uttar Pradesh (hereinafter referred as 'GOUP' which expression shall, unless the context requires otherwise include its assignees and successors) of the ***Second Part***,

and

C. [redacted] having its registered office at Shakti Bhawan, 14, Ashok Marg, Lucknow (hereinafter referred to as "UPPCL" which expression shall unless the context requires otherwise include its successors and permitted assigns), of the ***Third Part***.

(THDCIL, GOUP and UPPCL are hereinafter individually referred to as the 'Party' and collectively as 'Parties').

WHEREAS:

a) THDCIL, a Joint Venture Corporation of the GoI and GoUP, with equity participation in the ratio [redacted] is a premier power generating company in India having expertise and strength in areas such as setting up and operation & maintenance of power projects and sale of power. THDCIL has developed comprehensive in house expertise in various facets of power generation from concept to commissioning, efficient operation in accordance with National Power Policy of Government of India.

b) THDCIL intends to take up development of 1320 MW Super Thermal Power Project at Khurja, District Bulandshahar, subject to establishment of its techno-economic viability.

For the aforesaid purpose the Parties agree to sign these Presents on mutually agreed Terms and Conditions mentioned hereunder.

(S. K. AGARWAL)
Director (Finance)
U.P. Power Corpn. Ltd.
LUCKNOW

D. V. SINGH
Director (Technical)
THDC India Limited

NOW THEREFORE THIS MEMORANDUM OF UNDERSTANDING (MoU) WITNESSETH AS FOLLOWS :

1. **Intent**

a) To establish a [redacted] of UP by THDCIL, subject to establishment of its techno-economic viability, tie-up for fuel, funding, commitment for off-take of power, signing of PPAs and obtaining of necessary clearances/approvals.

2. **Broad Agreements**

a) Uttar Pradesh has requested for minimum 60% allocation of power from the Station subject to approval of the Govt. of India. THDCIL would take up allocation of power from the station, as above, with the Govt. of India. However, Allocation of Power from the Station to the State of Uttar Pradesh shall be as decided by GOI.

b) It is further agreed that the issue of higher allocation of power would be suitably taken up by GoUP with Ministry of Power, GOI.

c) Land requirement for the Khurja Project would include land as required for plant area including green belt, plant reservoir, ash disposal area, township and corridors for make up water, ash slurry pipelines, railway siding, etc., GOUP/UPPCL will assist in transfer of the land already acquired by UPSIDC in Khurja or in case of non-availability of the said land, will assist in acquisition of required land as per the acquisition policy of the State Government. However, the price of the land so acquired or transferred from UPSIDC will be paid by the first party. But the quantum of land will be ristricted to CEA norms.

([illegible])
सचिव
शासी निकाय
उ० प्र० सरकार

(S. K. AGARWAL)
Director (Finance)
U.P. Power Corpn. Ltd.
LUCKNOW

D. V. SINGH
Director (Technical)
THDC India Limited

d) GOUP will allocate the requisite quantity of water for the Khurja Project on payment of aplicable canal lining charges as decided by Irrigation Department of GOUP..

e) The project shall be based on [redacted] depending on the availability of domestic coal and the shortfall would be met by using imported coal. GOUP/UPPCL shall extend their co operation in obtaining the coal linkage for the project.

f) It is mutually agreed that GOUP/UPPCL shall extend their cooperation for obtaining various statutory clearances/inputs pertaining to the State Government.

g) Investment approval of the Project shall be sought by THDCIL, after the tie up of all inputs, (including land, water & coal), preparation of FR, receipt of statutory clearances, signing of PPAs etc. However in principle approval for signing this MOU has been obtained by the THDCIL from the authorised level.

h) The power generated from the Project shall be allocated from the busbar of the proposed Project to Uttar Pradesh and other beneficiaries by GoI as per clause 2(a). A separate Agreement shall be entered into by all the beneficiaries with Powergrid for transmission of power to the respective load centers.

i) [redacted] who will provide required help in this regard.

(S. K. AGARWAL)
Director (Finance)
U.P. Power Corpn. Ltd.
LUCKNOW

D. V. SINGH
Director (Technical)
THDC India Limited

3. **Project Development**

THDCIL shall prepare the [redacted] for the project and start implementation of the project on priority basis, subject to establishment of [redacted] for the same along with other necessary clearances and approvals.

4. **Commercial**

a) Beneficiaries including UPPCL shall enter into Power Purchase Agreements (PPA) with THDCIL for purchase of power allocated from the proposed Project. Tariff for sale of power shall be determined by CERC. Details of the terms and conditions about the Payment Security Mechanism, etc., shall be finalized and incorporated in the PPA, including the eventuality of their assignment to Distribution Licensees.

b) UPPCL shall open and maintain irrevocable revolving Letters of Credit (LC) in favour of THDCIL. The LC shall cover 105% of the one month's estimated billing in respect of power to be supplied from the project.

5. **Confidentiality :**

The parties shall keep in confidence all information, data, drawings, documents etc. exchanged/obtained under this MOU and shall not divulge the same to any third party without the prior written consent of the other party, unless such information is :

a) In the public domain
b) Already in the possession of the receiving party
c) Required by Government Ministries/Agencies/Regulatory Agencies or Court of Law or the law of land.
d) To be disclosed to third parties/consultants for which the receiving party(ies) should sign similar confidentiality agreement.

(S. K. AGARWAL)
Director (Finance)
U.P. Power Corpn. Ltd.
LUCKNOW

D. V. SINGH
Director (Technical)
THDC India Limited

This MOU shall come into force for all purposes and intents upon its signing and shall remain valid from the date of its signing, subject to approval of the Govt. of India. The terms and conditions of this MOU may be varied with mutual consent in writing by both parties.

IN WITNESS WHEREOF THE PARTIES THROUGH THEIR AUTHORISED REPRESENTATIVE HAVE SIGNED THESE PRESENTS ON THE DAY, MONTH AND YEAR MENTIONED ABOVE.

For and on behalf of THDC INDIA LIMITED

Witness 1.

Witness 2.

D. V. SINGH
Director (Technical)
THDC India Limited

For and on behalf of Govt of UP

Witness 1.

Witness 2.

(मनोज अग्रवाल)
सचिव
ऊर्जा विभाग
उ० प्र० शासन

For and on behalf of UPPCL

Witness 1.

Witness 2.

(S. K. AGARWAL)
Director (Finance)
U.P. Power Corpn. Ltd.
LUCKNOW

Annexure-V
(A) Cea letter regarding land requirement
(B) In-principle Land Availability Clearance

केन्द्रीय विद्युत प्राधिकरण Telefax-26106169

Central Electricity Authority

तापीय आयोजना एवं अन्वेषण प्रभाग

(TP&I DIVISION

9वां तल,सेवा भवन,आर.के.पुरम,नई दिल्ली-110066 (आई.एस.ओ 9001:2000

(प्रतिलिपि)

9th Floor Sewa Bhavan, R.K. Puram, New Delhi – 110 066

No.166/GC/BO/TPI/CEA/3578 Dated 28.12.2012

Sh. R.K.Bhat
Addl. G.M. (Design – Thermal)
THDC India Limited
(A Joint Venture of Govt. of India & Govt. of U.P.)
Design & Thermal Department
Plot No. 20, Sector – 14, Kaushambi, Ghaziabad- 201010 (U.P)
Fax No. 0120- 277 6495, 277 6496 , 277 6499

Subject: Regarding Land Requirement provisions for proposed Khurja STPP (2x660MW)

Ref: THDC letter No. 555/ THDCIL /KAU/T-D/420 Dated 12.12.2012

Dear Sir,

This has reference to your above cited letter dated 12.12.2012 forwarding therewith details of land requirement for the proposed Khurja STPP 2x660 MW . The land requirement for Kharja STPP has been worked out as 1362 Acres by THDC India Limited. The land requirement on the basis of using indigenous coal is in order.

Yours faithfully,

(P.D. Siwal)
Director (TPI)

Land requirement for 2X660 MW Thermal Power Station

(Reference table no. 11 of CEA report dated Sept'10 on land requirement for Thermal Power Station)

Area in acres

S. No	Description	As per CEA		Calculated value	Remark
		For 2X500MW	For 3X660MW	For 2X660MW	
(i)	(ii)	(iii)	(iv)	(v)	(vi)
1	Main plant	20	44	29 -	Proportionate value for 2X660MW, w.r.t. column (iv)
2	Coal Handling system	220	240	220	Same as for 2X500MW plant
3	Water system	28 (45)	54 (90)	60	Proportionate value for 2X660MW Refer foot note (a)
	Water reservoir	30	60	100	Refer foot note (b)
4	Switchyard	24	28	24	Same as for 2X500MW plant
5	Miscellaneous BOP facilities, stores, roads	66	83	74	Refer enclosed table (A)
6	Total (1 to 5 above)	388	509	507	
7	Green belt	130	170	170	1/3 of above total
8	Ash disposal area	350	495	330	Proportionate value for 2X660MW
9	Township	100	100	100	Same as for 2X500 / 3X660MW
10	Corridors for ash slurry, raw water and coal	120	245	255	Refer enclosed table (B)
	TOTAL	1090	1520	1362	

(a) Land requirement corresponding to Natural Draft Cooling Towers (NDCT) has been considered.

(b) In view of annual closure of Upper Ganga Canal (i.e. identified source of water) for 21 days, land requirement for water reservoir has been arrived at considering storage requirement of 25 days. Thus, keeping a additional cushion of 4 days water storage.

BHAT

ANNEXURE - 6

उत्तर प्रदेश स्टेट इण्डस्ट्रियल
डेवलपमेन्ट कारपोरेशन लिमिटेड

upsidc

यूपीएसआईडीसी कारपोरेट ऑफिस
A-1/4, लालकुआं
पोस्ट बॉक्स नं० 1050
कानपुर – 208 024
दूरभाष : 2582651-53 (PBX)
फैक्स : (0512) 2580797
वेबसाइट : www.upsidc.com
ई मेल : feedback@upsidc.com

Chief Engineer,
Power Purchase Agreement Directorate,
U.P. Power Corporation Ltd.
14th Floor, Shakti Bhawan Extn.,
14-Ashok Marg,
Lucknow-226001

Fax

संदर्भ संख्या 790 /एसआईडीसी/ एन्वी ओप ऐच.यु.आई.पी-10 दिनांक 07-9-11

विषय: जनपद बुलन्दशहर में खुर्जा औद्योगिक क्षेत्र के लिए यूपीएसआईडीसी लि० द्वारा अर्जित 1200 एकड़ भूमि को Khurja Super Thermal Power Station की स्थापना के लिए THDC को हस्तानान्तरित किये जाने के सम्बन्ध में ।

महोदय,

कृपया उक्त विषयक अपने कार्यालय के पत्र सं०–SPATC-173/THDC/668 दिनांक 23.8.11 का संदर्भ लेने का कष्ट करें ।

उ०प्र० राज्य औद्योगिक विकास निगम लि० द्वारा जनपद बुलन्दशहर में राष्ट्रीय राजमार्ग के किनारे ग्राम रूकनपुर, दशहरा खेरली, जहानपुर एवं ऊँचागांव के काश्तकारों की अर्जित 969.415 एकड़ निजी भूमि तथा पाकेट गॉव सभाओं की 231.740 एकड़ भूमि कुल मिलाकर 1201.355 एकड़ भूमि यूपीएसआईडीसी द्वारा अर्जित/पुनर्ग्रहीत कराई जा चुकी है। काश्तकारों द्वारा धारा–16 भूमि अध्याप्ति अधिनियम के अन्तर्गत प्रस्तुत संदर्भों का निस्तारण चल रहा है। न्यायालयों द्वारा निर्धारित प्रतिकर की दर पर काश्तकारों से समझौता प्रक्रिया तीव्र गति से चल रही है और इस प्रक्रिया में न्यायालयों द्वारा बढ़ाये गये प्रतिकर दर ब्याज सहित यूपीएसआईडीसी को काश्तकारों को प्रतिकर के भुगतान के लिए तत्काल लगभग रू० 151 करोड़ की आवश्यकता है। न्यायालयों द्वारा बढ़ाये गये प्रतिकर दर 10% भूमि अध्याप्ति व्यय भी देय होगा। यद्यपि निगम को हुई से औपचारिक कब्जा प्राप्त हो चुका है तथा राजस्व अभिलेखों में यूपीएसआईडीसी के स्वामित्व में भूमि अर्जित हो चुकी है परन्तु मौके पर काश्तकार खेती कर रहे हैं। इस प्रकार इन चारों ग्रामों की भूमि का मौके पर कब्जा प्राप्त करने के लिए निगम को तत्काल लगभग रू० 160 करोड़ की आवश्यकता है। यह धनराशि अनुमानित है, जो बढ़ सकता है ।

काश्तकारों से हो रहे समझौते की राशि का भुगतान काश्तकारों को करने के पश्चात् निगम इस भूमि का मौके पर कब्जा प्राप्त कर सकेगा ।

upsidc

Continuation Sheet No.

THDC India Ltd. को निगम आपस में निर्धारित मूल्य पर इस शर्त के साथ इस भूमि को देने को तैयार है कि न्यायालयों द्वारा निर्धारित प्रतिकर तथा उस पर आज की अधिनियम धारा 28ए के अन्तर्गत शेष काश्तकारों द्वारा प्रतिकर को बढ़ाने के लिए दायर किये गये वादों में प्रतिकर राशि के भुगतान में होने वाले व्यय के लिए THDC India Ltd. अग्रिम राशि निगम को उपलब्ध करा दें ।

सिद्धान्तः निगम खुर्जा की उक्त 1201 एकड़ भूमि THDC India Ltd. को 1320MW Khurja Super Thermal Power Station की स्थापना हेतु भूमि का कब्जा प्राप्त करने के बाद सहमत है ।

भवदीय,

(देवी शंकर शर्मा)
अपर प्रबन्ध निदेशक

उत्तर प्रदेश UTTAR PRADESH BS 810778

MEMORANDUM OF UNDERSTANDING

This memorandum of Understanding (hereinafter referred to as "MOU") entered into on this 14th day of December, 2013 at Lucknow, between

Uttar Pradesh State Industrial Development Corporation Limited, a Company incorporated under the companies Act, 1956 having its registered Office at A-1/4, Lakhanpur, Kanpur-208024 (Uttar Pradesh) (hereinafter referred as **'UPSIDC'** which expression shall unless the context requires otherwise include its assignees and permitted assigns), of the ***First part***,

and

THDC India Limited, a Company incorporated under the Companies Act, 1956 having its registered Office at Bhagirathi Bhawan, Bhagirathipuram, Tehri-Garhwal-249001 (Uttarakhand) and its Corporate Office at Pragatipuram, Bye Pass Road, Rishikesh-249201 (Uttarakhand) (hereinafter referred as **'THDCIL'** which expression shall unless the context requires otherwise include its assignees and permitted assigns), of the ***Second part***,

UPSIDC and **THDCIL** are hereinafter individually referred to as the **'Party'** and collectively as **'Parties'**).

Contd...2

WHEREAS:

a) THDCIL, Energy Department of Government of Uttar Pradesh and Uttar Pradesh Power Corporation Limited entered into a Memorandum of Understanding on 31st December, 2010 with the intent to establish a 1320 MW coal based Super Thermal Power project at Khurja, District Bulandshahar of UP by THDCIL, subject to establishment of its techno-economical viability, tie-up for fuel, Funding, Commitment for off-take power, signing of PPAs and obtaining of necessary clearances/ approvals.

b) As per the broad agreements of the aforesaid Memorandum of Understanding dated 31st December 2010, the land requirement for the Khurja Project would include land as required for plant area including green belt, plant reservoir, ash disposal area, township and corridors for make up water, ash slurry pipelines, railway siding, etc. The quantum of the land will be restricted to CEA norms. Energy Department of Government of Uttar Pradesh/ Uttar Pradesh Power Corporation Limited will assist in transfer of the land already acquired by UPSIDC in Khurja or in case of non-availability of the said land, will assist in acquisition of required land as per the acquisition policy of the State Government. The price of the land so acquired or transferred from UPSIDC will be paid by THDCIL.

c) It was also agreed vide aforesaid Memorandum of Understanding dated 31st December 2010, that THDCIL shall ensure Rehabilitation and Resettlement of project affected people. Rehabilitation Action Plan will be finalized in consultation with Energy Department of Government of Uttar Pradesh, who will provide required help in this regard.

Contd ..3

d) UPSIDC have acquired land of Gram Sabhas and private land situated in four villages, Dashehra Kherli, Jahanpur, Rukanpur, Nyphal alias Unchagaon in Tehsil Khurja, District Bulandshahar measuring 1200.843 acres. After completion of acquisition proceedings, the land titles have been mutated in the name of UPSIDC in revenue records. However, farmers are continuing to demand higher rate of compensation.

e) Aggrieved by rate of the award, 431 nos. references have been filed u/s 18 of Land Acquisition Act by the affected farmers for enhancement of the compensation of which 114 nos references have so far been decided. Courts have allowed compensation at the rate of Rs. 2,17,600/- per acre with additional benefits as admissible under the Land Acquisition Act as enforce on the date of acquisition.

NOW THEREFORE THIS MEMORANDUM OF UNDERSTANDING (MOU) WITNESSETH AS FOLLOWS:

1. **Intent**

   To transfer on lease the possession of 1200.843 acres of land from First party to Second party on rates of compensation/ ex-gratia as mutually agreed between First party and the erstwhile land owners or as per rates decided by courts of law, together with additional charges payable by Second party to First party as per existing rules of Government and UPSIDC as detailed hereinunder.

2. **Broad Agreements**

   a) After final settlement of compensation/ ex-gratia amount, UPSIDC shall intimate total charges (land compensation, land acquisition charges, UPSIDC charges etc.) to be paid by THDCIL.

Contd....4

b) Pending settlement of compensation/ ex-gratia amount, UPSIDC shall intimate THDCIL approximate total charges based on present ground assessment, so that process for investment approval can be initiated.

c) While disbursing the compensation/ ex-gratia amount, legally binding documents shall be obtained from the erstwhile land owners by UPSIDC, stating that the compensation/ ex-gratia has been received as full and final settlement. Also, neither any claim shall be preferred in future nor any legal proceedings shall be initiated after full and final settlement.

d) UPSIDC will transfer on 90 years lease as per the currently applicable rules and regulations of the State Government and hand over the physical possession of land to THDCIL immediately after the compensation/ ex-gratia is paid to the erstwhile land owners. THDCIL shall pay lease rent for the land during the period of lease as per the applicable rules. THDCIL shall have the option of getting the land mutated in its name as and when permitted by the State Government.

e) In addition to the cost of land/ compensation/ ex-gratia, THDCIL shall pay to UPSIDC administrative/ overhead charges @ 12.5% or as agreed between the parties. THDCIL will also pay interest at the applicable bank rates on the amount already disbursed by UPSIDC to the farmers/ Government. THDCIL shall also reimburse legal expenses, if any, incurred by UPSIDC in connection with litigations related to the said land.

f) In case any external development is required to be carried out through UPSIDC, the same shall be mutually agreed between THDCIL and UPSIDC and the payment for the same shall be made by THDCIL.

Contd.. 5

g) UPSIDC shall hand over possession and transfer the entire land to THDCIL. In case entire land as required for the Project is not available, THDCIL shall have the option not to take land on piecemeal basis.

h) First party agrees that they will extend their cooperation in obtaining the various statutory clearance/ inputs from various concerned authorities for the project.

i) UPSIDC shall ensure settlement of all the pending land reference cases under the Land Acquisition Act, 1894 and shall transfer litigation free land to THDCIL. Any litigation after transfer of the land to THDCIL and possession by THDCIL shall be the responsibility of THDCIL. The UPSIDC hereby undertakes to extend any assistance, including making available old records etc. as may be required.

j) Second party shall deposit/ make payment to the First party after obtaining investment approval from Government of India. The payment shall be released as per mutually agreed schedule.

3. **Confidentiality**

The parties shall keep in confidence all information, data, drawings, documents, etc. exchanged/ obtained under this MOU and shall not divulge the same to any third party without the prior written consent of the other party, unless such information is:

a) In the public domain.

b) Already in the possession of the receiving party.

Contd..6

c) Required by Government Ministries/ Agencies/ Regulatory Agencies or Court of Law of land.

d) To be disclosed to third parties/ consultants for which the receiving party(ies) should sign similar confidentiality agreement.

This MOU shall come into force for all purposes and intents upon its signing.

The terms and conditions of this MOU may be varied with mutual consent in writing by both parties.

IN WITNESS WHEREOF THE PARTIES THROUGH THEIR AUTHORISED REPRESENTATIVE HAVE SIGNED THESE PRESENT ON THE DAY, MONTH AND YEAR MENTIONED ABOVE.

For and on behalf of UPSIDC

For and on behalf of THDCIL

Witness 1. MANISH KUMAR GM(B) UPSIDC

Witness 1. B. AGRAWAL (M&CP) THDC IL

Witness 2. MAYANK SRIVASTAVA RM, SURAJPUR UPSIDC LTD.

Witness 2. (B. ASHWANI) GM (DHUKWAN) THDC IL

Annexure-VI
In-principle water Availability Clearance

ANNEXURE - 7

संख्या–48गु0स0 / 14–27–सिं0–4–136(डब्ल्यू) / 11

प्रेषक,

सुरेश चन्द्रा,
प्रमुख सचिव–।।,
उत्तर प्रदेश शासन।

सेवा में,

प्रमुख सचिव,
ऊर्जा विभाग,
उ0प्र0 शासन।

सिंचाई एवं जल संसाधन अनुभाग–4 लखनऊ, दिनांक 12 जून, 2014

विषयः मे0 टी0एच0डी0सी0 द्वारा खुर्जा, जनपद बुलन्दशहर में 1320 मे0वा0 तापीय विद्युत परियोजना की स्थापना के सम्बन्ध में।

महोदय,

उपर्युक्त विषयक विशेष सचिव, ऊर्जा अनुभाग–1 उ0प्र0 शासन के पत्र संख्या–98 / 24–1–11–98 / 2011, दिनांक 19 जनवरी, 2011 एवं तत्क्रम में अपने अ0शा0 पत्र संख्या–547 / 24–पी0–1–2014–98 / 2011, दिनांक 06 मार्च, 2014 का सन्दर्भ ग्रहण करने का कष्ट करें।

2– इस सम्बन्ध में मुझे यह कहने का निदेश हुआ है कि मे0 टी0एच0डी0सी0 द्वारा खुर्जा, जनपद बुलन्दशहर में स्थापित की जाने वाली 1320 मे0वा0 तापीय विद्युत परियोजना हेतु अपर गंगा कैनाल की लाईनिंग से 53 क्यूसेक जल की बचत द्वारा जलापूर्ति हेतु प्रतिबद्धता इस शर्त के साथ प्रदान की जाती है कि सक्षम स्तर के अनुमोदनोपरान्त एम0ओ0यू0, सैद्धान्तिक सहमति एवं परियोजना लागत के टी0एच0डी0सी0 द्वारा वहन के सम्बन्ध में जो विस्तृत शासनादेश सिंचाई विभाग, उ0प्र0 शासन द्वारा जारी किया जाएगा वह टी0एच0डी0सी0 को मान्य होगा। एम0ओ0यू0 पर हस्ताक्षर न किए जाने तथा शासनादेश / एम0ओ0यू0 में उल्लिखित शर्तों से असहमति व्यक्त किए जाने की दशा में यह प्रतिबद्धता स्वतः निरस्त समझी जाएगी।

भवदीय,

(सुरेश चन्द्रा)
प्रमुख सचिव–।।

संख्या- 98 / 24-1-11-38 / 2011

राजकमल गुप्ता,
विशेष सचिव,
उ0प्र0 शासन।

सेवा में,

प्रमुख सचिव,
सिंचाई विभाग,
उत्तर प्रदेश शासन।

ऊर्जा अनुभाग-1 लखनऊः दिनांक 19 जनवरी, 2011

विषयः मे0 टी0एच0डी0सी0 द्वारा खुर्जा जनपद-बुलन्दशहर में 1320 मे0वा0 तापीय विद्युत परियोजना की स्थापना विषयक।

उपर्युक्त विषय के संबंध में मुझे यह कहने का निदेश हुआ है कि खुर्जा जनपद-बुलन्दशहर में 1320 मेगावाट की तापीय विद्युत परियोजना स्थापित करने हेतु मे0 टी0एच0डी0सी0लि0 (भारत सरकार व उत्तर प्रदेश सरकार का संयुक्त उपक्रम) से दिनांक 31.12.2010 को समझौता ज्ञापन (प्रति संलग्न) किया गया है। परियोजना की स्थापना के लिए 55 क्यूसेक जल की आवश्यकता बताई गई है। उक्त परियोजना के लिए 55 क्यूसेक जल की उपलब्धता के संबंध में अपनी सहमति ऊर्जा विभाग को उपलब्ध कराने का कष्ट करें। टी0एच0डी0सी0 लि0 के पत्र दिनांक 07 जनवरी, 2011 की छायाप्रति सुलग संदर्भ हेतु संलग्न है।

संलग्नक-एक(ओ0)

भवदीय,

(राजकमल गुप्ता)
विशेष सचिव।

एसीएमजी
मुख्य अभियन्ता(संपत्ति)

आशाकांक्षित/नि-2793/सं0/ आई-20
कार्यालय मुख्य अभियन्ता(संपत्ति)
सिंचाई विभाग, उत्तर प्रदेश
मेरठ
दिनांक: मेरठ अगस्त 28, 2012

विषय: खुर्जा, बुलन्दशहर में मै0 टीएचडीसीआईएल लि0 द्वारा प्रस्तावित 1320 मेगावाट की तापीय विद्युत परियोजना हेतु 33 क्यूसेक पानी उपलब्ध कराये जाने के सम्बन्ध में जिला एडीएम की संस्तुति।

संदर्भ: आपका अधीक्षण अभियन्ता-59/अभि-0/यू-0/पी-20(टीए)/टीएचडीसीआईएल, दि-दि0 10.05.2012

प्रिय महोदय,

कृपया उपरोक्त विषयक संदर्भित पत्र का अवलोकन करें। जिला के अन्य से अवगत कराना है कि खुर्जा, बुलन्दशहर में मै0 टीएचडीसीआईएल लि0 द्वारा प्रस्तावित 1320 मेगावाट की तापीय विद्युत पावर परियोजना को 33 क्यूसेक पानी उपलब्ध कराये जाने हेतु मै0टीएचडीसीआईएल लि0 द्वारा "तौहनिक याचनी" की संस्तुति की गई है।

उपरोक्त विषयक के सम्बन्ध में मै0 टीएचडीसीआईएल लि0 की उपरोक्त मांग के अनुसार 33 क्यूसेक पानी उपलब्ध कराये जाने की जगह में सिंचाई विभाग द्वारा निम्नलिखित प्रतिबन्धों के साथ सैद्धान्तिक सहमति दिये जाने प्रस्तावित किया जाता है।

1- मै0 टीएचडीसीआईएल लि0 की मांग के अनुसार 33 क्यूसेक पानी को भुक्रा हेड वर्क्स से तापीय विद्युत गृह तक ले जाने हेतु पाइप लाइन पर कास रेगुलेटर, हेड रेगुलेटर तथा वेरियर विभाग के निर्माण हेतु टीएचडीसीआईएल लि0 द्वारा कार्य की लागत अनुमान सिंचाई विभाग को धनराशि को अग्रिम रूप से उपलब्ध करानी होगी।

2- पाइप लाइन को जाने वाले मार्ग पर पैदावार उत्पादों के राजस्वों एवं अधिकारियों की आवश्यक लम्बाई में लाईनिंग पर डीपेज जाने को रोकते हुये बनाए जाने आवश्यक होगी तथा लाईनिंग कार्य की लागत मै0 टीएचडीसीआईएल लि0 को वहन करनी होगी व धनराशि को भी विभाग में अग्रिम उपलब्ध करानी होगी।

3- उक्त संख्या-1 व 2 पर कराये गये कार्यों के वार्षिक रखरखाव एवं विद्युत संचालन हेतु प्रत्येक वर्ष मै0 टीएचडीसीआईएल लि0 को मांग अनुसार सिंचाई विभाग को धनराशि भुगतान करनी होगी।

अनुरोध है कृपया उपरोक्त के अनुपालन हेतु आवश्यक प्रेषित किया जायेगा।

भवदीय,

(वि0 किशोर)
मुख्य अभियन्ता (संपत्ति संसाधन)
कार्यालय प्रमुख अभियन्ता
सिंचाई विभाग, उत्तर प्रदेश
लखनऊ

(विनोद कुमार)
मुख्य अभियन्ता(संपत्ति)
28/8/12

संख्या-नि-2793/सं0/संपत्ति/ 28/8/2012

प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यकता कार्यवाही हेतु प्रेषित है:-

1- प्रमुख अभियन्ता (परिचालन एवं नियोजन), सिंचाई विभाग, उत्तर प्रदेश लखनऊ।
2- संयुक्त सचिव, सिंचाई अनुभाग-4, उत्तर प्रदेश शासन, लखनऊ को उनके पत्रांक-3601/ 11-27- नि-4-178 (संसदी)/ 10, दिनांक 25.08.2011 के संदर्भ में।
3- मुख्य अभियन्ता (परिचालन), सिंचाई विभाग, उत्तर प्रदेश, लखनऊ।
4- अधीक्षण अभियन्ता क्रीक गंगनहर, अलीगढ़।
5- अधिशासी अभियन्ता बुलन्दशहर जनपद गंगा खंड, बुलन्दशहर।

(विनोद कुमार)
मुख्य अभियन्ता(संपत्ति)
28/8/12

NOW THEREFORE THIS MEMORANDUM OF UNDERSTANDING (MoU) WITNESSETH AS FOLLOWS :

1. **Intent**

a) To establish a [redacted] of UP by THDCIL, subject to establishment of its techno-economic viability, tie-up for fuel, funding, commitment for off-take of power, signing of PPAs and obtaining of necessary clearances/approvals.

2. **Broad Agreements**

a) Uttar Pradesh has requested for minimum 60% allocation of power from the Station subject to approval of the Govt. of India. THDCIL would take up allocation of power from the station, as above, with the Govt. of India. However, Allocation of Power from the Station to the State of Uttar Pradesh shall be as decided by GOI.

b) It is further agreed that the issue of higher allocation of power would be suitably taken up by GoUP with Ministry of Power, GOI.

c) Land requirement for the Kherja Project would include land as required for plant area including green belt, plant reservoir, ash disposal area, township and corridors for make up water, ash slurry pipelines, railway siding, etc., GOUP/UPPCL will assist in transfer of the land already acquired by UPSIDC in Kherja or in case of non-availability of the said land, will assist in acquisition of required land as per the acquisition policy of the State Government, however, the price of the land so acquired or transferred from UPSIDC will be paid by the first party. The [illegible] quantum of land will be decided in JCC meeting.

d) GOUP will allocate the requisite quantity of water for the Khurja Project on payment of aplicable canal lhing charges as decided by Irrigation Department of GOUP.

e) The project shall be based on [redacted] depending on the availability of domestic coal and the shortfall would be met by using imported coal. GOUP/UPPCL shall extend their co operation in obt lning the coal linkage for the project.

f) It is mutually agreed that GOUP/UPPCL shall extend their cooperation for obtaining various statutory clearances/inputs pertaining to the State Government.

g) Investment approval of the Project shall be sought by THDCIL, after the tie up of all Inputs, (including land, water & coal), preparation of FR, receipt of statutory clearances, signing of PPAs etc. However in principle approval for signing this MOU has been obtained by the THDCIL from the authorised level.

h) The power generated from the Project shall be allocated from the busbar of the proposed Project to Uttar Pradesh and other beneficiaries by GoI as per clause 2(a). A separate Agreement shall be entered into by all the beneficiaries with Powergrid for transmission of power to the respective load centers.

i) [redacted] who will provide required help in this regard.

Annexure-VII
Coal block allotment & EC for the block

F.No.13016/9/2014-CA-III (Pt. II)
Government of India
Ministry of Coal
*****

Shastri Bhawan, New Delhi
Dated the 24th August, 2016

OFFICE MEMORANDUM

Subject: Allotment of Amelia coal mine to M/s THDC India Limited - Direction of the Central Government to the Nominated Authority under Rule 8 (2) (a) (ii) and Rule 11 (1) of the Coal Mines (Special Provisions) Rules, 2014 – Reg.

The undersigned is directed to refer to O.M. No. M-20/2014-IPC dated 01.06.2016 **(Annexure-I)** of Ministry of Power (MoP) wherein it was recommended to allot Amelia coal mine to M/s THDC India Limited (THDCIL) for its Khurja STPP (2×660 MW) located in Bulandshahar, Uttar Pradesh under Rule 11 (10) of the Coal Mines (Special Provisions) Rules, 2014 in public interest. Further, it was informed by MoP (vide Annexure-I) that implementation of Khurja STPP will facilitate overall development of the area, create job opportunities for the local people and improve the deficit power scenario of Uttar Pradesh. In addition, it was also informed that availability of coal to Khurja STPP from Amelia coal mine would benefit the consumers in states/UT of Uttar Pradesh, Delhi, Uttrakhand, Rajasthan and Himachal Pradesh.

2. Further, on being requested to confirm whether THDCIL shall be able to synchronize setting up of Khurja STPP (2×660 MW) with milestones for coal production as per Efficiency Parameters applicable to Amelia coal mine, Ministry of Power vide their O.M. No. F.No. M-20/2014-IPC dated 15.07.2016 **(Annexure-II)** has apprised that THDC has informed that it is committed for early implementation of the project and that implementation of the Khurja STPP shall be expedited to synchronize with the development of the Coal Mine. If, however, there would be a gap of few months (4-6 months), the produced coal shall be transferred to Coal India Limited or any other Organisation(s) as per direction of Ministry of Coal (MoC). Further, MoP again requested to consider the request of THDCIL for allotment of Amelia coal block to Khurja STPP (2×660 MW) as per Rule 11(10) of Coal Mines (Special Provisions) Rule, 2014 in public interest as the project will facilitate overall development of the area, create job opportunities for the local people and improve the deficit power scenario of Uttar Pradesh.

3. The recommendation of Ministry of Power for allotment of Amelia coal mine to THDCIL for its Khurja STPP (2×660 MW) has been considered. Accordingly, it has been decided with the approval of the Competent Authority to allot Amelia coal mine located in the State of Madhya Pradesh to THDCIL in accordance with the provisions of Section 5 (1) of the Coal Mines (Special Provisions) Act, 2015 read with Rule 11 (10) of the Coal Mines (Special Provisions) Rules, 2014 in order to meet the requirement for its Khurja STPP (2×660 MW) in public interest.

4. The Nominated Authority is hereby directed to execute an Allotment Agreement and consequently issue an Allotment Order in respect of Amelia coal mine in favour of THDC India Limited in accordance with Rule 8(2)(a)(ii) and Rule 11(1) of the Coal Mines (Special Provisions) Rules, 2014.

Encl. as above.

(Rishan Ryntathiang)
Under Secretary to the Government of India
Tel. No. 23073936

The Nominated Authority, Ministry of Coal

Copy for information to:

1. Secretary, Ministry of Power, New Delhi
2. Chief Secretary, Government of Madhya Pradesh
3. CMD, THDC India Limited, Ganga Bhawan, Pragatipuram, Bypass Road, Rishikesh
4. Director (Technical), THDC India Limited, Ganga Bhawan, Pragatipuram, Bypass Road, Rishikesh
5. Chairman, Coal India Limited, Kolkata
6. CMD, CMPDI Ltd, Ranchi
7. Coal Controller, Kolkata
8. Commissioner, Coal Mines Provident Fund Organization, Dhanbad

Copy also for information to:-

1. OSD/PS to MoS (IC) Power, Coal & NRE
2. PSO to Secretary (Coal)/PPS to SS (Coal)
3. PPS to JS (RPG)/JS(VB)/JS (RKS)/JS(VP)/Advisor (P)/Eco. Advisor

Annexure - I

No.M-20/2014-IPC
Government of India
Ministry of Power
****

Shram Shakti Bhawan, Rafi Marg,
New Delhi, the 1st June, 2016

OFFICE MEMORANDUM

Sub: Allotment of Amelia Coal Mine to Khurja, STPP of THDCIL in District Bulandshahar, Uttar Pradesh – Regarding.

The undersigned is directed to invite reference to Ministry of Coal's D.O. letter No.13016/9/2014-CA.III(Pt.II) dated 24th May, 2016 on the subject mentioned above.

2. In this context it has been informed by THDC that implementation of Khurja STPP will facilitate overall development of the area, create job opportunities for the local people and improve the deficit power scenario of Uttar Pradesh. Main project work cannot be started unless Coal Block is allotted to THDCIL because Environmental Clearance is a pre-requisite condition for CCEA approval. Power Purchase Agreements (PPAs) under Section 62 of Electricity Act, 2003 have been signed by THDCIL with beneficiary states prior to 5th January, 2011 and tariff would be determined as per CERC norms. Therefore, availability of coal to Khurja STPP from identified coal block Amelia would benefit the consumers in States of Uttar Pradesh, Delhi, Uttarakhand, Rajasthan and Himachal Pradesh. In this regard, a copy of THDCIL letter No. TDHCIL/D(T)/NCR-169 dated 28.05.2016 is enclosed.

3. In view of the above, allotment of Amelia Coal Block to THDCIL for Khurja STPP would be in public interest. Therefore, this Ministry recommends allotment of Amelia Coal Block to THDCIL for Khurja STPP (2x660 MW) under Rule 11(10) of the Coal Mines (Special Provision) Rules, 2014.

4. This issues with the approval of Secretary(Power).

Encl: As above.

(S. Majumdar)
Under Secretary to the Government of India
Tele-Fax: 2335-6938

To

Ministry of Coal
(Shri Vivek Bharadwaj, Joint Secretary),
Shastri Bhawan, New Delhi.

Copy to:

(i) **Shri D. V. Singh, Director (Technical), THDCIL**

Annexure- II

85246/2016/Coal

15/2

F. No. M-20/2014-IPC
Government of India
Ministry of Power

Shram Shakti Bhawan, Rafi Marg,
New Delhi, Dated 15.07.2016

OFFICE MEMORANDUM

Sub: Allotment of Amelia Coal Mine to Khurja, STPP (2x660) of THDCIL in District Bulandshahar, UP.

The undersigned is directed to refer Ministry of Coal's O.M. No. 13016/9/2014-CA-III (Pt.II) dated 28.06.2016 on the above mentioned subject requesting to confirm whether THDC India Limited shall be able to synchronize setting up of Khurja Thermal Power Plant (2x660 MW) with milestones for coal production applicable to Amelia Coal Mine.

2. In this regard, comments of THDCIL vide l tter dated 30.06.2016 are enclosed. THDC is committed for early implementation of the project. As per PIB approval for pre-investment activities, the proposal for investment approval should be brought before PIB latest by August, 2017. Only after allocation of coal block / coal linkage, Environmental Clearance will be considered by MoEF&CC. Proposal for investment approval can be processed only after EC is available.

3. Further, THDC has informed that the implementation of the Khurja STPP shall be expedited to synchronize with the development of the Coal Mine. If, however, there would be a gap of few months (4-5 months), the produced coal shall be transferred to Coal India Limited or any other Organisation(s) as per direction of Ministry of Coal.

4. In view of the above, Ministry of Coal is requested to consider the request of THDCIL for allotment of Amelia Coal Block to Khurja STPP (2x660 MW) as per Rule 11(10) of Coal Mines (Special Provisions) Rule, 2014 in public interest as the project will facilitate overall development of the area, create job opportunities for the local people and improve the deficit power scenario of Uttar Pradesh.

5. This issues with the approval of Secretary (Power).

Encl. as stated

JS(Stats) 18/7/16

15/7

Yours faithfully,

(S. Majumdar)
Under Secretary to the Govt. of India
Telefax: 2335-6938

To,

Ministry of Coal
(Shri Vivek Bharadwaj, Joint Secretary),
Shastri Bhawan,
New Delhi

Vi 18/7/16

18/7/16 (CA-III)

18/7

ms Ecoby

Copy to :

CMD, THDC India Limited, Ganga Bhawan, Pragatipuram, Bypass Road, Rishikesh – 249201.

No.J-11015/310/2006-IA.II(M)
Government of India
Ministry of Environment & Forests

Paryavaran Bhawan,
C.G.O.Complex,
New Delhi -110510.

Dated: 27th March 2008

To
M/s The Madhya Pradesh State Mining Corp. Ltd.,
Paryavas Bhawan,
Block No. 1 (A), Second Floor,
Jail Road, Arera Hills,
BHOPAL – 462011.

Sub: Amelia Opencast-cum-Underground Coal Mine Project (8.4 MTPA) of M/s The Madhya Pradesh State Mining Corporation Ltd., located in village Pidarwah, Tehsil Singrauli, District Sidhi Madhya Pradesh - environmental clearance – reg.

Sir,

This is with reference to your application vide your letter No./Geology/2006/164 dated 12.10. 2006 and this Ministry's earlier letter of even no. dated 27.12.2006 prescribing Terms of Reference to the above-mentioned project and your subsequent application dated 23.04.2007 for environmental clearance and subsequent letters dated 03.07.2007, 17.07.2007, 18.09..2007, 05.01.2008 and 19.02.2008 on the above-mentioned subject. The Ministry of Environment & Forests has considered your application. It has been noted that the project is for opening a new **Amelia Opencast-cum-Underground Coal Mine Project for an annual production capacity of 8.4 MTPA over a total lease area of 1619.10 ha and an area of 240.70 ha outside the lease.** The project is to supply coal to M.P. Power Generation Corp. and other commercial users. Of the entire lease area, 1182.21 ha of lease falls within forestland which forms a part of the Mahanban Reserve Forest, 24.39 ha is agricultural land, 172.50 ha is Govt. land. A number of rare and endangered fauna are found in the study area. There are a number of Reserve forests such as the Vihar RF, Mohar RF and Chokra RF situated within the 10km of the core zone. Forestry clearance has been applied for. There are no National Parks, Wildlife Sanctuary, Biosphere Reserves found in the 10 km buffer zone. The project area is drained by the Kanchan Muda Nala flowing along the lease and by small rivulets and streams which outflow into the nala and ultimately join River Mahan in the north-east. Kanchan Nadi and Mahan River flow at a distance of 3.5 km and 9km from the lease. The project involve R&R of 925 PAPs. Of the total lease area, quarry area will be 1116 ha, 15.40 ha of topsoil dump, 20 ha of infratrsucture facilities, 5.5 ha for settling pond, 27 ha of green belt, and 411.90 ha of undisturbed area. The external OB dumps will partially 17.30 ha would be within the lease, and 194.70 ha would be outside the lease along with a road of 6 ha. A colony of 40 ha would be established outside the ML. The project does not involve a coal washery. **Rated capacity of the mine is 8.4 million tonnes per annum (MTPA) of coal production**. The project envisages three phases – Phase-I commencement of mine operation in the northern sector by opencast method using shovel-dumper for OB removal and use of surface miner for extraction of coal at 3.8 MTPA and Phase-II in northern and southern halves by UG for production of coal at 1.4 MTPA and phase-III by opencast mining for a peak capacity of 3.20 MTPA. After 3rd year, all three phases would continue operation at a total combined production capacity of 8.40 MTPA. Mining will be both opencast (OC) using Continuous Surface Miners for production of 3.8 MTPA of coal and by shovel-dumper for 3.20 MTPA of coal and by underground (UG) mining of balance 1.4 MTPA of coal. Underground operations would begin from 2nd year onwards. Coal by UG mining would be brought to surface and loaded onto a belt conveyor to tipping trucks which will transport the coal to a railway siding near Devagram Railway Station by road involving about 55 20-t tippers covering a distance of 9.5 km (one-way) to railway siding. STP would be provided in the colony.It is proposed to transport coal by road to the nearest railway station at Devragram and thereafter by rail. Ultimate working depth of the mine by opencast operations is 50m below ground level (bgl) and 110m bgl by UG mining. . Groundwater in the study area ranges from 5-15m below ground level (bgl). Water table will be intersected during the first year of mining operation. Peak water demand is 1908.1 m^3/d of water, which will be met from mine sump/pit water (267.1 m3/d) and from groundwater (1641 m3/d). Topsoil generation

would be about 0.22 Mm3 /year and would be stored in a area of 15.37 ha in two dumps and used for reclamation o surface dumps and backfill fed area and OB about 29.16 Mm3/year which would be disposed of in 2 external OB dumps – one of 17.3 ha within the ML and 194.70 ha outside the ML and for backfilling an area of 853 ha. The total area to be brought under plantation would be 1120.70 ha which includes 912 ha within the Ml and 208.70 ha outside the ML. In the post mining stage, the total land proposed to be brought under plantation is 1137.40 ha, an area of 42 ha would be left for public use, and an area of 411.90 ha would be left undisturbed. Of the total quarry area, an area of 263ha to be left as void would be converted into a water body. The total PAPs is 965 who will be compensated for the land acquisition and also rehabilitated in a colony proposed to be constructed in an area of 10 ha near village Devri, at a distance of 6 m west of project site and connected by a road. Life of the mine is 32 years for opencast project and 60 years for the underground project. Mining Plan for the project was approved by MOC on 19.102006. The project proposal was prescribed Terms of Reference for preparation of EIA-EMP Report and for conduct of Public Hearing vide MOEF letter No. J-11015/310/2006-IA.II(M) dated 27.12.2006. Public Hearing was conducted on 25.03.2007 by the M.P. State Pollution Control Board. Capital cost of the project is **Rs. 1166 crores**.

2. The Ministry of Environment & Forests has examined the application in accordance with Section 12 of the EIA Notification 2006 and under the provisions thereof, hereby accords environmental clearance for the above-mentioned **Amelia Coal Mine Project** of **M/s The Madhya Pradesh State Mining Corporation Ltd. over a over a total lease area of 1619.10 ha for production of coal at 8.4 MTPA rated capacity** under the provisions of the Environmental Impact Assessment Notification, 2006 subject to the compliance of the terms and conditions mentioned below:

A. Specific Conditions

(i) Maximum production by opencast mining shall not exceed 7 MTPA and that by underground mining shall not exceed 1.4 MTPA. The maximum combined production at any given time shall not exceed 8.4 MTPA from both opencast and underground mining.

No mining operations shall be undertaken in the forestland within the lease area, until forestry clearance has been obtained under the provisions of FC Act, 1980.

No mining operations shall begin until land acquisition has been completed for the external OB dumping on 194.70 ha area and for roads outside the lease.

Mining shall be carried out as per statuette at a safe distance from Kanchan Muda nala and Kanchan River. At the time of depillaring, protective bunds and garland drains shall be provided so that no water from the surface enters the subsidence area and the shaft and the drains shall be channelled to outflow into the nala.

(iv) While extracting panels in the lower seam, all water bodies in the subsidence area shall be drained. Dewatering of the old goaves of the upper seam shall be continued as long as the lower seam is worked to prevent accumulation of large water bodies over working area.

(v) Sufficient coal pillars shall be left unextracted around the air shaft (within the subsidence influence area) to protect from any damage from subsidence, if any.

(vi) Solid barriers shall be left below the roads falling within the blocks to avoid any damage to the roads.

(vii) No depillaring operation shall be carried out below the roads and habitation area found within the lease.

Regular monitoring of subsidence movement on the surface over and around the working area and impact on natural drainage pattern, water bodies, vegetation, structure, roads, and surroundings shall be continued till movement ceases completely. In case of observation of any high rate of subsidence movement, appropriate effective corrective measures shall be taken to avoid loss of life and material. Cracks shall be effectively plugged with ballast and clayey soil/suitable material.

(ix) Garland drains (size, gradient and length) around the safety areas such as mine shaft and low lying areas and sump capacity shall be designed keeping 50% safety margin over an above the peak sudden rainfall

and maximum discharge in the area adjoining the mine sites. Sump capacity shall also be provided adequate retention period to allow proper settling of silt material.

(x) OB shall be stacked at the earmarked external OB dumpsite(s) within and outside the ML area. The ultimate slope of the dump shall not exceed 28^{o}. Monitoring and management of existing reclaimed dumpsites shall continue until the vegetation becomes self-sustaining. Compliance status shall be submitted to the Ministry of Environment & Forests and its Regional office located at Bhopal on a yearly basis.

(xi) Catch drains and siltation ponds of appropriate size shall be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The water so collected shall be utilised for watering the mine area, roads, green belt development, etc. The drains shall be regularly desilted and maintained properly.
Garland drains (size, gradient and length) and sump capacity shall be designed keeping 50% safety margin over and above the peak sudden rainfall and maximum discharge in the area adjoining the mine site. Sump capacity shall also provide adequate retention period to allow proper settling of silt material.

Dimension of the retaining wall at the toe of the dumps and OB benches within the mine to check run-off and siltation shall be based on the rainfall data.

Dust suppression measures shall include wet drilling, water sprinkling on haul roads, transfer points/loading points coal loading to belt conveyor to be enclosed and provided with dust extraction systems and water sprinklers. Coal bunkers shall be provided with bag filter. Plantation shall be developed around areas such as CHP.

Railway siding shall be provided with sheds for ground bunkers, which shall be fitted with bag filters/water sprinkling arrangements to ensure that no fugitive dust emissions are generated.

Road passing through G&D stretch and used for mineral transportation would be black topped. Measures for suppression of dust from transfer points at CHP and at Railway siding would include mist type water sprinklers of optimal capacity.

Drills shall be wet operated only.

Controlled blasting shall be practiced with use of delay detonators and only during daytime. The mitigative measures for control of ground vibrations and to arrest the fly rocks and boulders shall be implemented.

No mineral processing unit such as a coal washery shall be installed in the ML without prior approval of this Ministry.

A progressive afforestation plan covering an area not less than 1137.40 ha shall be implemented, which includes reclaimed external OB dump (17.30 ha + 194.70 ha), topsoil dump (15.40 ha), backfilled area (853 ha), along ML boundary, barrier zone, along roads (3 ha) and infrastructure (10 ha), greenbelt (27 ha) and in colony (14 ha) and along road outside the ML (3 ha) by planting native species including Mahua and Tendu in consultation with the local DFO/Agriculture Department. The density of the trees shall be around 2500 plants per ha. Mahua and Tendu plantation shall be part of compensatory afforestation to be carried out in the 2600 ha of degraded forestland.

Partial backfilling shall start by the 2^{nd} year of operations and concurrent backfilling thereafter. Of the total excavated area of 1116 ha, an area of 853 ha shall be backfilled and reclaimed with plantation/afforestation by planting native plant species in consultation with the local DFO/Agriculture Department. The density of the trees shall be around 2500 plants per ha. The balance area of 263 ha of the decoaled area, left as void and being converted into a water reservoir, shall be gently sloped and the upper benches of the reservoir shall be stabilised with plantation and the periphery of the reservoir fenced.

The Conservation Plan prepared for the fauna and flora found in the study area shall include a Plan for protection and conservation of the rare and the endangered fauna such as Leopard and Bear found in the study area. The Programme for conservation of the wildlife particularly the rare and endangered species/Schedule-I fauna and flora shall be implemented in consultation with the concerned Forest and

Wildlife Departments in the State Government. Separate funds shall be earmarked for implementation of the various activities there under and the status thereof shall be regularly reported to this Ministry and the MOEF Regional Office, Bhopal.

The project proponent shall also participate in the Regional Action Plan for Conservation of endangered for and fauna found within the lease and in the buffer zone (study area) whenever such a Pan gets formulated by the State Government. Separate funds shall be earmarked for implementation of the various activities under the Regional Action Plan.

The company shall obtain prior approval of CGWA/CGWB Regional Office for use of groundwater for mining operations. Further requirement of water, if any, will be from rainwater harvesting measures and recycled mine water.

Regular monitoring of groundwater level and quality shall be carried out by establishing a network of exiting wells and construction of new peizometers. The monitoring for quantity shall be done four times a year in pre-monsoon (May), monsoon (August), post-monsoon (November) and winter (January) seasons and for quality in May. Data thus collected shall be submitted to the Ministry of Environment & Forests and tot eh Central Pollution Control Board quarterly within one month of monitoring.

The Company shall put up artificial groundwater recharge measures for augmentation of groundwater resource. Any additional water requirement for mining operation shall be met from rainwater use only. The project authorities shall meet water requirement of nearby village(s) in case the village wells go dry due to dewatering of mine. It shall be ensured that if the river/nala discharge of mine water takes place, it shall be away from the recharging area of the mine.

ETP shall also be provided for treatment of effluents from workshop, and recycled and reused to the maximum extent possible. Any effluents discharged onto the land/onto surface waters shall meet the standards for discharge. The water at the outlet points would be regularly monitored and records maintained thereof.

Colony shall be provided with STP. Treated water shall be used for green belt development.

) Besides carrying out regular periodic health check up of their workers, 10% of the workers identified from workforce engaged in active mining operations shall be subjected to health check up for occupational diseases and hearing impairment, if any, through an agency such as NIOH, Ahmedabad within a period of one year and the results reported to this Ministry and to DGMS.

i) R&R of 965 PAPs shall be based on norms not less than that of the National R&R Policy . A resettlement colony of 10 ha near village Devri at a distance of 6 km from ML shall be established within a specified time-frame.

For monitoring land use pattern and for post mining land use, a time series of landuse maps, based on satellite imagery (on a scale of 1: 5000) of the core zone and buffer zone, from the start of the project until end of mine life shall be prepared once in 3 years (for any one particular season which is consistent in the time series), and the report submitted to MOEF and its Regional office at Bhopal.

A Final Mine Closure Plan along with details of Corpus Fund shall be submitted to the Ministry of Environment & Forests five year before mine closure for approval.

B. General Conditions

(i) No change in mining technology and scope of working shall be made without prior approval of the Ministry of Environment and Forests.

(ii) No change in the calendar plan including excavation, quantum of mineral coal and waste shall be made.

(iii) Four ambient air quality monitoring stations shall be established in the core zone as well as in the buffer zone for SPM, RSPM, SO2 and NOx monitoring. Location of the stations shall be decided based on the meteorological data, topographical features and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.

(iv) Data on ambient air quality (SPM, RSPM, SO2 and NOx) shall be regularly submitted to the Ministry including its Regional Office and to the State Pollution Control Board and the Central Pollution Control Board once in six months.

(v) Fugitive dust emissions from all the sources shall be controlled regularly monitored and data recorded properly. Water spraying arrangement on haul roads, wagon loading, dump trucks (loading and unloading) points shall be provided and properly maintained.

(vi) Adequate measures shall be taken for control of noise levels below 85 dBA in the work environment. Workers engaged in blasting and drilling operations, operation of HEMM, etc shall be provided with ear plugs/muffs.

(vii) Industrial wastewater (workshop and wastewater from the mine) shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May 1993 and 31st December 1993 or as amended from time to time before discharge. Oil and grease trap shall be installed before discharge of workshop effluents.

(viii) Vehicular emissions shall be kept under control and regularly monitored. Vehicles used for transporting the mineral shall be covered with tarpaulins and optimally loaded.

(ix) Environmental laboratory shall be established with adequate number and type of pollution monitoring and analysis equipment in consultation with the State Pollution Control Board.

(x) Personnel working in dusty areas shall wear protective respiratory devices and they shall also be provided with adequate training and information on safety and health aspects.

Occupational health surveillance programme of the workers shall be undertaken periodically to observe any contractions due to exposure to dust and to take corrective measures, if needed.

(xi) A separate environmental management cell with suitable qualified personnel shall be set up under the control of a Senior Executive, who will report directly to the Head of the company.

(xii) The funds earmarked for environmental protection measures shall e kept in separate account and shall not be diverted for other purpose. Year-wise expenditure shall be reported to this Ministry and its Regional Office at Bhopal.

(xiii) The Regional Office of this Ministry located at Bhopal shall monitor compliance of the stipulated conditions. The Project authorities shall extend full cooperation to the office(s) of the Regional Office by furnishing the requisite data/ information/monitoring reports.

(xiv) A copy of the will be marked to concerned Panchayat/ local NGO, if any, from whom any suggestion/representation has been received while processing the proposal.

(xv) State Pollution Control Board shall display a copy of the clearance letter at the Regional Office, District Industry Centre and Collector's Office/Tehsildar's Office for 30 days.

(xvi) The Project authorities shall advertise at least in two local newspapers widely circulated around the project, one of which shall be in the vernacular language of the locality concerned within seven days of the clearance letter informing that the project has been accorded environmental clearance and a copy of the clearance letter is available with the State Pollution control Board and may also be seen at the website of the ministry of Environment & Forests at http://envfor.nic.in.

3. The Ministry or any other competent authority may stipulate any further condition for environmental

protection.

4. Failure to comply with any of the conditions mentioned above may result in withdrawal of this clearance and attract the provisions of the Environment (Protection) Act, 1986.

5. The above conditions will be enforced *inter-alia*, under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 along with their amendments and Rules.

(Dr.T.Chandini)
Director

Copy to:

1. Secretary, Ministry of Coal, Shastri Bhawan, New Delhi.
2. Secretary, Department of Environment & Forests, Government of Madhya Pradesh, Secretariat, Bhopal.
3. Chief Conservator of Forests, Regional office (EZ), Ministry of Environment & Forests, E-2/240 Arera Colony, Bhopal – 462016.
4. Chairman, Madhya Pradesh State Pollution Control Board, Paryavaran Parisar, E-5, Arera Colony, Bhopal – 462016.
5. Chairman, Central Pollution Control Board, CBD-cum-Office Complex, East Arjun Nagar, New Delhi -110032.
6. Member-Secretary, Central Ground Water Authority, Ministry of Water Resources, Curzon Road Barracks, A-2, W-3 Kasturba Gandhi Marg, New Delhi.
7. District Collector, Sidhi, Government of Madhya Pradesh, New Delhi.
8. Monitoring File 9. Guard File 10. Record File

(Dr.T.Chandini)
Director

Annexure-VIII
NOC from Airport Authority of India

ANNEXURE -9

सुरक्षा सर्वोपरि सेवा

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

BY Regd/RPAD

AAI/NOC/2011/277/2169-73 Date : 18-07-2011

THDC India Ltd,
Plot No-20, Sector-14,
Kaushambi,
Ghaziabad

SUBJECT:- NO OBJECTION CERTIFICATE -(FOR HEIGHT CLEARANCE ONLY)

Sir,

Please refer to your letter no Nil dated Nil on the subject mentioned above.

This office has no objection to the construction of the proposed Construction of Chimney Super Thermal Power Project by M/s THDC India Ltd herein after referred to as the applicant(s) at location Amla, Khurja, Buland Shahar U.P Ghaziabad, (Co-ordinates - 28 10 40 N 77 54 40 E for a height of 275.00 Mts. (in figure) Two Hundred Seventy Five Meter (in words) above ground level so that the top of the proposed structure when erected shall not exceed 196.00 Mts. (site elevation) plus (+) 275.00 Mts. (height of structure) = 471.00 Mts. above mean sea level.

This no objection certificate is being issued on the express understanding that the site elevation (height above mean sea level) viz 196.00 Mts. relative location of the proposed building/structure & its distances and bearings from ARP/ Runway ends, as tendered by the applicant(s) are correct. If, however, at any stage it is established that the said data as tendered & which could adversely effect aircraft operations, the structure or part(s) thereof in respect of which this 'No Objection Certificate' is being issued will have to be demolished at his own cost as may be directed by the Airports Authority of India. The Applicant(s) are therefore advised in his /their own interest to verify the elevation and other data furnished for the site, before embarking on the proposed construction.

The issue of this 'NOC' is further subject to the provisions of Section 9-A of the Indian Aircraft Act, 1934 and those of any notifications issued there under from time to time and under which also the applicant may be called upon by the Airports Authority of India (National Airports Division) to demolish in whole or in part the structure now being authorized vide this 'No Objection Certificate'.

The use of electric fire or oil fired furnace is obligatory.

This certificate is valid for a period of Seven years from the date of issue. If the building /structure /chimney is not constructed & completed within the above mentioned period of Seven years, you will be required to obtain a fresh 'No Objection Certificate' from the Airports Authority of India(National Airports Division) and/or the General Manager, Aerodromes, Northern Region. The date of completion of the building/ structure/chimney should be intimated to the Airports Authority of India and/or the General Manager, Aerodromes, Northern Region.

No light or a combination of lights which by reason of its intensity, configuration or colour may cause confusion with the aeronautical ground lights of the Airport shall be installed at the site at any time during or after the construction of the building.

Day & Night markings with secondary power supply may be provided as per ICAO Standard.

"The permissible top elevation/height includes height for superstructures(eg. Wireless, TV antennas, mumties, lift machine room, overhead water tank cooling towers etc.)"

NOTE:- SITE IS EXAMINE w.r.t SO 84 (E) CIVIL AERODROMES only.

(R.M Lal)
GENERAL MANAGER (ATM)
NORTHERN REGION

Copy to:- 1. The Chairman, Airports Authority of India, Rajiv Gandhi Bhawan, Safdarjung Airport, N.D
2. Chief Executive Officer, DIAL, New Uddan Bhawan, International T-3, Opp. ATS Complex, IGI Airport, New Delhi- 37
3. Chief Architect Town Planner, GDA, Vikas Path Near Old Bus Stand, Gaziabad-201001 (U.P)
4. GM, Carlo Airports Authority of India, Rajiv Gandhi Bhawan, Safdarjung Airport, N.D.

GENERAL MANAGER (ATM)/NR

ANNEXURE - 9

O/C

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली-110075
G-5 & 6, Sector-10, Dwarka, New Delhi-110075
दूरभाष / Phone : 91-11-23074100,25074
फैक्स / Fax: 91-11-2508327 / 250935

NHAI/13013/655/CO/11-12/GC Ghz-Ali/BOT/45285 Dated: 29.10.2013

To,

Director General (Road Development) & SS
Ministry of Road Transport & Highways
1, Parliament Street,
Sansad Marg,
New Delhi-110001

[Kind Attn.:- Shri Rohit Kumar Singh, Joint Secretary, MoRTH]

Sub: Re-routing of NH-91- reg.

Ref: Ministry of Transport and Highways Letter No. NH-24036/06/2013-H dated 16.08.2013.

Sir,

Please refer the above cited letter enclosing therewith DO dated 14.08.13 of Ministry of Power regarding re-routing of NH-91. The proposal submitted by Ministry of Power for re-routing of NH-91 falling under area of proposed Khurja Super Thermal Power Plant is approved in-principle by the Competent Authority subject to the following conditions:

(i) THDCIL will bear the entire cost of realignment of road including land cost, construction cost, cost of maintenance of extra length, shifting of utilities/encumbrances and cost of feasibility study and DPR etc.

(ii) Construction work on new alignment would be executed by NHAI as a deposit work and funds would be deposited by THDCIL as demanded by NHAI.

(iii) Traffic would continue to ply on the existing NH, which is being four laned, till such time the realigned portion is completed and made operational. Land under the present alignment would be transferred to THDCIL after realigned portion is operationalised.

Yours faithfully,

(J.K. Goyal)
General Manager (Tech.) UP 29/10/13

Copy to:

(1) Regional Officer, Lucknow
(2) Project Director, PIU, Aligarh

Copy also to:- Sh. G. Sai Prasad, Joint Secretary Ministry of Power, Govt. of India Shram Shakti Bhawan, Rafi Marg, New Delhi-110001

Annexure-IX
In-Principle Consent from NHAI for NH Reouting

ANNEXURE - 10

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन और राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport and Highways)
जी-5 एवं 6, सेक्टर-10, द्वारका, नई दिल्ली-110075
G-5 & 6, Sector-10, Dwarka, New Delhi-110075

Tel. (Phone): 91-11-2307 1000/25074
Fax: 91-11-2609 1507 / 25039

NHAI/13013/655/COV11-12/GC Ghz-Ali/BOT/45283 Dated: 29.10.2013

To,

Director General (Road Development) & SS
Ministry of Road Transport & Highways
1, Parliament Street,
Sansad Marg,
New Delhi-110001

[Kind Attn.:- Shri Rohit Kumar Singh, Joint Secretary, MoRTH]

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Yours faithfully,

T.J.R. Goyal
General Manager (Tech.) UP 29/10/13

Copy to:

(1) Regional Officer, Lucknow
(2) Project Director, PIU, Aligarh

Copy also to:- Sh. G. Sai Prasad, Joint Secretary Ministry of Power, Govt. of India Sram Shakti Bhawan, Rafi Marg, New Delhi-110001

Annexure-X
CSR Scheme

THDC INDIA LIMITED

"THDCIL CSR and Sustainability Policy 2015"#

THDCIL CSR &Sustainability Policy 2015

Table of Contents

1.0 Preamble

1.1 In 2008, THDCIL had framed a Policy on Corporate Social Responsibility (CSR) known as 'Scheme for Corporate Social Responsibility – Community Development (CSR-CD)', which was adopted from financial year 2008-09. Consequent upon issue of guidelines by DPE in April, 2010, 'THDC CSR-CD Scheme 2010' was introduced. Subsequently, a separate policy on Sustainable Development was framed in 2012, which was based on DPE guidelines issued in September, 2011. As per aforesaid guidelines of DPE, Corporate Social Responsibility and Sustainable Development were treated as two separate subjects and accordingly dealt with separately for the purpose of MoU evaluation. Because of the close linkage between the concepts of Corporate Social Responsibility and Sustainable Development, DPE issued combined guidelines on Corporate Social Responsibility and Sustainability for CPSEs effective from 1st April 2013. In accordance with the said guidelines THDCIL CSR & Sustainability Policy-2013 was issued with the approval of the Board.

1.2 The Companies Act, 2013 has been enacted in August 2013 and Section 135 of the Companies Act deals with Corporate Social Responsibility, which is applicable to all companies, including CPSEs. The Companies covered under the eligibility criteria, based on threshold limits of net-worth, turnover, or net profit, as specified in Section 135(1) of the Companies Act, shall be required to take up CSR Activities. Companies (Corporate Social Responsibility Policy) Rule, 2014, under the provisions of the Companies Act, has also been notified, which is effective from 1st April, 2014. DPE has also issued revised guidelines vide OM Dated 21st October, 2014 on CSR and Sustainability for CPSEs effective from 1st April, 2014.

1.3 As required under Companies Act and CSR Rules, all companies covered under the eligibility criteria based on threshold limit of net-worth, turnover, or profit shall formulate a Corporate Social Responsibility Policy with the approval of Board for activities to be undertaken as specified in Schedule VII of the Companies Act. Also, as per DPE Guidelines all CPSEs must adopt a CSR and Sustainability Policy specific to the Company, with the approval of the Board of Directors. With the issuance of this policy, THDCIL CSR & Sustainability Policy-2013 issued with the approval of the Board stands superseded.

2.0 CSR & Sustainability Vision and Mission:

2.1 CSR Vision

- Socially responsible corporate, continuously enhancing value creation in society and community and promoting sustainable development.

2.2 Mission

- To build sustainable value based relationship with the key stakeholders through ongoing two way communication.
- To undertake CSR programmes[1] with a human face.
- To transparently share the CSR &Sustainability initiatives with the stakeholders.
- To ensure increased commitment at all levels in the organization to operate its business in an economically, socially and environmentally sustainable manner.
- To directly or indirectly take up CSR programmes that benefit the communities in and around its work centers and over a time result in enhancing the quality of life and economic well being of the local populace.
- To promote inclusive growth and address the basic needs of the deprived, underprivileged, neglected and weaker sections of the society.
- To generate through CSR initiatives, goodwill and pride for THDCIL among stakeholders and help reinforce a positive and socially responsible image of THDCIL as corporate entity.

3.0 Institutional Mechanism

3.1 Board Level CSR Committee

3.1.1 THDCIL shall have a Corporate Social Responsibility Committee (CSR Committee) of the Board constituted in terms of Sub- section (1) of Section 135 of the Companies Act 2013. The CSR Committee shall elect one Independent Director as Chairman of the Committee. Company Secretary shall be Secretary to the CSR Committee.

[1] *The term 'CSR programmes' used in the Policy includes CSR Projects and CSR Activities.*

3.1.2 The CSR Committee shall formulate and recommend to the Board for approval, the CSR and Sustainability Policy of the Company which shall indicate the activities to be undertaken by THDCIL relatable to Schedule VII of the Companies Act and amount of expenditure to be incurred.

3.1.3 The CSR Committee shall monitor the CSR & Sustainability Policy from time to time and steer the CSR and Sustainability Programme of the Company.

3.1.4 The CSR Committee shall meet at least once in every three months and four times in a year.

3.2 **Below Board Level Committee**

3.2.1 An officer of the level of General Manager, heading the CSR and Sustainability functions shall be the designated Nodal Officer, who shall be the head of Below Board Level Committee (BBLC). The other members of the BBLC shall be drawn from various functional Departments/Units i.e. S&E, Finance, SEWA/TES as decided by the CSR Committee. Independent Experts in the field of CSR and Sustainable development, from outside the organization may also be nominated in the BBLC.

3.2.2 The Nodal Officer shall be permanent Special Invitee to the Board Level CSR Committee.

3.2.3 The Nodal Officer shall have a team of officials to assist him / her in co-ordination work. The composition of the team to assist the nodal officer shall be decided by the Director in charge of CSR in consultation with CMD.

3.2.4 The BBLC shall be responsible for entire CSR & Sustainability Programmes and its functions shall, inter alia, include the following:

- Preparation of proposals for CSR & Sustainability Programmes, location, estimation of each programme and preparation of annual budget and submitting the same for the consideration of CSR Committee and approval of the Board.
- Implementation & Monitoring of CSR Sustainabilty Programmes.
- Baseline/ need assessment survey and impact assessment of completed Programmes.
- Preparation of Quarterly Progress Report and Annual Report on CSR to be placed before the Board through CSR Committee.

4.0 Planning

4.1 Resources

4.1.1 Every year, THDCIL shall ensure that at least 2% of the average net profit of the Company made during the three immediate preceding financial years is spent in pursuance of its CSR & Sustainability Policy, excluding such activities undertaken in pursuance of normal course of business.[2] The unspent amount would not lapse and will be carried forward to the next year for utilization for the purpose for which it was allocated.

4.1.2 Even if THDCIL is not covered under the eligibility criteria based on threshold limit of net-worth, turnover, or net profit as specified in the Act, but makes profit in the preceding year, the Company will take up CSR programmes as specified in the Act and the CSR Rules and spend at least 2% of the net profit made in the preceding year.

4.1.3 Expenditure on capacity building, such as training, workshops, seminars, conferences, etc for CSR, for own employees of the Company as well as those of implementing agencies, through Institutions with track record of at least three financial years will qualify as CSR expenditure. Such expenditure on capacity building, including expenditure on administrative overheads and base line / need assessment survey and impact assessment study shall not exceed 5% of the of total CSR expenditure in any year.

4.1.4 The Budget and Annual CSR and Sustainability Plan shall be approved by the Board on the recommendation of the CSR Committee.

4.1.5 Up to 5% of the annual CSR Budget may be earmarked for emergency needs for taking up permitted CSR programmes during natural calamities / disasters. However, it may be ensured that unutilized balance of such emergency fund is utilized for CSR programmes within the same financial year, so as to avoid any carry forward of unspent Annual CSR Budget.

4.2 Selection of CSR Programmes

4.2.1 Selection of CSR programmes must be related to the activities as specified in Schedule VII of the Companies Act 2013 vide **Annexure - I.** The entries in Schedule VII may be interpreted liberally so as to capture the essence of the subjects.

---

[2] Net profit to be calculated as per Section 198 of the Companies Act, read with CSR Rules 2(f).

4.2.2 Keeping in view the spirit of executing CSR & Sustainability programmes, the broad umbrella of THDCIL CSR initiatives will be titled **'THDC Sahridaya'** (Corporate with a Human heart). Focus areas where THDCIL shall undertake CSR programmes are titled by the objective they seek to achieve as under:

i. **THDC Niramaya** (Health) - Nutrition, Health and Sanitation and Drinking Water projects
ii. **THDC Jagriti** (Initiatives for a Bright future) – Education initiatives
iii. **THDC Daksh** (Skill) - Livelihood Generation and Skill development initiatives
iv. **THDC Utthan** (Progress)- Rural Development
v. **THDC Samarth** (Empowerment)- Empowerment initiatives
vi. **THDC Saksham** (Capable) - Care of the aged and differently abled
vii. **THDC Prakriti** (Environment) - Environment protection initiatives

The nature of the CSR programmes to be undertaken under each of the above focus areas will be indicated in the 'CSR hand book of THDCIL'.

4.2.3 As far as possible, CSR programmes shall be undertaken in Project mode, which entails planning the stages of execution in advance, fixing targets, resources required within the allocated budget, and having a definite time span for achieving desired outcomes. For easy implementation, long-term CSR plans shall be broken down into medium-term and short-term plans.

4.2.4 If required, THDCIL will collaborate with other companies / CPSEs for undertaking CSR programmes and pool the resources and capabilities for greater social, economic and environmental impact. The collaboration with other companies will be in such a manner that THDCIL is in a position to report separately on such programmes in accordance with CSR Rules.

4.2.5 CSR & Sustainability programmes will be aligned with business policies and strategies of the Company and such CSR programmes will be selected which can be better implemented / monitored through in-house expertise, so as to exploit Company's core competence and resource capability in implementation of CSR programmes.

4.2.6 'THDCIL's CSR Communication Strategy' approved by the Board envisages ongoing communication with the key stake holders to ascertain their views and suggestions regarding the CSR and sustainability initiatives under taken / to be under taken by the Company. However, the final decision in selection and implementation of CSR activities would be that of the Board level CSR Committee.

4.2.7 As a part of the sustainability initiatives within the organization, THDCIL shall give due importance to environmental sustainability even in normal mainstream activities by ensuring that its operations and processes promote renewable sources of energy, reduce / re-use / recycle waste material, replenish ground water supply, protect / conserve / restore the ecosystem, reduce carbon emissions and help in greening the supply chain. However, expenditure towards such sustainability initiatives would not constitute a part of CSR spends from 2% of profits as stipulated in the Act and the CSR Rules.

4.3 **Selection of location and beneficiaries**

4.3.1 Preference will be given to the local area in selecting the location of CSR and Sustainability activities. The definition of “Local area” for this purpose will be

(i) the periphery of the Company’s plant / project / business activities and (ii) the Broad Geographical Area directly impacted by the Company’s business operations. Priority shall also be accorded to CSR and Sustainability Programmes for the benefit of those stakeholders who are directly impacted by Company’s operations and activities.

4.3.2 At least 65% of the annual CSR budget should be allocated to CSR programmes for local area and for the benefits of stakeholders who are directly impacted by the Company’s business operations / activities.

4.3.3 After giving preference to local area, THDCIL will undertake CSR programmes anywhere in the country.

4.3.4 Baseline/ need assessment survey will be desirable prior to the selection of any CSR programme. Baseline surveys may not be required in all cases, provided there is credible documentary evidence of having got the need assessment study done through own resources, or through some specialized agency, or having accessed reliable data in this regard from recognized authoritative secondary sources.

5.0 Implementation

5.1 The CSR and Sustainability programmes will be mainly implemented through SEWA-THDC and THDC Education Society (TES), the two Company sponsored / established registered Societies. CSR programmes may also be undertaken by the Projects / Units of THDCIL directly.

5.2 THDCIL may take up the implementation of CSR activity directly through the Projects/ Units of the Company with its manpower and resources, if it feels confident of its organizational capability to execute such programmes.

5.3 The CSR and Sustainability programmes may also be undertaken through trust, society or company under section 8 of the Companies Act not established by THDCIL if such entity has been created exclusively for undertaking CSR activities or where the corpus is created exclusively for a purpose directly relatable to a subject covered in Schedule VII of the Companies Act. Such trust, society or company must have an established track record of three years in undertaking similar programmes and THDCIL will specify the programmes to be undertaken through these entities, the modalities of utilization of funds on such programmes and reporting mechanism.

5.4 While engaging or partnering with external agencies, care shall be exercised to ascertain the credentials so as to select only reliable, specialized agencies which have the necessary capabilities and expertise to implement the CSR Programmes.

5.5 Engagement of external specialised agencies is the discretion of the THDCIL, but preferably they shall be engaged from the available panels of such agencies maintained by the Government Ministries / Departments, autonomous organisations, or the National / Regional CSR Hub.

5.6 At times, implementation of CSR & Sustainability programmes requires specialized knowledge and skills for which services of external specialized agencies may be sought.

6.0 Monitoring

6.1 Monitoring of CSR and Sustainability programmes will be done concurrently with implementation to assess the progress vis-à-vis planned.

6.2 To ensure transparency and effective implementation of the CSR programmes undertaken, a robust monitoring mechanism will be instituted by the Company, providing for periodic monitoring at different levels using the following indicative medium:

i. Monthly Progress Report
ii. Quarterly Progress Report
iii. Video Conferencing
iv. Site Visits

v. Documentary evidence including photographs, films and videos
vi. Other in – house monitoring mechanisms, as determined by the CSR Committee
vii. Third Party can be engaged for monitoring with due care to eliminate conflict of interest

7.0 Reporting

7.1 Monthly Progress Report will be submitted to the Director In-charge of CSR & Sustainability.

7.2 Quarterly progress report on CSR and Sustainability will be placed before the Board after consideration by the Board Level CSR Committee.

7.3 The Board's report in the Annual Report shall include Annual Report on CSR containing particulars specified in **Annexure-II** and the same shall be displayed in the THDCIL's website.

7.4 A brief narrative on the action taken for implementation of DPE guidelines on sustainability initiatives shall also be included in the Board's Report on CSR.

7.5 Annual Sustainability Report will be published and displayed on Company's web site as per the 'THDCIL's CSR Communication Strategy'.

8.0 Impact Assessment

Impact assessment of all completed CSR & Sustainability programme above Rs 5.00 lakhs will be done through specialized external agencies and the report containing the success/failure shall be submitted to Board Level CSR Committee.

9.0 General Provisions

9.1 THDCIL shall execute all CSR activities and programmes in terms of the systems and procedures as detailed in the 'CSR Handbook' (as maybe notified from time to time) which are aligned/based on the provisions of Section 135 of the Companies Act, 2013, the CSR Rules and the subsequent clarifications and amendments as notified by Ministry of Corporate Affairs/ Department of Public Enterprises.

9.2 If necessitated, new CSR programmes can be taken up during the course of a year, with the Board's approval based on the recommendations of the CSR Committee, in addition to CSR activities already incorporated in the annual CSR plan.

9.3 The surplus arising out of CSR projects or programmes or activities shall not form part of the business profit of the Company.

9.4 One-off events such as marathons/ awards/ charitable contribution/ advertisement/ sponsorship of TV programme etc would not be qualified as part of CSR expenditure.

9.5 Contribution of any amount directly or indirectly to any political party under section 182 of the Act, shall not be considered as CSR activity.

9.6 The CSR projects or programmes or activities that benefit only the employees of THDCIL and their families shall not be considered as CSR activities.

9.7 CSR programmmes undertaken only in India will be considered for the purpose of mandated two percent expenditure.

9.8 For every CSR project/ programme of THDCIL, the implementing agency shall abide by the provisions of the THDCIL's 'Ethics Policy' and 'Whistle Blower Policy'.

*** * * * * * * * ***

Annexure-I
(Refer Para 4.2.1)

Activities which may be undertaken under Corporate Social Responsibly Policy vide Schedule VII of the Companies Act 2013

i. Eradicating hunger, poverty and malnutrition, promoting health care including preventive health care and sanitation, including contribute to Swach Bharat Kosh set-up by the Central Government for the promotion of sanitation and making available safe drinking water.
ii. Promoting education, including special education and employment enhancing vocation skills especially among children, women, elderly, and differently abled and livelihood enhancement projects.
iii. Promoting gender equality, empowering women, setting up homes and hostels for women and orphans; setting up old age homes, day care centres, and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward groups.
iv. Ensuring environmental sustainability, ecological balance, protection of flora and fauna, animal welfare, agro forestry, conservation of natural resources and maintaining quality of soil, air and water, including contribution to the Clean Ganga Fund set-up by the Central Government for rejuvenation of river Ganga.
v. Protection of natural heritage, art and culture, including restoration of building and sites of historical importance and works of art; setting up public-libraries; promotion and development of traditional art and handicrafts.
vi. Measures for the benefit of armed forces veterans, war widows and their dependents.
vii. Training to promote rural sports, national recognized sports, paralympic sports and Olympic sports.
viii. Contribution to the Prime Minister's National Relief Fund or any other fund set up by the Central Government for socio-economic development and relief and welfare of the Scheduled Castes, the Scheduled Tribes, other backward classes, minorities and women.
ix. Contributions or funds provided to technology incubators located within academic institutions which are approved by the Central Government.
x. Rural development projects.
xi. Slum area development. *

**The term "Slum area" shall mean any area declared as such by the Central Government or any State Government or any other competent authority under any law for the time being in force.*

(The above entries in Schedule VII have been updated incorporating amendments notified up to 24.10.2014)

Annexure –II
(Refer Para 7.3)

Annual Report on CSR Activities, with the following information, to be included in the Board's Report

1. A brief outline of the Company's CSR Policy, including overview of projects or programs proposed to be undertaken and reference to the web-link to the CSR Policy and Projects or programs.

2. The composition of CSR Committee.

3. Average net profit of the Company for the last three years.

4. Prescribed CSR expenditure (i.e. 2% of item 3 above).

5. Details of CSR spent during the financial year.
   (a) Total amount to be spent for the financial year.
   (b) Amount unspent, if any.
   (c) Manner in which the amount spent during the financial year as detailed below.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
S. No	**CSR projects or activities identified**	**Sector in which the project is covered**	**Project or Programs (1) Local area or other (2) State and district where project or programs was undertaken**	**Amount outlay (Budget) Project or program wise**	**Amount spent on project or programs Sub-head: (1)Direct expenditure on projects or programs (2)Overheads**	**Cumulative expenditure up to the reporting period.**	**Amount spent: Direct or through implementing agency (Give details of implementing agencies)**
1							
2							
3							
TOTAL							

6. In case the CSR spent is less than two percent of the average net profit of the last three financial years or any part thereof, reasons for not spending the amount shall be specified in the Board's Report.

7. A responsibility statement of CSR Committee that the implementation and monitoring of CSR Policy is in compliance with the CSR objectives and Policy of the Company.

Sd/ **CEO/MD/Director**	Sd/ **Chairman-CSR Committee**

Annexure-XI
Vision Document

टीएचडीसी इंडिया लिमिटेड
THDC INDIA LIMITED
(भारत सरकार एवं उ.प्रे. सरकार का संयुक्त उपक्रम)
(A joint venture of Govt. of India & Govt. of UP)

Sustainable Livelihood & Community Development Centre,
Aam Bagh, Veerbhadra Road, Rishikesh – 249203 (Uttrakhand)
Phone: 0135-2476172, Fax: 0135-2452900

No: THDC/RKSH/HRD/F/VI/1/ 749 Dated: 11.03.2015

CIRCULAR

Sub: Revised Vision & Mission of the Company.

A need for review of Vision & Mission of the Corporation, (formulated in June' 2007) was felt due to change in the business environment such as:

- Award of Mini Ratna Status & Schedule – A.
- Diversification (Thermal, wind and solar on its radar).
- Changes in external environment (competition, legal and regulatory framework, sectoral reforems, emerging risks).

Accordingly the Mission & Vision of the Corporation was reviewed as per the shared understanding of the Management. Board of Directors in the 174th Meeting held on 13.02.2015 has resolved/ approved the revised Vision & Mission of the Company.

The revised Vision & Mission of the Company is re-produced below:

Our Vision

A world class energy entity with commitment to environment and social values

Our Mission

- To plan, develop and operate energy resources efficiently.
- To adopt state of the art technologies.
- To achieve performance excellence by fostering work ethos of learning and innovation.
- To build sustainable value based relationship with stakeholders through mutual trust.
- To undertake rehabilitation and resettlement of project affected persons with human face.

Earlier statement of Mission & Vision is required to be replaced with the above statements in the printed Material/Journal/Annual Note Book/Audio Visual Presentations & other documents of the Company.

This issues with the approval of Competent Authority.

11/3/15

(H. Wadhwa)
Addl. General Manager (HRD)

Distribution: As per overleaf.

Copy to All Executives

Annexure-XII
Environment Policy

टीएचडीसी इण्डिया लिमिटेड

पर्यावरण नीति

हम पर्यावरण के संरक्षण और प्रदूषण को कम करने के लिए प्रतिबद्धता के साथ स्थायी ऊर्जा प्रदान करने के लिए प्रतिबद्ध है।

हमारा उद्देश्य लक्ष्य निर्धारण प्रगति एवं परिणाम संचार द्वारा पर्यावरण के प्रदर्शन में निरन्तर सुधार करना है।

पर्यावरणीय फुटप्रिंट्स को कम करने के लिए हम:

- लागू कानूनी आवश्यकताओं, कानूनों, विनियमों और सर्वोत्तम प्रथाओं का पालन करेंगे।
- पर्यावरण नीति को अपने कर्मचारियों, संबंधित सभी हितधारकों को सूचित करेंगे।
- अपनी व्यापारिक गतिविधियों के सम्बन्ध में कर्मचारियों, ठेकेदारों, उपठेकेदारों, आपूर्तिकर्ताओं और सलाहकारों को उनके पर्यावरणीय दायित्वों को पूरा करने में मदद करेंगे।
- अपनी गतिविधियों से सम्बन्धित संसाधनों के संरक्षण, अपशिष्ट कम करने और पर्यावरणीय जोखिम को समाप्त करने का प्रयास करेंगे।
- आई० एस० ओ० १४००१ के अनुसार पर्यावरण प्रबन्धन प्रणालियों की स्थापना संचालन व सुधार करते हुए उसे अपनी व्यापारिक प्रक्रियाओं में एकीकृत करेंगे।

श्री राम मिश्रा

(एस. आर. मिश्रा)
महाप्रबन्धक (सामाजिक एवं पर्यावरण)

सं०-टीएचडीसी/इंडी०/पॉलि०/ दिनांक 29.10.2015

THDC INDIA LIMITED

ENVIRONMENT POLICY

We are committed to provide sustainable power with commitment for protection of Environment and to minimize pollution.

We aim to achieve continual improvement in Environmental performance by setting objectives, reviewing progress and communicating results.

For reduction of our environmental footprints, we shall-

- Comply with applicable legal requirements, laws, regulations and follow best practices;
- Communicate our Environment Policy to all our stakeholders, including our employees;
- Facilitate our employees, contractors, sub-contractors, suppliers and consultants to fulfill their environmental obligations with respect to our business operations & activities;
- Strive to conserve resources, reduce waste and mitigate environmental risks that may be associated with our activities;
- Review and continually improve environmental management systems in line with ISO 14001and integrate the same into our business processes.

(S. R. Mishra)
General Manager (Social & Environment)

Annexure-XIII

Socio-economic market survey of fly ash utilization

THDC

'MARKET SURVEY REPORT OF FLY ASH UTILIZATION'

FOR

PROPOSED (2X660MW) SUPER THERMAL POWER PROJECT AT KHURJA, DISTT.BHULANDSHAHAR, U.P.

M.2012 **Oct., 2012**

SUBMITTED BY

MANTEC CONSULTANTS PVT LTD

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Chapter 1: Introduction

1.1 Objective of the report

As per the Fly Ash Notification by the Government of India under the Ministry of Environment and Forest 2009, the Central Government issued directions for restricting the excavation of top soil for manufacturing of bricks and promoting the utilization of fly ash in the manufacturing of building materials and in construction activities with in a specified radius of 100 km from the coal based thermal power plant. Fly ash includes all categories of Coal ash generated at the thermal plant and collected by Electrostatic Precipitator or bad filters or other similar suitable equipments. Purpose of this report is to conduct a market survey to study the possibilities of 100 % utilization of the fly ash generated during the operation of the proposed (2x660 MW) Super Thermal Power Project at Khurja. This would mean, all ash generated such as Electro Static Precipitator ash, dry fly ash, bottom ash and mound ash could be used in bricks industry, cement industry, clay based building material, concrete, mortar and plaster industry. This report encourages the achievement of the ultimate objective of conservation of top soil and minimization of environmental pollution caused due to fly ash.

1.2 Brief About THDC

THDC India Limited (formerly Tehri Hydro Development Corporation Limited) is a joint venture of Government of India & Government of UP with Equity ratio as 3:1. The company was incorporated in July 1988 to develop, operate & maintain the 2400 MW Tehri Hydro Power Complex and other Hydro projects in the Bhagirathi valley.

The corporation has successfully commissioned Tehri Dam & Hydro Power Plant (1000 MW) Stage-I during X^{th} plan. Two units (100 MW each) of Koteshwar Hydro Electric Project have also been commissioned in March 2011. With this, installed capacity of the corporation has increased to 1200 MW. Balance two units (100 MW each) of Koteshwar HEP are scheduled to be commissioned in March, 2012. The works for implementing Pump Storage Plant of 4x250 MW capacities are under progress and project is scheduled for commissioning during XII^{th} Plan.

In addition, THDCIL is implementing 444 MW Vishnugad Pipalkoti Hydro Electric Project on river Alaknanda in Uttarakhand. The corporation is also entrusted with six other Hydro Projects in Bhagirathi, Alaknanda and Sarda Valleys in Uttarakhand, totaling to 810 MW. Govt. of UP has allotted 24 MW Dhukwan Project on Betwa river to THDCIL for implementation.

Towards diversification of the company into other energy sectors, THDCIL has entered into a MoU on 31st Dec'10 with GoUP and UPPCL for setting up 2x660 MW Khurja Super Thermal Power Project in district Bulandshahar, UP.

Availability of power is one of the major infrastructure requirements for industrial development of a nation. Quality power at optimum cost is a catalyst for agricultural, industrial and commercial developments as well as well being of the people of the country. Uttar Pradesh is strategically located so as to feed the Northern Region of the country to meet the power need of the Northern Grid after meeting its own requirement. The state of Uttar Pradesh has ambitious plans for rapid industrialization. The economic development of Uttar Pradesh is dependent on adequate availability of quality power.

1.3 Brief about the Project

1.3.1 Project

THDC has proposed a Super Thermal Power Plant of 2x660 MW at village Dusshera Kheri, Tehsil Khurja, distt. Bulandshaher of Uttar Pradesh

1.3.2 Location

Proposed project is situated in village Dusshera Kheri, Tehsil Khurja, distt. Bulandshaher of Uttar Pradesh. Latitude and Longitude of the proposed site is 28°10.417' to 28°08.586' Northern latitude and between 77°55.373' & 77°53.783' Eastern longitude. Vicinity map of the project site is shown as **Figure-1.1.**

Figure-1.1: Vicinity of the Project Site

1.3.3 Approach

The proposed site is situated at a distance of 11 km (approx) from Khurja town in North direction and 36 km from Aligarh, one of the major towns of Uttar Pradesh. The proposed plant site is surrounded by villages Dushhara-kherli, Jahanpur, Naiphal (Unchagaon) and Rukunpur. The proposed plot is approachable from National Highway (NH-91). The Upper Ganga Canal passes through the North Eastern side of the plant.

The Northern Railway main line passes near the Western side of the site. The nearest railway station is Danwar which is about 5 km from the site. The nearest major Railway Station is at Khurja at a distance of about 11 km on Northern side. The distance from Delhi to the project site is about 90 km.

Name of Town	Distance (in km)	Direction
Khurja	11	North
Aligarh	36	South East

1.3.4 Land Requirement

The plant is proposed to be setup near village Dushhara-Kherli in between Khurja & Aligarh. A total area of around 1381 acres has been identified for the proposed plant.

1.3.5 Fuel Requirement and Availability

1.3.5.1 Coal Quantity

The basic fuel for this project has been considered as Coal. Presently, the compositions of fuel characteristics and quantity of coal are not known.

Considering the calorific value of 4200 kcal/kg and heat rate of 2447 kcal/kwh, the coal requirement shall be approx. 5.37 million tonne corresponding to 90% PLF. The peak daily coal requirement shall be about 16500 tonnes based on gross calorific value of 4200 kcal/kg, 100% plant load factor and heat rate of 2447 kcal/kwh for 2x660 MW units. THDC has applied to Ministry of Coal for long term coal linkage for the proposed power plant.

1.3.5.2 Coal Quality

The coal quality considered for is as follows:
Proximate analysis (as received basis) - Domestic coal

Ash	: <34%
GCV	: >4200 (kcal/kg)
Total moisture (average)	: 13.0%

1.3.6 Estimated Project Cost

Approximate project cost of power station and facilities will be approximately` 9745 Crores.

1.3.7 Commissioning Schedule

The 1st unit of 660 MW is envisaged to start generation within 52 months from zero date (date of investment approval) as per CERC Guidelines i.e. from 2017. The second unit would be commissioned within 6 months of commissioning of 1st unit.

1.4 Fly Ash generation from Proposed (2x660 MW) STPP at Khurja

In the proposed STPP of capacity (2x660) 1320 MW at Khurja fly ash will be produced as a by product. As per MoEF notification, 2009 for utilization of Fly Ash, the fly ash should be transported from the site to various industries so that it can be used by the industries and the top soil can be prevented.

The break up for the daily, monthly and annual quantity of fly ash generated from the proposed project is as follows:

Daily Fly Ash generation : 5,006 tonnes
Monthly Fly Ash generation : 1,50,180 tonnes
Yearly Fly Ash generation : 16,52,033 tonnes

1.5 Ash Utilization targets from date of Commission

The target and quantity of Fly Ash to be utilized in the first 4 years after commissioning is as shown in **Table-1.1** and **Figure-1.2**

Table-1.1: Year wise target for Ash Utilization as per MoEF notification

S.No.	Target Date	Percentage Utilization of Fly Ash	Quantity (Tonnes per annum)
1	1st Year	50%	8,26,017
2	2nd Year	70%	11, 56, 423
3	3rd Year	90%	14, 86, 829
4	4th Year	100%	16, 52, 033

Figure-1.2: Year wise target for Ash Utilization as per MoEF notification

Chapter 2: Fly Ash Generation, Utilization and Transportation in India

2.1 Fly Ash

Fly ash is a fine, glass powder recovered from the gases of burning coal during the production of electricity. Fly ash is one of the residues generated in combustion, and comprises the fine particles that rise with the flue gases. Ash which does not rise is termed bottom ash. Depending upon the source and makeup of the coal being burned, the components of fly ash vary considerably, but all fly ash includes substantial amounts of silicon dioxide (SiO_2) (both amorphous and crystalline) and calcium oxide (CaO), both being endemic ingredients in many coal-bearing rock strata. When mixed with lime and water the fly ash forms a cementations compound with properties very similar to that of Portland cement. Because of this similarity, fly ash can be used to replace a portion of cement in the concrete, providing some distinct quality advantages. The concrete is denser resulting in a tighter, smoother surface with less bleeding.

Fly ash concrete offers a distinct architectural benefit with improved textural consistency and sharper detail. Fly Ash is also known as Coal Ash, Pulverized Flue Ash, Pozzolona.

Fly Ash is most commonly used in Pozzolan in PCC application. Pozzolans are siliceous or siliceous and aluminous material, which in a finely divided form and in the presence of water, react with calcium hydroxide at ordinary temperatures to produce cementitious compounds.

2.2 Current Fly Ash Generation in India

In India fly ash generation is around 110 million tonnes / year and is set to continue at a high rate into the foreseeable future. Presently majority of the coal ash generated is being handled in wet form and disposed off in ash pond which is harmful for the environment and more over ash remains unutilized for gainful applications. India has sufficient coal reserves. In India almost 65-70% of electricity production is dependent on coal which produces a huge quantity of Fly Ash as residue which is allegedly a waste product in Thermal Power Stations. Fly Ash has a vast potential for use in High Volume fly ash concrete especially due to its physio-chemical properties. A good amount of research has already been done in India and abroad on its strength and other requisite parameters. Currently fly ash generation and utilization is taking place in six major states; Gujarat, Maharashtra, Tamil Nadu, Rajasthan, Andhra Pradesh and Uttar Pradesh. The fact file for Uttar Pradesh is presented at the end of the present report.

2.3 Present Scenario of Fly Ash:

In India there are about 75% of total installed power generation is based upon coal. The total consumption of coal in the power plants is about 230-250 million MT per year. The ash content in coal varied from 30-50%. The total ash generated from these power plants is about 110 million MT per year. Ash generation is rising about 10% per year and it is expected reach at 170 million MT by 2015. According to Ministry of Environment & Forest (MoEF) about 30% % of Ash is being used in fillings, embankments, construction, block & tiles, etc.

2.4 Ash Content in Indian Coal

The quality of coal depends upon its rank and grade. The coal rank arranged in an ascending order of carbon contents is:

Lignite ----> sub-bituminous coal ----> bituminous coal ----> anthracite

Indian coal is of mostly sub-bituminous rank, followed by bituminous and lignite (brown coal). The ash content in Indian coal ranges from 35% to 50%.

The coal properties including calorific values differ depending upon the colliery. The calorific value of the Indian coal (~15 MJ/kg) is less than the normal range of 21 to 33 MJ/kg (gross).

According to National Thermal Power Corporation (NTPC), coal is used for approximately 62.3% of electric power generation in India, oil and gas accounts for 10.2%, hydro share is 24.1%, nuclear, wind, and other contribute remaining 3.4%.

The coal quality used in proposed (2 X 660 MW) STPP at Khurja is as follows:

Ash	: 34 %
GCV	: >4200 (kcal/kg)
Total moisture (average)	: 13.0 %

2.5 Ash Collection

Ash can be collected in following categories:

Dry Fly Ash
Dry ash is collected from different rows of Electrostatic Precipitators. It is available in two different grades of fineness in silos for use as resource material by different users.

Bottom Ash

Bottom ash is collected from the bottom of the boiler and transported to hydro bins and then ash mound for use in road embankment.

Conditioned Fly Ash
Conditioned fly ash is also available in ash mound for use in land fills and ash building products.

2.6 Fly Ash Application/ Project

NTPC Dadri

The NTPC Dadri project has the unique distinction of having Asia's first 100% dry ash extraction with transit ash storage silos and final storage place converted to a green ash mound

Fly Ash generated at NTPC Dadri has been used successfully in the following applications:

- Land Fills
- Road Embankments
- Road Construction
- Portland Pozzolona Cement
- Building Products Concrete

Road Construction and Paving

Ash has been used in concrete roads and roller compacted concrete roads which are not only durable, but have long service of 30-35 years without much maintenance in comparison to WBM and Bituminous Macadam roads.

HCC Projects

Development of high strength and high performance triple blended concrete for the Bandra-Worli Sea Link project. High performance concrete for RAPP (5&6) incorporating fly ash & development of high volume fly ash concrete mixes for pavement quality concrete for various road works.

ACC Road Project

ACC has constructed demonstration roads using high volume fly ash concrete with upto 50% replacement at its Greater Noida and Faridabad Ready Mix Plants. It has also constructed a small demonstration patch at Tikaria-Amethi, in its Cement Plant.

Other Projects

1. Construction of road (experimental basis about 1.00 km length) using fly ash, at Raichur, Karnataka. This Project was implemented by PWD (Public Works Department), Raichur and CRRI (Central Road Research Institute)

2. Use of Roller Compacted concrete technology using high doses of fly ash for construction of Saddle Dam and upper Dam of Ghatghar pumped storage Scheme near Nashik, have been implemented in joint co operation of Maharashtra Irrigation Department, Central Soil and Mineral Research Station, University of Roorkee

2.7 Use of Fly Ash in

- **Road Embankments:**

  For the first time in India, Gujarat Ambuja Cements Ltd. has constructed a High Volume Fly Ash (HVFA) concrete road at their cement plant in Ropar, Punjab. The road has been constructed with 50% fly ash.

  The BIS standards related to fly ash and its utilization is being revised through drafting a second revision of IS:3812, i.e., Specification for fly ash for use as pozzolan and admixture. The minimum and maximum percentages of fly ash in PPC, specified by IS–456, have risen from 10% to 15% and from 25% to 35% respectively. The government of India has issued a notification that makes it mandatory to use at least 25% ash in the manufacture of clay bricks, blocks, or tiles within a radius of 50 km from coal or lignite based thermal power plants. There are some fiscal incentives to encourage the production and use of fly ash based products, the Government of India has withdrawn the 8% excise duty previously imposed on such products. Now, no excise duty shall be levied on the manufacture of a good in which a minimum of 25% fly ash is used.

  The construction of the first dam in India using Roller Compacted Concrete (RCC) technology with high doses of fly ash has started near Nasik, India. Approximately 60-70% cement is being replaced by fly ash.

- **Construction & Filling Works**:

  Fly Ash can be utilized for making various construction structures. DMRC has utilized fly ash in underground concrete works, Administrative Building of Greater Noida Industrial Development Authority (GNIDA) constructed with Fly Ash Bricks, this shows that fly ash can be utilized as a building material even for commercial & residential complexes. Fly ash use improve performance making it stronger, more durable & more resistant to chemical attack.

  Fly ash utilization, especially in concrete has significant benefits including:

  1. Increase the life of concrete roads and structures by improving concrete durability.
  2. Net reduction in energy use and green house gas and other adverse air emissions when fly ash is used to replace od displace manufactured cement.
  3. Reduce the demand for land for disposal/deposition of fly ash.
  4. Controls the source of pollution.

- **Mine filling:**

  Use of ash in black filling of opencast mines and stowing of underground mines can be a major area of utilization of ash. In open cast mines after extraction of coal and completion of mining operation, mines are back-filled with over burden materials and remaining area can be backfilled with ash. In India most of the open cast mines are quite young and back filling operation is yet to start.

- **Agriculture:**

  Use of fly ash in agriculture, as a soil modifier and source of micro and macro nutrients, has been successfully established by scientific community (Annamalai University). It improves plants water & nutrient uptake, helps in development of roots and soil binding, stores carbohydrates and oil for use when needed, protects the plant from soil borne diseases and detoxify contaminated soils.

Effect of Fly ash on yield of crops	
Name of Crop	**Percent Increase**
Groundnut	40.2
Sunflower	25
Safflower	15.2
Maize	12
Paddy	10.5-18

Various crops have been grown and harvested in varying agro-climatic conditions and different soil-crop combinations and increase in crops yield has been successfully demonstrated.

2.8 Fly Ash Transportation

Fly ash can be supplied in four forms:

Dry: This is currently the most commonly used method of supplying fly ash. Dry fly ash is handled in a similar manner to Portland cement. Storage is in sealed silos with the associated filtration and desiccation equipment, or in bags.

Conditioned: In this method, water is added to the fly ash to facilitate compaction and handling. The amount of water added being determined by the end use of the fly ash. Conditioned fly ash is widely used in aerated concrete blocks, grout and specialist fill applications.

Stockpiled: Conditioned fly ash not sold immediately is stockpiled and used at a later date. The moisture content of stockpiled ash is typically 10 to 15%. This is used mainly in large fill and bulk grouting applications.

Lagoon: Some power stations pump fly ash as a slurry to large lagoons. These are drained and when the moisture content of deposited fly ash has reached a safe level may be recovered. Because of the nature of the disposal technique, the moisture content can vary from around 5% to over 30%. Lagoon fly ash can be used in similar applications to stockpiled conditioned fly ash.

In the proposed project the envisaged mode of coal transportation from coal mines to the power plant is by Indian Railway system. Railway lines shall be developed which will be suitably branched from Indian railway system. The broad gauge rail route distance from nearest railway station at Danwar would be approximately 5 km.

2.9 Disposal Method of Bottom Ash

At thermal power plants, fly ash is currently collected/disposed off by using wet or dry systems. In cases, where fly ash collection systems are not very efficient, a portion of it escapes into the atmosphere causing environmental pollution.

Although accurate data about the influence of the polluted atmosphere on the state of health of persons inhabiting the vicinity of the power station is not available, cases of pulmonary diseases, including asthma and silicosis are found to be on the increase. In association with moisture in the atmosphere, fine particles of fly ash often form aerosols which affect visibility around power stations, though to varying extent. Aerosols, being particles in colloidal

dispersion and of lower bulk density, take a long time to settle down as fine precipitation of dust. These can thus be carried over considerable distances from the power station.

In the wet system, fly ash is mixed with water and sluiced to settling ponds or dumping near the plant. Being cheaper than any other manner of fly ash removal, it is the widely used method at present in India.

Electrostatic Precipitation is the most popular and widely used method of emission control today which enables collection of dry fly ash. The characteristic of coal contributes significantly to the characteristics of fly ash collection. After arresting the fly ash in ESP, it is then transported to silos through suction or by pressurized air. When required, this can be obtained in the container for further transportation directly from the silos through chutes at the bottom, or to the delivery point by pipeline using vacuum suction or pressurized air.

Chapter 3 : Market Survey

3.1 Purpose of Market Study

As per the notification of Ministry of Environment and Forest, New Delhi dated 3rd November 2009, it is said that all new coal and lignite based thermal power stations are to achieve the target of Fly Ash Utilization per the **Table-3.1** below:

Table-3.1: MoEF targets for Ash Utilization

S.No.	Percentage Utilization of Fly Ash	Target Date
1.	At least 50% of Fly Ash generation	One year from the date of commencement of the plant
2.	At least 70% of Fly Ash generation	Two years from the date of commencement of the plant
3.	At least 90% of Fly Ash generation	Three years from the date of commencement of the plant
4.	100% of Fly Ash generation	Four years from the date of commencement of the plant

Further, the unutilized fly ash in relation to the target during a year, if any, shall be utilized with in next two years in addition to the targets stipulated for these years and the balance utilized fly ash accumulated during first four years shall be utilized progressively over next five years in addition to 100% utilization of current generation of Fly Ash.

Keeping in view the above, a market study for the utilization of Fly ash generated by proposed (2x660) MW Super Thermal Power Plant was carried out to identify the potential users. within 100 km radius from the proposed power plant.

3.2 Study Area

As per the notification of Ministry of Environment and Forest, industries which may utilize Fly Ash within 100 km radius of the project site were targeted. All the potential users in the 100 km radius of the project site were identified. The map of the 100 km radius of the project site is shown in **Figure-3.1**

Figure-3.1: Map of 100 km radius of the project site

There are three states Uttar Pradesh, Delhi and Haryana which are within the 100 km radius from the project site. The major portions of the study are falls in Uttar Pradesh.

3.3 Methodology Adopted for the Field Study

A desk study was done for identifying the relevant rules and regulations regarding fly ash utilization in India through Ministry of Environment & Forests, New Delhi website and interaction with various govt. agencies. A preliminary meeting was conducted for identifying the potential users for fly ash based on fly ash use. Three sets of questionnaire were designed covering cement manufacturing plants, Fly ash products / RMC manufacturers and construction agencies such as Public Works Department, Building Contractors, Housing Board, etc. The draft questionnaires were prepared and sent to THDC for finalization. The questionnaires were finalized in consultation with THDC officials and inputs from NTPC consulting.
The questionnaires were then sent to the various industries covering Cement, Bricks Manufactures, Ready Mix Concrete Manufacturers and others including PWD and NHAI those may be potential users of Fly Ash. The major industries contacted are Ambuja Cements, Ultratech Cement, RMC (India) Ltd., Dalmia Cement; JK Lakshmi Cement etc. and RMC suppliers like Ashtech Pvt. Ltd., Ghaziabad, Star Corporation, Adycon Infrastructures Pvt. Ltd., etc. The detailed list of the industries/users/suppliers contacted is attached as **Annexure I.**

Since the response was slow and not very encouraging, a team was set up to visit the users agencies to identify the potential of Fly Ash in the respective industries/users and filling of questionnaires. The objectives of team members were to interact with the companies' officials, identify the future plans on fly ash utilization; current use of fly ash in industries, etc. The response from fly ash users was concluded and presented in the report.

3.4 Analysis of Market Survey

The responses on questionnaires and discussions with prospective fly ash users were analyzed. The team received encouraging response from most of the companies, specifically with RMC manufacturers. Some important companies which may be the potential buyer of fly ash are Ambuja Cements, Ultratech Cement, RMC (India) Ltd, Star Corporation, Adycon Infrastructures Pvt. Ltd. etc. The analysis of responses of various kinds of fly ash users are described below:

(i) Cement Manufacturing Industries

Major Cement Industries in the study area are clinker plants. Ambuja Cement, Ultratech, ACC and J. P. Cement are the major fly ash users in the study area and approximately production 5000 tonne per day which may be doubled in next five years (2017) considering the present growth. During discussions, they intend to utilize fly ash which will be generated by the proposed THDC thermal power plan at Khurja. As per the current practice, they are purchasing the fly ash through vendors. The current requirement will be approximately 1000 tonne (20% of fly ash in cement) per day and future demands may be increased up to 2000 tonne per day. However, they are not able to sign any MoU with THDC considering the long commissioning time of the project. They are the potential utilisers of fly ash and will have intention to increase their capacity of cement manufacturing in the study area after getting sufficient and confirm supply of fly ash from Khurja thermal power station after its commissioning.

(ii) RMC Manufacturers

Ready Mix Concrete (RMC) manufacturers are comparatively new industry which is now increasing very rapidly in Delhi and NCR (Study Area) as most of the construction projects are now utilizing RMC. The major suppliers of RMC are Adycon Infrastructures Pvt. Ltd., Mahesh Enterprises, RMC Readymix India Ltd., Star Corporation, Ultratech, ACC, etc. The current demand in this sector is approximately 8000 tones per day which may be increased up to 12500 tones per day in next five years. The fly ash consumption in RMC is approximately 20-30% in RMC and therefore, demand in 2017 will be approximately 3125 tones per day (based on 25% fly ash content). The discussions with RMC manufacturers were very encouraging and they showed willingness for signing MoU with THDC. The letters of understanding for utilizing of fly ash have already been submitted by Adycon Infrastructures Pvt. Ltd., Star Corporation, Ficus E-Logic Pvt. Ltd. and Mahesh Enterprises. These are enclosed as **Annexure-II** respectively.

(iii) Fly Ash Products Manufacturers

The other important industries for utilization of fly ash are Fly Ash Bricks / Blocks / Pots / Cement Sheets manufacturers. Some of the Bricks manufacturers in the Study Area are Power Brick Corporation, Everest India, Ganesh Eit Udyog, S. M. Bricks, etc. These are not very organized and mostly are small scale units. They can be potential utilizers of fly ash as the price of clay bricks is increasing rapidly and fly ash bricks are cost effective and environment friendly. The present utilization of fly ash bricks are only 5% as compared to clay bricks. Based on the survey, the demand may vary from 200-300 tones per day and may be increased to 500-700 tones per day in next five years. The existing fly ash based bricks manufacturers have been

shown the interest for utilizing fly ash provided land will be provided for the industry on lease with subsidized rates.

(iv) Construction Agencies, such as PWD / NHAI, etc.

There are nos of Highways, Railways and Bridge projects which are proposed in the study area by Public Works Department, Dedicated Freight Corporation of India Ltd., National Highways Authority of India, etc. They are showing willingness of utilization of fly ash in embankments as utilization of fly ash within 100 K.M. radius of power plant is also a mandatory requirement as per MoEF Notification, 2009. However, they could not be able to sign any MoU at this stage and put a condition in the construction contract for utilizing the fly ash within 100 KM radius of existing power plant through contractor / concessionaire.

3.5 Ash Utilization Targets and Industries

As per the notification of Ministry of Environment and Forest, New Delhi dated 3rd November, 2009, it is said that all new coal and lignite based thermal power stations are to achieve the target of Fly Ash Utilization (as shown in **Table-3.1**)

The industries wise break-up for targets on ash utilization is shown in **Table-3.2** and **Figure-3.2** for 1st year, **Table-3.3** and **Figure-3.3** for 2nd year, **Table-3.4** and **Figure-3.4** for 3rd year and **Table-3.5** and **Figure-3.5** for 4th year.

Table-3.2: Industry wise Target for Ash Utilization – 1st Year (50%)

Industry	Quantity Consumed (Tonnes/annum)	Percentage Consumed
Cement	289106	35%
Ready mix concrete	371708	45%
Bricks	82602	10%
Others (PWD, NHAI etc.)	82602	10%
Total	**826017**	**100%**

Figure-3.2: Industry wise Target for Ash Utilization – 1st Year (50%)

Table-3.3: Industry wise Target for Ash Utilization – 2nd Year (70%)

Industry	Quantity Consumed (Tonnes/annum)	Percentage Consumed
Cement	462569	40%
Ready mix concrete	578212	50%
Bricks	57821	5%
Others (PWD, NHAI etc.)	57821	5%
Total	**1156423**	**100%**

Figure-3.3: Industry wise Target for Ash Utilization – 2nd Year (70%)

Table-3.4: Industry wise Target for Ash Utilization – 3rd Year (90%)

Industry	Quantity Consumed (Tonnes/annum)	Percentage Consumed
Cement	520390	35%
Ready mix concrete	817756	55%
Bricks	74342	5%
Others (PWD, NHAI etc.)	74342	5%
Total	**1486829**	**100%**

Figure-3.4: Industry wise Target for Ash Utilization – 3rd Year (90%)

Table-3.5: Industry wise Target for Ash Utilization – 4th Year (100%)

Industry	Quantity Consumed (Tonnes/annum)	Percentage Consumed
Cement	660813	40%
Ready mix concrete	743415	45%
Bricks	82602	5%
Others (PWD, NHAI etc.)	165203	10%
Total	**1652033**	**100%**

Figure-3.5: Industry wise Target for Ash Utilization – 4th Year (100%)

Chapter 4: Conclusion and Recommendations

As per the Market study conducted by Mantec Consultants Pvt. Ltd. on the utilization of Fly ash generated from the proposed Super Thermal Power Plant of (2X660) MW at Khurja. The potential fly ash users will be RMC manufacturers and Cement Industries and they may consume up to 80% of the fly ash generated by the proposed power plant. As per the current practice, the manufacturers are arranging fly ash through a marketing agency to avoid inconvenience with the thermal power plant and get the continuous supply for their product. The cement industries have shown intention of utilizing fly ash when the plant will be commissioned. However, not able to sign MoU at this stage as they prefer to purchase fly ash through authorized vendors / suppliers and would like to increase their capacity after the commissioning of Khurja Thermal Power Plant enable them to get sufficient and firm supply of fly ash.

The RMC manufacturers showed willingness for signing MoU with THDC considering the future market potential of fly ash. The letters of understanding for utilizing of fly ash has already been submitted by Adycon Infrastructures Pvt. Ltd., Star Corporation, Ficus E-Logic Pvt. Ltd.and Mahesh Enterprises.

Based on the market survey, it is concluded that 100% fly ash utilization shall be achievable as power plants close to National Capital Region and demand of cement, RMC and bricks are very high. Therefore, it is recommended that THDC may appoint an agency which can form MoU with THDC for 100% utilization of fly ash within four years from the date of commissioning of proposed power plant. The user agency shall establish their own transportation, clientele, and distribution mechanism for utilization of fly ash.

FLY ASH FACT SHEET State: Uttar Pradesh

Uttar Pradesh is the most populous state in the country accounting for 16.4 per cent of the country's population. It is one of the largest state in geographical area covering 9.0 per cent of the country's geographical area, encompassing 2,94,411 square kilometres and comprising of 83 districts.

The structure of state income shows that the contribution of primary sector has declined to 41 percent of the state income though the sector still sustain 73 percent of the total working force. The share of secondary sector, on the other hand, has gone up to 20 percent of the total state income, which now employ 9 percent of the total workers in the state. U.P. state growth has been more capital intensive than labour intensive, more urban based than rural based and the shift income from primary to other sectors is not accompanied by corresponding change in employment pattern.

Distinguishing feature of Uttar Pradesh economy is its regional imbalances. In terms of economic indicators like agricultural productivity, infrastructural facilities, industrial growth, the Uttar Pradesh economy can be categorize into five regions: Western, Eastern, Central, Ruhelkhand and Hill. The Western Uttar Pradesh is agriculturally prosperous. It is relatively industrialized and has seen greater degree of urbanization.

There are around 11 major thermal power plants in the state with a total capacity of around 10000 MW. Most of the larger thermal power plants in the state are either owned by NTPC or the state government's Rajya Vidyut Utpadan Nigam Limited. In general, the thermal power plants in the state are modernized and produce good quality of fly ash. Details of Fly Ash generated from present power plants has been summarized in **Table-I**.

1.	State:	Uttar Pradesh
2.	Major Thermal Power Plants:	
I.	NTPC Singrauli	2050 MW
II.	UPRVUNL Anpara	1630 MW
III.	UPRVUNL Opra	1550 MW
IV.	NTPC Rihand	1000 MW
V.	NTPC Dadri	840 MW
VI.;	NTPC Unchahar	840 MW
VII	Hindalco Ranukoot	619 MW
VIII.	UPRVUNL Harduagunj	440 MW
IX.	NTPC Tanda	440 MW
X.	UPRVUNL Panki	279 MW
XI.	UPRVUNL Jhansi	220 MW

Table-I : Details of Fly Ash generated from present power plants

Name of Plant	Quantity Of Fly Ash Generation			Ash Collection	Current Fly Ash Use		Transportation Data		Other Fly Ash Utilization Activities	
	Total	Dry	Wet		Quantity Used	Application	Mode of transport & Distances from plant	Transportation Cost	Projects	Cement Product Inn (PPC)
Renukoot Hindalco Industries Ltd. Renusagar	1689320	844660	844660	Both wet and dry.	48 %of fly ash used.	0.6 % dry FA used as FA bricks. 8.5 % dry FA used in cement industry. 13.90% dry FA used in land development. 25.0% dry FA used in raise of ash dyke	Closed Bulkers 225 Km		Bricks. raise of ash dyke	cement industry
Sohnebhadra District NTPC Rihand	13.22	10.58	2.64	Dry ash collection	35 %of fly ash used	2.0% dry FA used as FA bricks. 1.3% dry FA used in cement industry.				

Name of Plant	Quantity Of Fly Ash Generation			Ash Collection	Current Fly Ash Use		Transportation Data		Other Fly Ash Utilization Activities	
	Total	Dry	Wet		Quantity Used	Application	Mode of transport & Distances from plant	Transportation Cost	Projects	Cement Product Inn (PPC)
						96.13.90% dry FA used in land Development. 25.0% dry FA used in raise of ash dyke				
Faizabad NTPC Tanda	1050000	840000	210000	Have to install.		Discharged in pond.	Nil		In process	
Harduaganj UPRVUNL Harduaganj	25 trucks			Slurry collection system		Used in Ash pond			Fly ash Bricks.	
Rai Barelli NTPC Unchahar	2050000			Dry ash collection Silo two in number 350 MT each.4		50 % of Fly Ash used In Cement Industries. Fly ash bricks. Roads.				

ANNEXURE-1

LIST OF INDUSTRIES/USERS/SUPPLIERS

S. No.	Name of Company	Location
1.	J.K. Laxmi Cement	New Delhi
2.	Gujarat Ambuja Cement Ltd	Delhi
3.	Grasim Industries Ltd.	Delhi
4.	J.K. Cement	Delhi
5.	ACC Cement Ltd.	Delhi
6.	DCM Shriram Consolidated Ltd.	Delhi
7.	Shri Cement Ltd.	Delhi
8.	Wonder Cement Ltd.	Delhi
9.	Birla Corporation India Ltd.	Delhi
10.	Bangur Cement Ltd.	Delhi
11.	Monika Trading Company	Ghaziabad
12.	Shiva Industries	Ghaziabad
13.	Parashuram Cement Ltd.	Ghaziabad
14.	Gutgutia Cement Ltd.	Ghaziabad
15.	Trade Linkers	Ghaziabad
16.	Kanpur Industrial Corporation	Ghaziabad
17.	Dalmia Cement Ltd.	Noida
18.	Noida Cement Ltd.	Noida
19.	RCC Cement Ltd.	Noida
20.	Power Bricks Corporation	Ghaziabad
21.	Sainath Tiles & Bricks Ltd.	Ghaziabad
22.	Mohit Traders	Faridabad
23.	Harish Bhatta Company	Delhi
24.	Everest India Ltd.	Delhi
25.	Eco Vision	NOIDA
26.	Vardhman Brick Industries	Delhi
27.	Ashtech Marketing Pvt. Ltd.	Ghaziabad
28.	Aribha Brick Udyog	Aligarh
29.	BDK bricks	Aligarh
30.	Bhole Brick Udyog	Aligarh
31.	Bohre Brick Udyog	Aligarh
32.	Ganesh Eit Udyog	Aligarh
33.	Kishan Brick field	Aligarh
34.	Ma Sheetla Brick Udyog	Aligarh
35.	RJ Brick Udyog	Aligarh
36.	SM Brick Udyog	Aligarh
37.	Shiv Bricks Industries	Aligarh
38.	Maa Brick Field	Ghaziabad

39.	Jai Shri Ram Bhatta Company	Mathura
40.	Jamman Lal Brick Business	Mathura
41.	Laxmi Brick Udyog	Mathura
42.	Subhas Chaudhari Brick Industries	Mathura
43.	TBN Taj Brick Udyog	Mathura
44.	Kalka Brick Field	Ghaziabad
45.	Anvary Brick Field	Meerut
46.	Azad Brick Field	Meerut
47.	Dev Udyog Bhatta	Meerut
48.	ACC Ltd.	Faridabad
49.	Aakansha Cement Pvt. Ltd.	Meerut
50.	Century Cement Industries	Meerut
51.	Grasim Industries Ltd.	Meerut
52.	Vabhav Trading Company	Faridabad
53.	Balaji Cement Corporation	Faridabad
54.	Shiv Ratan Gupta	Faridabad
55.	OM Prakash & Brothers	Delhi

ANNEXURE-II

LETTERS OF UNDERSTANDING (MOU)

ADYCON
READY MIX
Quality Concrete
NS-EN ISO 9001:2000/ISO 9001:2000

Adycon Infrastructures Pvt. Ltd.

Head Office : KG-18, NEW KAVI NAGAR, GHAZIABAD - 20 1002 (U.P.)
Plant : GHAZIABAD • INDIRAPURAM • NOIDA • GREATER NOIDA
Mobile : 9891776363, 9810349868 **Telefax :** 0120-4330472
E-mail : adycon.infrastructures@gmail.com • **Web. :** adyconrmc.com

THDC India Limited
Design-Thermal Department
Plot No. 20, Sector-14
Kaushambi, Ghaziabad-201 010, U. P.

Sept 25, 2012

Sub. Regarding utilization of Fly Ash Produced by Upcoming Coal based Khurja Super Thermal Power Project (2 x 660 MW) in Khurja, Dist. Bulandshahar, U. P.

Dear Sir,

We have been informed by M/S Mantec Consultants Pvt. Ltd., the agency engaged by you for Ash Utilization Study, that THDC India Ltd. is planning to set up 2 X 660 MW coal based super thermal power project, at Khurja , Distt. Buland shaher (U.P.).
During discussions, it was also informed that about 7400 tonnes of Fly Ash is expected to be produced daily, once the project is commissioned in the year 2017.

With regard to possibility of utilization of the produced ash, we would like to inform as follows:

i.) We are in the business of Ash utilization and the company profile is enclosed as Annexure A.
ii.) We Adycon Infrastructures Pvt. Limites,Ghaziabad are intend to utilize 1500 tones per day of fly ash produced by Khurja STPP on mutually agreeable terms and condition.

Looking forward to associate with THDC.

Thanking you,

Yash Gupta

Director
Adycon Infrastructures Pvt. Limited

Ficus E-Logic Pvt Ltd

A-16 , Sector-65 , Noida- 201301

Phone : 0120-4227924 , Email : Info@ficuslogic.co.in

Reference No. FEL/Fly Ash/0121

THDC India Limited
Design-Thermal Department
Plot No. 20, Sector-14
Kaushambi, Ghaziabad-201 010, U. P.

October 1, 2012

Sub. Regarding utilization of Fly Ash Produced by Upcoming Coal based Khurja Super Thermal Power Project (2 x 660 MW) in Khurja, Dist. Bulandshahar, U. P.

Dear Sir,

We have been informed by M/S Mantec Consultants Pvt. Ltd., the agency engaged by you for Ash Utilization Study, that THDC India Ltd. is planning to set up 2 X 660 MW coal based super thermal power project, at Khurja , Distt. Buland shaher (U.P.).

During discussions, it was also informed that about 7400 tonnes of Fly Ash is expected to be produced daily, once the project is commissioned in the year 2017.

With regard to possibility of utilization of the produced ash, we would like to inform as follows:

i.) We are in the business of fly ash utilization and marketing fly ash products from fly ash.
ii.) We M/s Ficus E-logic Pvt. Ltd., Noida are intend to utilize 1100 tones per day of fly ash produced by Khurja STPP on mutually agreeable terms and condition.

Thanking you,

Yours faithfully,

Ashok Suyal
Executive Director
Ficus E-logic Pvt. Ltd.

MAHESH ENTERPRISES

.....CEMENTING BONDS WITH COMMITMENT

MCON readymix concrete

mycem

HEIDELBERGCEMENT

THDC India Limited
Design-Thermal Department
Plot No. 20, Sector-14
Kaushambi, Ghaziabad-201 010, U. P.

Oct. 5th, 2012

Sub. Regarding utilization of Fly Ash Produced by Upcoming Coal based Khurja Super Thermal Power Project (2 x 660 MW) in Khurja, Dist. Bulandshahar, U. P.

Dear Sir,

We have been informed by M/S Mantec Consultants Pvt. Ltd., the agency engaged by you for Ash Utilization Study, that THDC India Ltd. is planning to set up 2 X 660 MW coal based super thermal power project, at Khurja , Distt. Buland shaher (U.P.).
During discussions, it was also informed that about 7400 tones of Fly Ash is expected to be produced daily, once the project is commissioned in the year 2017.

With regard to possibility of utilization of the produced ash, we would like to inform as follows:

i.) We are in the business of Ash utilization through RMC Plant, Bricks etc.
ii.) We M/s Mahesh Enterprises, Ghaziabad are intend to utilize 2250 tones per day of fly ash produced by Khurja STPP on mutually agreeable terms and condition.

With regards,

For MAHESH ENTERPRISES

Auth. Signator

■ 39, Naya Ganj, Ghaziabad - 201001 Ph. : 95-120-2730042, 2834462
■ III-B-3, Nehru Nagar, Ghaziabad Telefax : 95-120-4115562, 4115563

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Ref. No. SC/2012/ CM

Dated.....

THDC India Limited
Design-Thermal Department
Plot No. 20, Sector-14
Kaushambi, Ghaziabad-201 010, U. P.

Sept 29, 2012

Sub. Regarding utilization of Fly Ash Produced by Upcoming Coal based Khurja Super Thermal Power Project (2 x 660 MW) in Khurja, Dist. Bulandshahar, U. P.

Dear Sir,

We have been informed by M/S Montec Consultants Pvt. Ltd., the agency engaged by you for Ash Utilization Study, that THDC India Ltd. is planning to set up 2 X 660 MW coal based super thermal power project, at Khurja , Distt. Buland shaher (U.P.).
During discussions, it was also informed that about 7400 tonnes of Fly Ash is expected to be produced daily, once the project is commissioned in the year 2017.

With regard to possibility of utilization of the produced ash, we would like to inform as follows:

i.) We are in the business of Ash utilization and the company profile is enclosed as Annexure A.
ii.) We Adycon Infrastructures Pvt. Limites,Ghaziabad are intend to utilize 2000 tones per day of fly ash produced by Khurja STPP on mutually agreeable terms and condition.

We are now looking forward to associate with THDC.

Thanking you,

Vikas Gupta
Partner
Star Corporation