

**PRE-FEASIBILITY REPORT  
FOR  
THE PROPOSED THERMAL POWER PROJECT (4X270 MW)  
AT  
MANUGURU MANDAL, KHAMMAM DISTRICT,  
TELANGANA STATE**

*Project Proponent :*



**TELANGANA THERMAL POWER GENERATION CORPORATION LTD  
(TSGENCO- A GOVERNEMENT OF TELANGANA STATE UNDERTAKING)  
VIDYUT SOUDHA, HYDERABAD**

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### **Annexure – I : Plant Layout**

1. **EXECUTIVE SUMMARY**

<b>S .No</b>	<b>Description</b>	<b>Details</b>
1.	Name of the Project	Manuguru thermal power project (4x270 mw) at Manuguru Mandal, Khammam district, Telangana state
2.	Location of the Plant	Geographical Co-ordinates Latitude - 180 1' 26.59" N Longitude - 800 43' 48" E Altitude - MSL + 72.859 M
3.	Power plant Capacity	4 X 270 MW
4.	Total land requirement for the project	The land for the proposed project is 1183.24 acres (for Thermal power plant is 1110.38 acres and for future expansion of Solar power plant is 72.86 acres)
5.	Source & total water requirement	Source of water – Godavari river Total water requirement 4155 m3 / hour
6.	Power Evacuation	Through 440 kV system
7.	Working hours	3 shifts daily of 8 hrs each (Effective 18 hrs a day) 310 days a year
8.	Rehabilitation and Resettlement	There are no homesteads, Hence, no resettlement is involved. However, Compensation will be paid for land losers as per the R&R policy.
9.	Manpower [Operation]	1000 persons
10.	Estimated Cost of the Project	Rs. 7360.21 crores

2. **INTRODUCTION OF THE PROJECT/ BACKGROUND INFORMATION**

(i) **Identification of Project and Project Proponent**

Telangana State Power Generation Corporation Limited (TSGENCO) is one of the pivotal organizations of Telangana, engaged in the business of Power Generation. Apart from the operation and maintenance of the power plants it has under taken the execution of the ongoing and new power projects scheduled under capacity addition programme and is also taking up renovation and modernization works of the old power stations.

TSGENCO has been incorporated under companies Act, 2013, on 19<sup>th</sup> May 2014 and commenced its operations from 02-06-2014. After bifurcation of state as per state re organization act, this was a sequel to Government's reforms in Power Sector to un-bundle the activities relating to Generation, Transmission and Distribution of Power, which were earlier taken up by APSEB. All the generating stations owned by erstwhile APSEB and APGENCO were transferred to the control of TSGENCO.

TSGENCO is establishing power plants for power generation to meet the growing demand for industrial, agriculture, domestic and other sectors in Telangana. As per 17<sup>th</sup> Electric Power Survey (EPS), CEA, peak demand in considering the utilization factor of 53.89%, TS system will require about 22,402 MW by the end of 12<sup>th</sup> plan and 33,154 MW by the end of 13<sup>th</sup> plan.

The installed capacity of TSGENCO as on date is 4365.30 MW comprising 2282.50 MW Thermal, 2081.80 MW Hydro, 1 MW solar power stations, and contributes about half the total Energy requirement of Telangana. Solar PV unit established at Jurala has once again generated 1.7 MU during 2013-2014 against guaranteed energy of 1.4 MU per annum.

**(ii) Brief description of Nature of the Project**

- **Need for the Project**

The installed capacity of Telangana state includes state sector, private sector and share from central sector as on 01.06.2010 was 14523 MW. With the commissioning of additional electric power generating units and share from share from central sector projects programmed from commissioning the capacity of Telangana system by the year 2013-14 will be 23522 MW.

Telangana State has been facing substantial power deficit resulting into sever power cuts on industrial, Domestic, Commercial and Agriculture sectors. The State of Telangana requires substantial addition to its power generating capacity to meet power demand of industrial, agricultural and other sectors. In order to meet the power demand TSGENCO has proposed to install 4 x 270 MW sub critical coal based power generation unit at Manuguru, Khammam District, Telangana the load center power plant is fully justified.

**(iii) Demand-Supply Gap**

Table-2.2 shows the details of peak load and energy requirement of State of Andhra Pradesh and Southern Region as per 17<sup>th</sup> Electric Power Survey, a publication of CEA, upto the year 2021-2022.

**TABLE-1**  
**PEAK LOAD AND ENERGY REQUIREMENT/ CONSUMPTION IN THE STATE OF TELANGANA, SOUTHERN, WESTERN & NORTHERN REGION**

Year	State of Telangana		Southern Region		Western Region		Northern Region	
	Peak Load (MW)	Energy Requirement (MKWH)	Peak Load (MW)	Energy Requirement (MKWH)	Peak Load (MW)	Energy Requirement (MKWH)	Peak Load (MW)	Energy Requirement (MKWH)
2011-12	14721	89032	40367	253443	47108	294860	48137	294841
2016-17	21845	132118	60433	380068	64349	409805	66583	411513
2021-22	28216	175590	80485	511659	84778	550022	89913	556768

*Source: 17<sup>th</sup>, Electric Power supply*

**(IV) Imports v/s Indigenous production**

Domestic coal is proposed to be sourced from the SCCL mines and imported coal will be sourced from Indonesia or other available good quality imported coal.

**(V) Employment Generation (Direct & Indirect) due to the Project**

During construction period the requirement of man power will be about 2000 to 3000. In the operation phase, 300 persons will get direct employment in various

services and about 1000 persons will get indirect employment.

The plant management will be responsible for overall performance of the unit. The management will be supported by a team of highly skilled persons having varied expertise and experience, which will function individually as well as collectively for overall performance of the plant.

### **3. PROJECT DESCRIPTION**

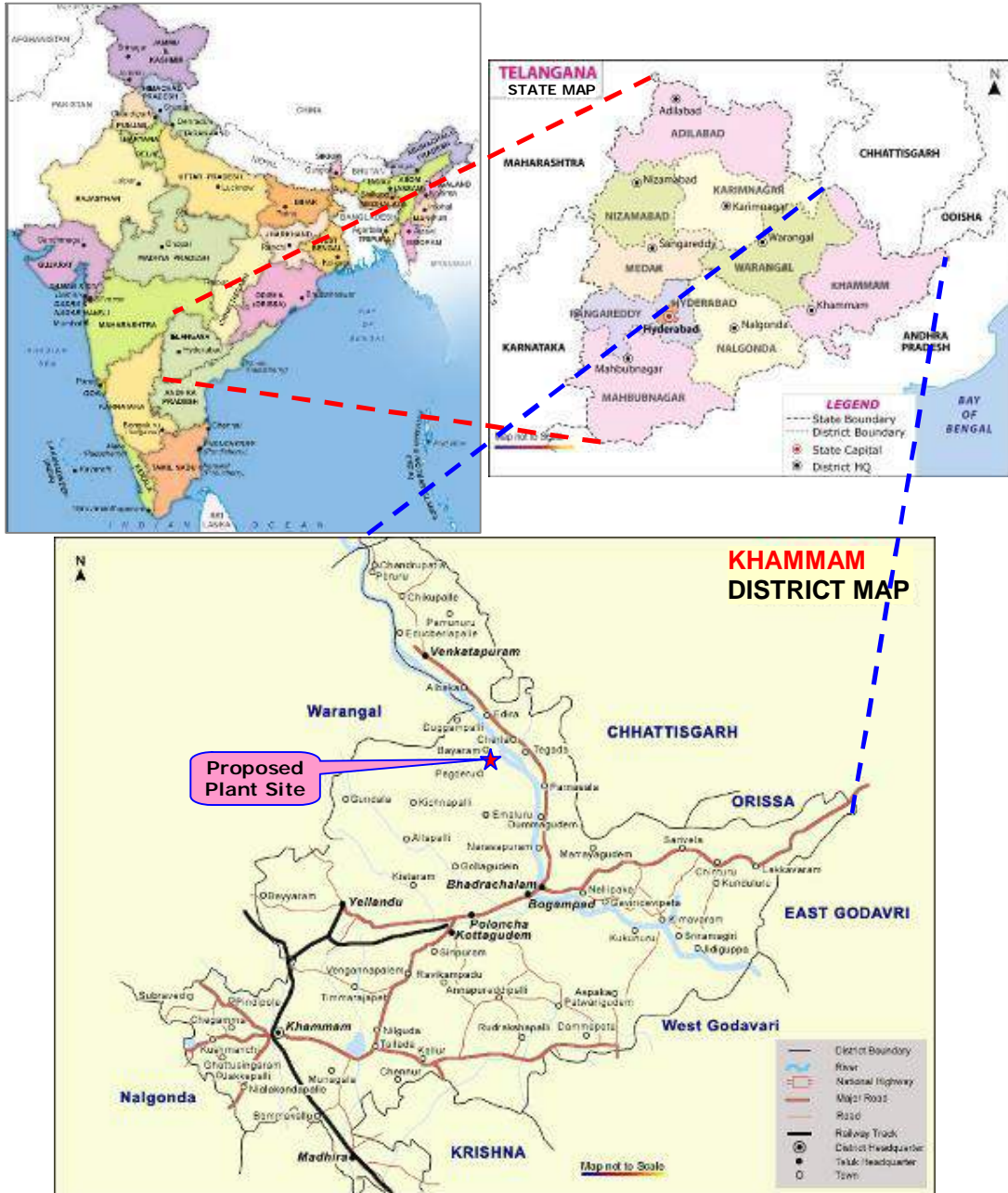
**(i) Type of project including interlinked and interdependent projects, if any.**

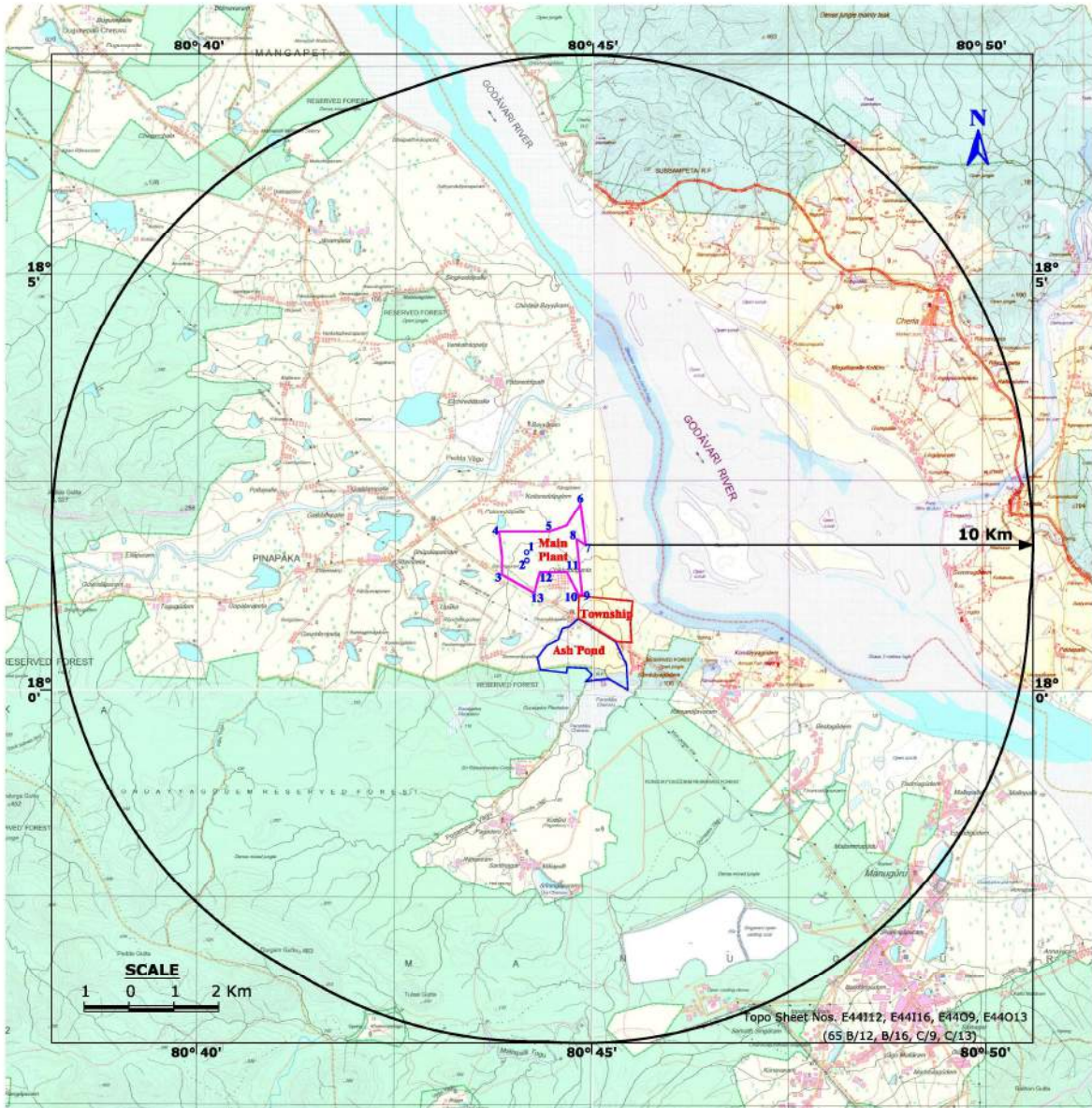
4X 270 MW Coal fired thermal power plant

#### **Location**

The proposed thermal power plant 4 x 270 MW Coal based Thermal Power plant is proposed near Ramanujavaram village, Manuguru mandal, Khammam district, Telangana state. The site is situated in Latitude 18<sup>0</sup> 1' 26.59" N and Longitude 80<sup>0</sup> 43' 48"E. The index map of the project site is shown in **Figure-1** and a map showing area 10 km around the project site is shown in **Figure-2**.

**FIGURE-1**  
**INDEX MAP SHOWING THE PROJECT SITE**





**(ii) Details of alternate sites considered and the basis of selecting the proposed site, particularly the environmental considerations gone into should be highlighted.**

Three alternative sites for the proposed thermal power project are identified based on siting criteria of MoEF and following considerations:

- i. Availability of suitable and adequate land
- ii. Distance from reliable source of water
- iii. Road and railway access
- iv. Availability of infrastructural facilities
- v. Environmental aspects

The details of three alternative sites for the proposed 4X270 MW power plant are as follows:

**Site 1: Near Ramanujavaram village, Manuguru mandal**

**• Location and approach**

4 x 270 MW Coal based Thermal Power plant is proposed near Ramanujavaram village, Manuguru mandal, Khammam District, Telangana State. The site is situated in Latitude 18<sup>0</sup>1'26.59" N and Longitude 80<sup>0</sup>43'48"E. Site is located at a distance of 10 Km from Manuguru Mandal. SH-12/NH-221 (Manuguru-Eturunagaram Highway) is at distance of 37.0 km in SSE direction from the proposed site. Manuguru Railway Station is located at 15 km distance in SSE direction. The topo map of the proposed site is shown in **Figure-3**.

**• Land**

Sufficient land is available. The land identified for the proposed project is 1183.24 Acres (437.21 acres for main plant, 428.17 acres for ash dyke, 145 acres for green belt development and 100 acres for township, 72.86Acres is proposed for establishing solar power plant). The land proposed for plant site is plain with a general elevation of about 72.859 m MSL. Government lands and Patta Lands will be converted to industrial use.

**• Water**

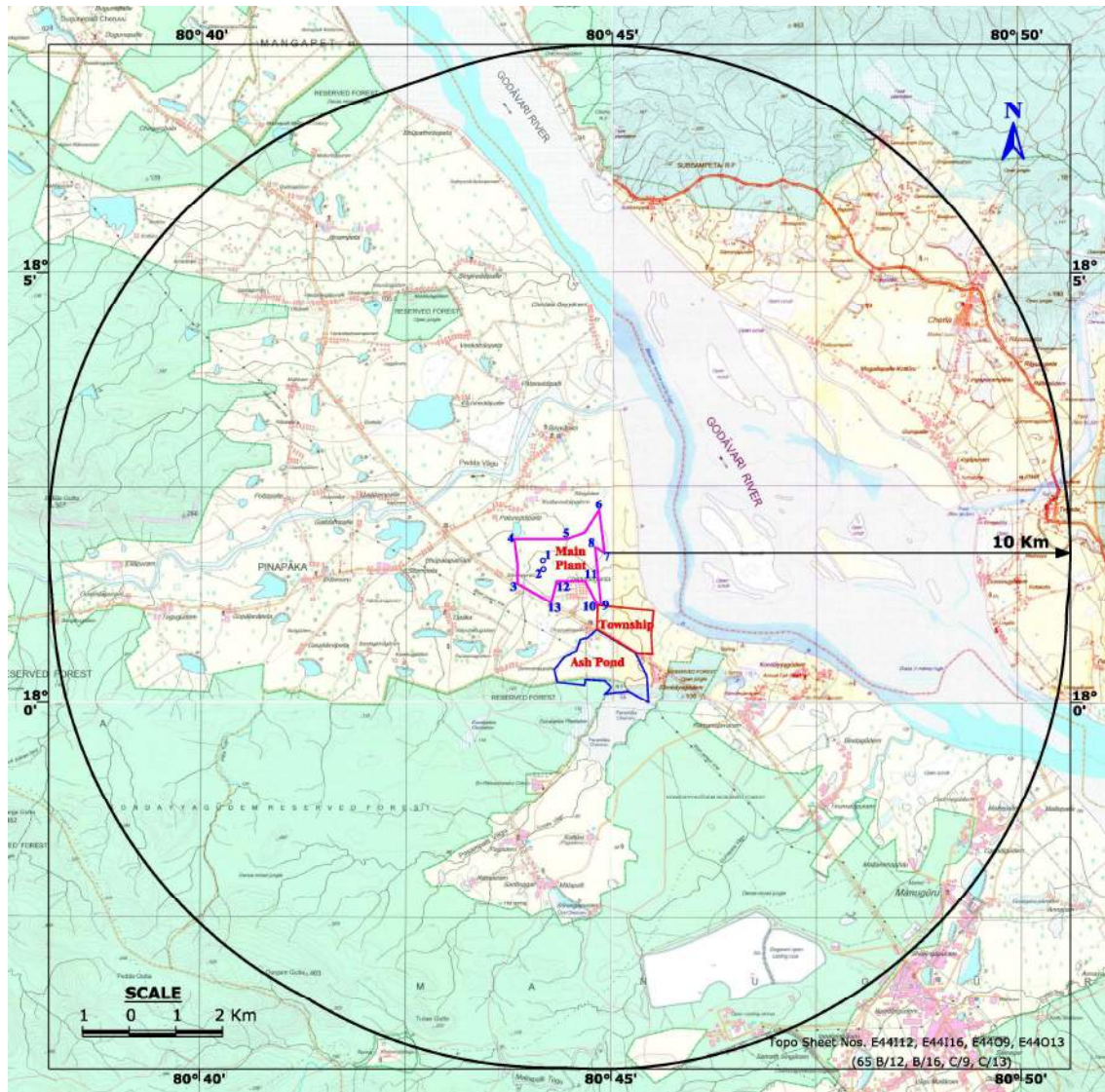
The water requirement for the proposed TSGENCO 4X270 MW sub critical power plant near Manuguru will be around 4155 m<sup>3</sup>/hr and shall be drawn from Godavari river at distance of approx. 3.0 km.

**• Environmental Aspect**

The site is generally in conformity to the siting criteria of MoEF. Government lands and Patta Lands will be converted to industrial use. Kinnerasani wildlife sanctuary is located at 10.8 km in south west direction. No archaeological monument of national importance exists within 10 km study area from the project site. No forest land in the proposed site. However the site is surrounded by Cherla RF, Subbampet RF, Kondayyagudem RF, Kalavanagaram RF, Janapet RF near Gaddigudem village, RF near Venkatrapeta.



**FIGURE-3**  
**STUDY AREA OF PROPOSED ALTERNATIVE SITE-1**



## **Site 2: Site near Punukulachilka village at Kothagudem mandal**

### **Location and approach**

The proposed alternative site near Punukulachilka village, Kothagudem mandal, Khammam District, Telangana State. The site is situated in Latitude 17°44'41.53" N and Longitude 80°33'44.84"E. Site is located at a distance of 34.0 Km from Bhadrachalam town and 20.4 km from Kothagudem town. SH-12/NH-221 is at distance of 20.1 km in SSE direction from the proposed site. Gajulagudem railway station is located at 16.9 km distance in SE direction. The topo map of the proposed Alternative site is shown in **Figure-4**.

### **Land**

Land of about 1200 acres has been identified as the alternative site for the proposed project. The proposed land is slightly undulated with general site elevation of about 100-120 MSL. The present land use of the site is forest land.

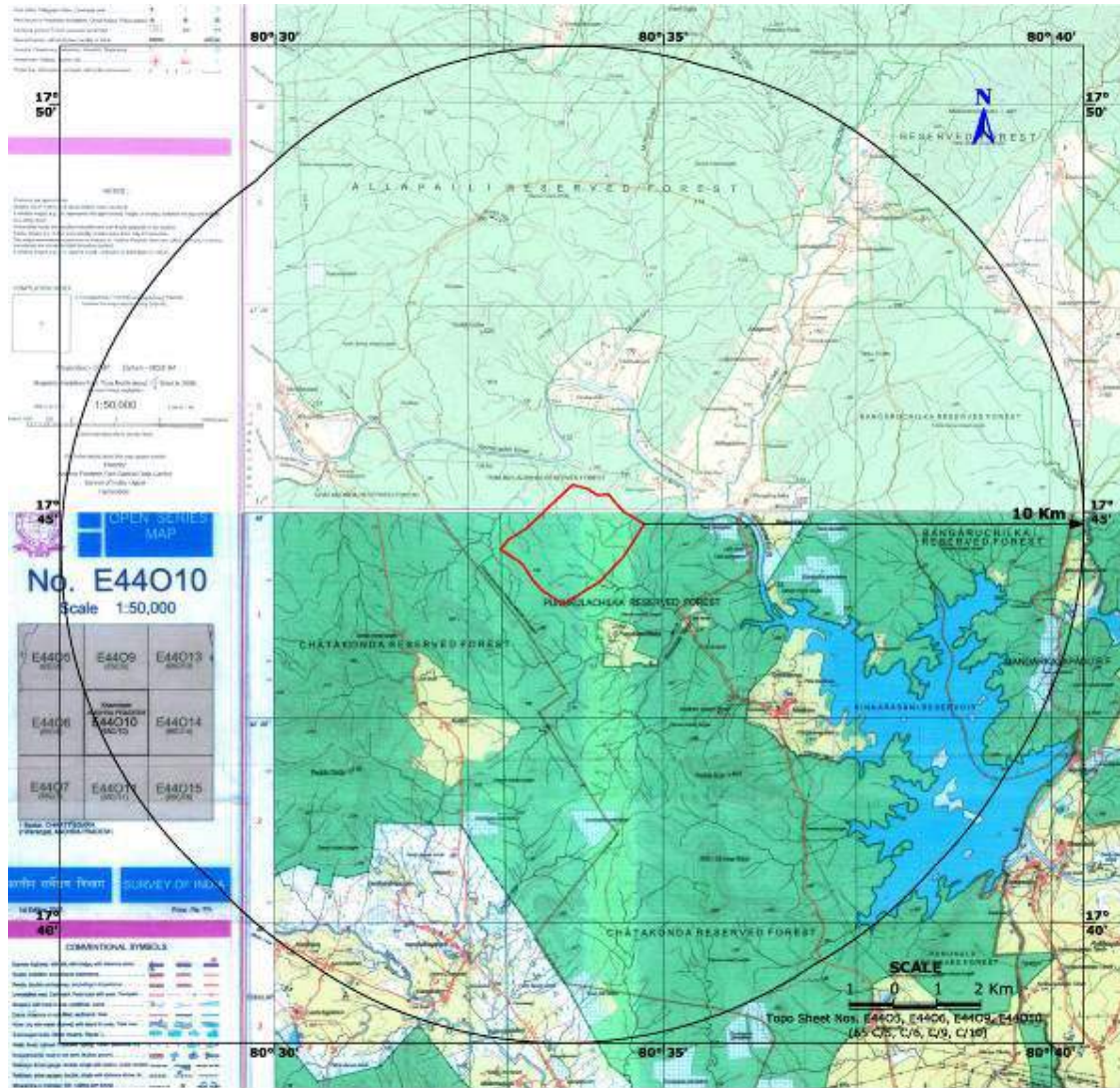
- **Water**

The water requirement for the proposed TSGENCO 4X270 MW sub critical power plant shall be drawn from Kinnerasani river at distance of 0.6 km in N direction.

- **Environmental Aspect**

The land use is forest land and falls within the eco sensitive area of Kinnerasani wildlife sanctuary. No archaeological monument of national importance exists within 10 km study area from the project site. However the site is within the Punukulachilka RF, Allapalli RF (0.7 km, NNW), Bangaruchilka RF (3.0 km, ENE), Mandarkalapadu RF (7.5 km, ESE), Chatakonda RF (0.8 km, SW).

**FIGURE-4**  
**STUDY AREA OF PROPOSED ALTERNATIVE SITE-2**



### **Site 3: Pandurangapuram village at Polvancha mandal**

#### **Location and approach**

The proposed alternative site near Panurangapuram village, Kothagudem mandal, Khammam District, Telangana State. The site is situated in Latitude 17°39'14.79" N and Longitude 80°43'35.39"E. Site is located at a distance of 15.5 Km from Bhadrachalam town and 14.2 km from Kothagudem town. NH-221 is at distance of 5.4 km in SSE direction from the proposed site. Gajulagudem railway station is located at 7.3 km distance in SW direction. The topo map of the proposed Alternative site is shown in **Figure-5**.

#### **Land**

Land of about 1200 acres has been identified as the alternative site for the proposed project. The proposed land is plain with general site elevation of about 80-100 MSL. The present land use of the site is double crop agricultural land.

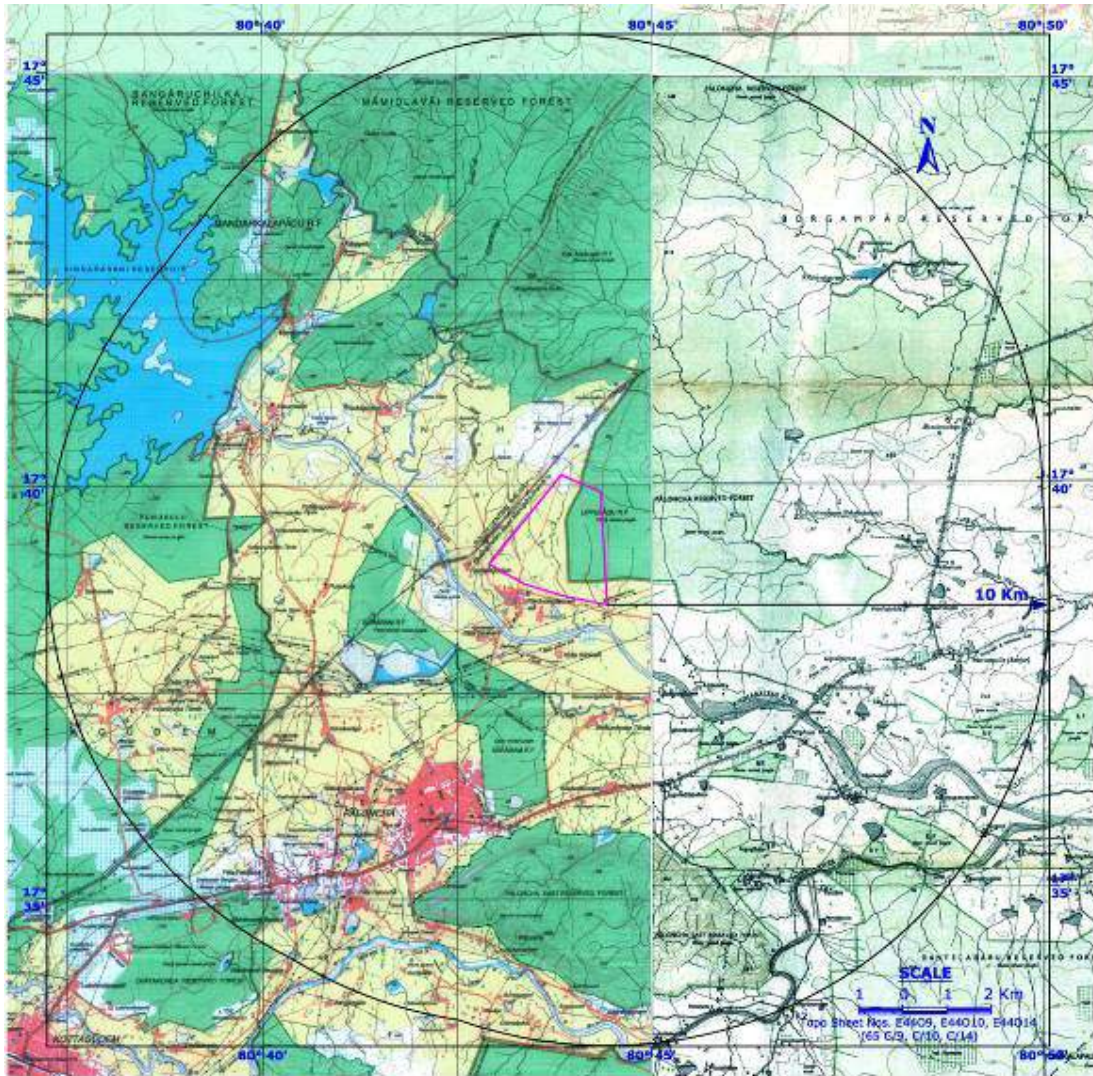
- **Water**

The water requirement for the proposed TSGENCO 4X270 MW sub critical power plant shall be drawn from Kinnerasani river at distance of 0.5 km in S direction.

- **Environmental Aspect**

The land use is double crop agricultural and flat land. Kinnerasani wildlife sanctuary is located at 2.5 km in south west direction. No archaeological monument of national importance exists within 10 km study area from the project site. No forest land in the proposed site. However the site is within the Uppusagu RF, Borgampad RF (3.0 km, NNE), RF near Jikalagudem (7.0 km, ESE), Dantelabaru RF (7.7 km, SE), Paloncha East RF (4.9 km, S), Suraram RF (1.6 km, W), Chatakonda RF (5.1 km, SSW), Pudukulu RF (5.2 km, WNW), Mandarkala padu RF (3.2 km, NW), Mamidlavai RF (3.8 km, NNW), Kistasagar RF (2.2 km, N).

**FIGURE-5**  
**STUDY AREA OF PROPOSED ALTERNATIVE SITE-3**



**TABLE-3**  
**COMPARISON OF ALTERNATIVES**

Sr. No.	Description	Site-I (Manuguru)	Site-II (Punukulachilka)	Site-III (Pandurangapuram)
1.	Land	<ul style="list-style-type: none"> <li>➤ Sufficient land is available.</li> <li>➤ The land identified for the proposed project is 1183.24 acres. 1110.38 acres (449.35 ha) is for thermal power plant. The additional land of 72.86 acres is proposed for establishing the solar power plant</li> <li>➤ The land proposed for plant site is plain with a general elevation of about 72.859M above MSL.</li> <li>➤ Government lands and Patta Lands will be converted to industrial use.</li> <li>➤ No forest land is involved</li> </ul>	<ul style="list-style-type: none"> <li>➤ Land of about 1200 acres has been identified for the proposed project.</li> <li>➤ The proposed land undulated with general site elevation of about 100-120 MSL.</li> <li>➤ The present land use of the site is forest land.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Land of about 1200 acres has been identified for the proposed project,</li> <li>➤ The land is flat with general elevation of about 80 -100 MSL,</li> <li>➤ The present land use of site is double crop agricultural land.</li> </ul>
2.	Water	Water will be sourced from Godavari river. In-principle commitment available for 99,720 KLD (4155 m <sup>3</sup> /hr) will be met from Godavari river.	➤ Kinnersani river (0.6 km, N)	➤ Kinnersani river (0.5 km, S)
3	National Parks	NIL	Nil	Nil
4	Wildlife Sanctuaries	Kinnerasani wildlife sanctuary (10.8 km, SW)	Within the Eco-sensitive zone of Kinnerasani wild life sanctuary	Kinnerasani wild life sanctuary (2.5 km, NW)
5	Monuments	NIL	Nil	Nil
6	Hills / Valleys	NIL	Nil	One hill is existing in the study area
7	Nearest National Highway/ State Highway	SH-12/NH-221 (37.0 Km, SSE)	SH-12/NH-221 (20.1 Km, SSE)	NH-221 (5.4 Km, SSE)
8	Nearest railway station	Manuguru railway station (15 km, SSE)	Gajulagudem railway station (16.9 km, SE)	Gajulagudem railway station (7.3 km, SW)
9	Nearest Airport	Rajahmundry - 154 Km, SE; Vijayawada -165 Km, S Hyderabad Airport – 257 Km, SW	Rajahmundry- 150 km, SE Vijayawada -136 Km, SSE Hyderabad -230 km, WSW	Rajahmundry -130 km, SE Vijayawada -124 Km, S Hyderabad - 243 km, WSW
10	Nearest town	Bhadrachalam Town (50 Km) and Kothagudam Town (65 Km) – South East	Bhadrachalam Town (34 km, ESE) Kothagudam town (20.4 km, SSE)	Bhadrachalam Town (15.5 km, E), Kothagudam town (14.2 km, SW)

Sr. No.	Description	Site-I (Manuguru)	Site-II (Punukulachilka)	
11	Nearest water bodies(In-land, coastal, marine or under-ground waters)	Godavari River (0.8 km, E)	Godavari river (30.0 km, ENE) Kinnerasani river (0.6 km, ENE) Kinnerasani reservoir (3.1 km, ESE) Mureru river (8.8 km, SSW)	➤ God ➤ Kin ➤ Mur ➤ Kinna
12	Nearest forest	<ul style="list-style-type: none"> <li>➤ Cherla RF (8.2 km, NE)</li> <li>➤ Subbampet RF (6.7 km, NE)</li> <li>➤ Kondayyagudem RF (1.8 km, S)</li> <li>➤ Kalavanagaram RF (7.9 km, W)</li> <li>➤ Janapet RF near Gaddigudem village (5.5 km, WNW)</li> <li>➤ RF near Venkatraopeta (4.6 km, NNW)</li> </ul>	<ul style="list-style-type: none"> <li>➤ The site is within the Punukulachilka RF,</li> <li>➤ Allapalli RF (0.7 km, NNW),</li> <li>➤ Bangaruchilka RF (3.0 km, ENE),</li> <li>➤ Mandarkalapadu RF (7.5 km, ESE),</li> <li>➤ Chatakinda RF (7.5 km, SW).</li> </ul>	<ul style="list-style-type: none"> <li>➤ The</li> <li>➤ Upp</li> <li>➤ Bor</li> <li>➤ RF</li> <li>➤ Dar</li> <li>➤ Pal</li> <li>➤ Sur</li> <li>➤ Cha</li> <li>➤ Pur</li> <li>➤ Ma</li> <li>➤ Ma</li> <li>➤ Kis</li> </ul>
13	Conclusion	The site is suitable for locating 4 X 270 MW coal based plant and hence selected.	The site falls within Eco-sensitive zone of Kinnerasani wild life sanctuary and includes reserve forest area	The sit and v Kinner

**(iii) Size or magnitude of operation.**

4X 270 MW Coal fired thermal power plant.

**(iv) Project description with process details**

The Coal based thermal power plant to be set up near Ramanujavaram village, Manuguru Mandal will use domestic coal is proposed to be sourced from the SCCL mines and imported coal will be sourced from Indonesia or other available good quality imported coal.

Coal will be fired in a high pressure boiler to produce steam at about 155 kg/cm<sup>2</sup>, 540°C, which will be fed to steam turbine which will drive the generator connected rigidly to it. The power output from the generator through appropriate electrical system will be fed to the grid for distribution to consumer.

Exhaust steam from the turbine will be cooled in the water cooled surface condenser and the condensate water will be recycled in the power cycle involving boiler, turbine and condenser as mentioned. Water for cooling purposes is required in the condenser, heat exchanger of auxiliary systems of boiler, turbine and generator etc. In addition water is required for bottom ash handling system, dust suppression system of coal handling, firefighting systems, drinking (in plant and colony), make up for the power cycle etc. Hot water outlet of condenser and other heat exchangers will be cooled in suitable cooling tower and reused in the system. Similarly water used in other systems mentioned above will be recycled to the extent possible after suitable treatment. However, make-up will be required to be added for replenishing the loss due to evaporation, blow down and other consumptive use. To minimize the make up, effluent water from different process in the power station will be chemically treated so as to make it suitable for use in the development of green belt, sanitation, dust suppression etc.

About 4155 m<sup>3</sup>/hr of water will be required for 4x270 MW power plant planned at the location.

Fly Ash produced after burning coal in the boiler will be collected in ESP and conveyed pneumatically to storage silo located within the plant premises. Total ash generated in the power plant will be collected in dry form and sent for further utilization. In case of disposal to ash pond/dyke, it will be High Concentrated Slurry Disposal (HCSD).

**SELECTION OF PROCESS**

The 1080 MW power would be generated by a configuration of 4 x 270 MW units, with 1 boiler and 1 steam turbine for each unit.

**Main Plant**

**Steam Generator & Auxiliaries**

The steam generating unit is sized for 865 TPH. Steam flow (minimum) at 155 kg/cm<sup>2</sup> (g) minimum super heater outlet steam pressure and 540 (±5)°C steam temperature re-heated steam flow at RH out let 37.31 kg/cm<sup>2</sup> (g) pressure 540±5°C temperature at MCR with specified coal. This will ensure adequate margin over the requirement of turbine at 100% MCR to cater for:



- Auxiliary steam requirement for atomization of fuel oil, soot blowing operation, fuel oil system.
- Derating of the steam generating units with ageing, covering WVVO flow of steam turbine.

The steam generator will be semi-outdoor, natural circulation, radiant reheat, dry bottom, balanced draft, single drum type unit designed for firing pulverized coal as prime fuel. The complete furnace section will be of welded membrane wall construction, arranged as a pressure tight envelop with requisite number of tilting tangential burners (in case of corner fired) or fixed, horizontal burners (in case of front/rear end fired).

Each steam generator will be designated to operate with "the HP heaters out of service" condition (resulting in lower feed water temperature at Economizer inlet) and deliver steam to meet the turbo generator requirement at 100% MCR. The steam generator will be suitable for operation with 60% capacity HP-LP turbine bypass system envisaged for turbo-generator.

All the pressure parts of main boiler section will be in accordance with the latest applicable IBR. The material used for pressure parts will be in accordance with the codes and standards.

The complete furnace section will be of welded wall type arranged as a gas and pressure tight envelop circulation system will be complete with necessary number of unheated down corners, supply and riser piping.

Superheated steam section will consist horizontal LT super heater section, pendent radiant platen super heater and final pendent super heater. Adequately sized de-super heater will be provided in between LTSH and platen super heater for control of final super heater steam temperature.

Re-heater will be arranged in one section in between radiant super heater and final super heater section. Reheater- desuperheater are envisaged in emergency at inlet to reheater for use during any abnormal emergency conditions.

Economizer will be arranged in between LTSH section and regenerative air heater. Each steam generator will be designed for continuous operation while burning best coal (100% imported coal) and worst coal (50% imported coal+ 50% Indian coal) and with coal burning along with oil support for flame stabilization at low loads. Adequate number of coal burners at various elevations shall be provided. Steam generator will be designed so as to not require oil support for flame stabilization beyond 35% BMCR when firing worst coal and to minimize the use of fuel oil. The steam generator and its auxiliaries will be sized suitably such that the unit could operate in synchronism with interconnected electrical network at frequency which may go as low as 47.5 Hz.

All provisions in the steam generator design and fuel firing system will be made to reduce the NOx emission from steam generator which will not be more than 260 gm/gigajoule at ESP outlet at 6% oxygen.

### **Electrostatic Precipitator**

High Efficiency Electrostatic Precipitators would be installed to control the emission of ash particles. The Precipitators would be designed to limit the particulate emission to

50 mg/Nm<sup>3</sup> under all design conditions. The ESP would have an efficiency of around 99.9%.

### **Chimney**

To facilitate wider dispersion of emission, two twin flue chimneys of 275 m height are envisaged. It would be provided with access to personnel for regular monitoring of the stack emissions.

### **Condenser cooling water system**

Closed cycle condenser cooling is envisaged for cooling water system with NDCT type cooling towers. Make up water will be pumped to the circulating water (CW) sump through two (2) Nos. 100% capacity buried steel pipes. There will be two CW sumps, one for unit 1 & 2 and other for unit 3 & 4. Each CW sump will be provided with 5 (4W+1S) CW pump sets for pumping water to condenser of each unit and will discharge to Natural draft cooling towers having cooling range of 10<sup>0</sup>C maintaining a cycle of concentration of 5. The recooled water (at 32<sup>0</sup>C) from cooling towers will be channeled to CW sump. Suitable arrangement for side stream filters, chlorine dosing to curb organic growth and chemical dosing for maintaining cycle of concentration (COC) of 5 will be made.

### **Coal Handling System**

One independent coal handling plant consisting of two (2) parallel streams (1W+1S) to operate at rated capacity of 1617 TPH each, are envisaged for the proposed CHP to cater to the coal requirements of 4 x 270 MW units.

#### **(vi) Raw material required along with estimated quantity likely source, marketing area of final products, mode of transport of raw material and finished product.**

Coal has been considered as the primary fuel for the proposed 4 x 270 MW power plant. Fuel Oil will be secondary fuel during start-up and during light load operation.

SCCL mines are nearest to site for domestic coal. Annual coal requirement for the proposed plant will be around 4.07 MTPA (50% domestic coal + 50 % imported coal) and 3.24 MTPA (100% imported coal) per annum based on the following parameters:

- i. Coal GCV of 4550 Kcal/kg for 50% domestic coal + 50% imported coal and coal of GCV of 5700 Kcal/kg for 100% imported coal.
- ii. Station Heat Rate of plant 2300 Kcal/kwh
- iii. PLF 85%

Maximum daily inflow of coal for base load operation to the 4x270 MW plant with performance coal will be 545.93 TPH (50% domestic coal + 50% imported coal) and 435.79 TPH for imported coal. Fuel oil of 4020 KL/Year for startup and flame stabilization. Fuel oil will be brought to site by rail.

#### **(v) Availability of water its source, Energy/power requirement and source should be given.**

- **Water Supply & Sewerage**

Water requirement will be drawn from the Godavari river. The makeup water shall be brought to the plant area by intake structure, pump house and buried piping. Total water requirement will be about 4155 m<sup>3</sup>/hr.

- **Power Evacuation**

TSTRANCSO grid system of Telangana for transmission of power at 400 KV. The power of the proposed generating unit will be evacuated at 400 KV from new switchyard through 4 Nos. 400 KV transmission lines connected to the power grid sub-station.

- **Quantity of Wastes to be generated and Scheme for their Management/Disposal**

All efforts will be made to utilize fly ash for use in various applications/uses. Unused flyash and bottom ash will be disposed off safely in the ash disposal area. After the ash pond is abandoned, it would be reclaimed by providing earth cover and there after undertaking tree plantation.

#### **4. SITE ANALYSIS**

##### **Infrastructure**

For establishment and successful operation of coal thermal power plant, it is imperative to ensure availability of the following infrastructure:

- No structure of archaeological importance;
- Rail/ road accessibility;
- Availability of water and proximity to source;
- Availability of land;
- No populated city in vicinity;
- Power evacuation plan; and
- Environmental consideration.

##### **(i) Connectivity**

The proposed power plant is located at distance of 15 km in SSE direction from the Manuguru railway station. The site is well connected to Hyderabad as well as Vijayawada by road through SH-12/NH-221 (Manuguru-Eturunagaram Highway).

##### **(ii) Land details**

The land identified for the proposed project is 1183.24 acres (437.21 acres for main plant, 428.17 acres for ash dyke and 100 acres for township and 72.86Acres is for proposed for establishing solar power plant.). The land proposed for plant site is plain with a general elevation of about 72.859M above MSL. The present land use of plant site is Government lands and Patta Lands which will be converted to industrial use.

Ash utilization will be implemented to optimize the land requirement for Ash dump. Additional Area outside the power plant boundary such as corridor for raw water pipe & Coal conveyer system is required.

Topographically the study area is plain with local undulations. The topography of the site is fairly flat and requires minimum filling. No filling material from outside is envisaged for the plant construction.

**(iii) Existing land use pattern, shortest distances from the periphery of the project to periphery of the forests, water bodies.**

The entire project land is government assigned lands. There are no water body except two nallas in the project area. Information on forests and water bodies nearer to the proposed project site is given below:

**Water Bodies:**

There are four water bodies, namely, Godavari River, Perantala chervvu, Peddavagu and Tal peru river within the study area of 10-km radius from the project boundary.

**Forests:**

The Cherla RF, Subbampet RF, Kondayyagudem RF, Kalavanagaram RF, Janapet RF near Gaddigudem village and RF near Venkatraopeta are the only forest blocks and Kinnerasani wildlife sanctuary within 10-km radius from the project boundary.

There are no sanctuaries, biosphere reserves or tiger or elephant reserves or within 10 km radius from the proposed plant boundary.

**(iv) Soil classification**

The area being located on the banks of river Godavari is comprised of a top cover of recently formed alluvium. The alluvium in the area is made of clay, silt and sand. The interior plain lands are covered by soils made of sandy loam.

**(v) Climatic data from secondary source**

The meteorological data of the site is given in the **Table-3**

**TABLE-3**  
**METEOROLOGICAL DATA**

Annual mean ambient temperature	Max: 44.8 <sup>0</sup> c Min: 13.0 <sup>0</sup> c
Relative humidity	Max: 82% Min: 31%
Wind speed	5 km/hr
Rainfall	Avg: 1050.6 mm

**5. PLANNING BRIEF**

**(i) Planning concept (type of industries, facilities transportation etc). Town and country planning/development authority classification**

There are no other projects in the 10-km radius of the project. The project area falls within the region which is well connected by road and rail to Bhadrachalam Town (50 Km) and Kothagudam Town (65 Km) in South East direction.

(ii) **Population Projection:** The distribution of population in 10 km around the project site is shown

The study area falls under Manuguru mandal of Khammam district. As per 2011 census the study area consists of 42,766 persons inhabited in the study area of 10 km radial distance from the periphery of the port. The distribution of population in the study area is given in **Table-4**.

**TABLE-4**  
**DISTRIBUTION OF POPULATION IN THE STUDY AREA**

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
No. of Households	4904	6049	23184	34137
Male Population	8945	11066	44228	64239
Female Population	9968	11275	44829	66072
Total Population	18913	22341	89057	130311
Male Population (0-6 years)	958	1142	4274	6374
Female Population (0-6 years)	906	1125	4048	6079
Total Population (0-6 years)	1864	2267	8322	12453
% of 0-6 years population	9.86	10.15	9.34	9.56
Average Household Size	3.86	3.69	3.84	3.82
% of males to the total population	47.30	49.53	49.66	49.30
% of females to the total population	52.70	50.47	50.34	50.70
Sex Ratio (no of females per 1000 males)	1114	1019	1014	1029
Density	121	158	682	305
land	<b>15605</b>	<b>14107</b>	<b>13054</b>	<b>42766</b>

*Source: District Primary Census Statistics of Khammam District of Telangana -2011*

➤ **Average Household Size**

The study area had an average family size of 4 persons per household in 2011. This is moderate family size and is in comparison with the other parts of the District.

➤ **Sex Ratio**

The configuration of male and female indicates that the males constitute to about 49.30% and 50.70% females to of the total population.

Social Structure

In the study area about 28.33% population belong to Scheduled Tribes (ST) and 15.46% Scheduled Castes (SC). The distribution of population in the study area by social structure is shown in **Table-5**.

**TABLE-5**  
**DISTRIBUTION OF POPULATION BY SOCIAL STRUCTURE**

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Schedule caste	2547	3285	14320	20152
% To the total population	13.47	14.70	16.08	15.46
Schedule Tribes	5344	7955	23618	36917
% To the total population	28.26	35.61	26.52	28.33
Total SC and ST population	7891	11240	37938	57069
% To total population	41.72	50.31	42.60	43.79
Total population	18913	22341	89057	130311

*Source: District Primary Census Statistics of Khammam District of Telangana -2011*

### Literacy Levels

The analysis of the literacy levels in the study area reveals an average literacy rate of 61.53% as per 2011 census data. The distribution of literates and literacy rates in the study area is given in **Table-6**.

The male literacy i.e. the percentage of literate males to the total males of the study area works out to be 33.34% The female literacy rate, which is an important indicator for social change, is observed to be 28.19% in the study area.

**TABLE-6**  
**DISTRIBUTION OF LITERATE AND LITERACY RATES**

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Male Population	8945	11066	44228	64239
Female Population	9968	11275	44829	66072
Total Population	18913	22341	89057	130311
Male Population (0-6 years)	958	1142	4274	6374
Female Population (0-6 years)	906	1125	4048	6079
Total Population (0-6 years)	1864	2267	8322	12453
Male literates	5547	6650	31245	43442
Female literates	5105	5192	26436	36733
Total literates	10652	11842	57681	80175
Male literacy rate (%)	52.07	56.16	54.17	54.18
Female literacy rate (%)	47.93	43.84	45.83	45.82
Average Male Literacy to the total population (%)	29.33	29.77	35.08	33.34
Average female Literacy to the total population (%)	26.99	23.24	29.68	28.19
Total Literacy rate (%)	56.32	53.01	64.77	61.53

*Source: District Primary Census Statistics of Khammam District of Telangana -2011*

### Occupational Structure

The occupational structure of residents in the study area is studied with reference to main workers, marginal workers and non-workers. The main workers include 4 categories of workers defined by the Census Department consisting of cultivators, agricultural laborers, those engaged in manufacturing, processing and repairs in household industry; and others including those engaged in household industry, construction, trade and commerce, transport and communication and all other services.

The marginal workers are those workers engaged in some work for a period of less than six months during the reference year prior to the census survey. The non-workers include those engaged in unpaid household duties, students, retired persons, dependents, beggars, vagrants etc.; institutional inmates or all other non-workers who do not fall under the above categories.

As per 2011 census records altogether the main workers works out to be 87.78% of the total population. The marginal workers and non-workers constitute to 12.22 % and 53.58 % of the total population respectively. The distribution of workers by occupation indicates that the non-workers are the predominant population. The occupational structure of the study area is given in **Table-7**.

**TABLE-7**  
**OCCUPATIONAL STRUCTURE**

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Total Population	18913	22341	89057	130311
Total workers	10212	12753	37527	60492
Work participation rate (%)	53.99	57.08	42.14	46.42

Particulars	0-3 km	3-7 km	7-10 km	0-10 km
Total main workers	9276	10783	33043	53102
% of main workers to total workers	90.83	84.55	88.05	87.78
Marginal workers	936	1970	4484	7390
% of marginal workers to total workers	9.17	15.45	11.95	12.22
Non-workers	8701	9588	51530	69819
% of non-workers to total population	46.01	42.92	57.86	53.58

Source: District Primary Census Statistics of Khammam District of Telangana -2011

## (ii) Landuse Planning

Total requirement of land for the thermal power project is 1110.38acres. 33% of the thermal project area is for raising plantation including peripheral green belt development using native plant species in consultation with the local Forest officials. 72.86 acres is proposed for establishing solar power plant. A tentative break-up of land is given below in **Table-8**. The plant layout is given in **Annexure-II**.

**TABLE-8**  
**PROJECT AREA BREAK-UP**

Sr. No.	Description	Area (in Acres) (4x 270 MW)
1	Main Power block & Auxillaries	42.8
2	Switch yard	23.5
3	Raw Water reservoir	91.2
4	Water facilities and cooling tower	60.1
5	Coal Storage & Handling facilites	165.44
6	Others & Utilites	54.17
	<b>Total main plant area</b>	<b>437.21</b>
7	Ash dyke	428.17
8	Town ship	100
9	Green belt	145
	<b>Total land for thermal power plant</b>	<b>1110.38</b>
10	Solar power plant	72.86
	<b>Total</b>	<b>1183.24</b>

### Assessment of infrastructure demand (physical & social)

#### Amenities/Facilities.

Facilities will be created at the project site for –

- Routine maintenance of all equipment;
- Incidental minor repair / replacement of sub-assemblies and components of CHP equipment, coal washery equipment and accessories, water pumps and pumping installations;
- Day-to-day repair and maintenance of plant and machinery; and
- Inspection and scheduling of major repairs from outside agencies.

#### Service Buildings

Office buildings, sub-station, statutory buildings such as first aid centre, rest shelter, canteen etc. of appropriate size will be provided.

## **Residential Buildings**

The Bachelor's accommodation and staff quarters will be located in the project area at a suitable place.

## **Roads**

Approach road to project site will be provided.

## **6. PROPOSED INFRASTRUCTURE**

### **(i) Industrial area (processing area)**

- Power Block;
- Switchyard;
- Sea water in-take and discharge pipe corridor;
- Cooling tower, pump house and piping;
- Water storage and treatment facilities;
- Coal conveyor corridor from port to plant;
- Coal stock piles (crushed and uncrushed);
- Other BoP facilities (CHP, AHP, Compressors, DG set, Effluent, etc.);
- Pipe / cable corridors, inter building clearances, pathways, etc;
- Roads and Drains;
- Equipment lay down and open storage area;
- Non-plant buildings;
- Access road; and
- Emergency Ash Pond.

### **(ii) Green belt**

33% of the total project area will be used for Plantation and Greenery development).

### **(iii) Social infrastructure**

Canteen, Rest shelter / room, Recreation Room will be provided.

### **(iv) Connectivity**

The proposed project site is located at a distance of 10 Km from Manuguru Mandal. SH-12/NH-221 (37.0 Km, SSE) Manuguru-Eturunagaram Highway branches off to the power station site. Manuguru Railway Station is located at 15 km distance in SSE direction.

### **(v) Drinking Water Management (Source & Supply of water)**

The potable water requirements for plant and colony will be met from dual media filter (DMF) system. The colony & Plant potable water requirement shall be 5 m<sup>3</sup>/hr.

### **(vi) Sewerage System**

Domestic sewage will be treated and disposed of through STP. The treated sewage water will be used for green belt development.



**(vii) Industrial Waste Management**

**a) Industrial Effluent**

The plant effluent after treatment will be reused to maximum possible extent. All treated effluents will be brought to the guard pond for dilution and will be used for horticulture and green belt development.

**b) Domestic Effluent**

STP will be provided. Sludge after digestion will be used as manure.

**(viii) Solid Waste Management**

**a. Total ash**

Dust generation in ash pond will be controlled by maintaining the area in wet conditions.

**b. Municipal waste**

The municipal waste which will be generated, will be composted and used as manure.

**(ix) Power Requirement & Supply/Source**

Total power requirement will be sourced from proposed TPP.

**7. REHABILITATION AND RESETTLEMENT (R & R) PLAN**

There are no homesteads. Hence, no resettlement is involved. However, Compensation will be paid for land losers as per the R&R policy.

**8. PROJECT SCHEDULE & COST ESTIMATES**

**(i) Likely date of Start of Construction and likely date of Completion**

The project will be scheduled to go into commercial operation in 33 months from the zero date i.e from the date of placement of order for the boiler and turbine generator package (BTG) after the issuance of "Environmental Clearance" and "Consent to Establish".

**(ii) Estimated project cost along with analysis in terms of economic viability of the project.**

The project cost and analysis are given in **Table-9**.

**TABLE-9**  
**COST OF GENERATION**

Sr.No	Particulars	Option-1 (50% imported+50% Domestic coal)	Option-2 (100% imported)
1	Plant capacity	4X270 MW	4X270 MW
2	Auxiliary Energy consumption	9.0%	8.5%
3	Station Heat rate (kcal/kwh)	2300	2300
4	Depreciation	For first 12 years 5.28% & for balance 13 years-2.05%	For first 12 years-5.28% & for balance 13 years -2.05%
5	O&M	2.11% Escalated @ 4% every year	2.11% Escalated @ 4% every year
6	Loan repayment period	10 years	10 years
7	Interest on loan	12.50 % per annum	12.50 % per annum
8	Loan repayment	40 equal quarterly installments with 2 year moratorium	40 equal quarterly installments with 2 year moratorium
9	GCV of coal (Design)	4550 kcal/kg	5700 kcal/kg
10	Present day coal price	Rs. 3450/tonne on delivered basis with 5% annual escalation.	Rs. 5300/tonne on delivered basis with 5% annual escalation
11	GCV of support fuel	10,000 kcal/kg	10,000 kcal/kg
12	Support fuel present day	Rs. 55,000/tonnes for HFO/LDO	Rs. 55,000/tonnes for HFO/LDO
13	PLF	85%	85%
14	Return on capital employed (RoCE)	13.65%	13.65%
15	Completion schedule	33 months	33 months
16	Economic life of plant	25 years	25 years

## **9. Analysis of Proposal (Final Recommendations)**

### **Financial and Social Benefits**

The project will improve the socio-economic status of the society in the region by generating direct and indirect employment opportunities. The project will contribute additional revenue to the State & Central exchequers in the form of taxes and cess etc.

The anticipated impacts of the project are explained below:

Human settlement is expected to increase after this project gets operational. In the long term, the project will have impact on the population growth due to migration of people from outside area. Indirect employment opportunities will also add to this.

The literacy level of the project area is likely to increase as there will be influx of many educated people taking up jobs in the project, which is likely to result in establishment of better educational facilities.

The impact of the project on the civic amenities will be minimal. Health care facilities will be developed for the employees of the proposed project. These medical facilities will be extended to surrounding villages.

The project related construction activities will benefit the local populace in a number of ways such as supply of construction labourers – skilled, semi-skilled and un-skilled, tertiary sector employment and provision of goods and services for daily needs

including transport. The proposed project will provide employment to the skilled as well as un-skilled persons. The local population will be given preference depending upon their suitability to the job requirement. Besides direct employment, indirect employment opportunities will also open up. The project will have positive impact in the region. Quality of life of the people will improve, which in-turn will improve the socio-economic conditions of the area.

