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# CHAPTER- 1

## EXECUTIVE SUMMARY

The iron and steel industry in India contributes about 2% of the Gross Domestic Product (GDP) and its weight in the Index of Industrial Production (IIP) is 6.2%. The per capita consumption of steel in India is pegging at 69 kg as against an average of 214 kg of the developed countries. Our country's finished steel production is projected to grow by six to eight per cent in this fiscal, aided by spike in demand from key user industries like construction, infrastructure and automobiles and white goods. During April-September 2018, finished steel output expanded by six per cent to 53.9 million tonnes (MT), while consumption rose at an even higher pace of 7.8 per cent to reach 47.7 MT during this period. In the corresponding period of FY18, steel production had inched up by only 2.5 per cent to 50.8 MT though consumption moved up faster by 7.6 per cent to 44.2 MT.

Ratings agency CARE Ratings feels the upward trend in production and consumption is expected to continue through the rest of this fiscal. Crude steel production in FY18 reached an all-time high of 102.34 million tonnes (MT), increasing 4.5 per cent year-on-year (y-o-y). A forecast by the World Steel Association Projects Indian steel demand to grow 5.5 per cent in calendar 2018 to 92 MT and six per cent in 2019 to touch 97.5 MT.

On the assessment of steel market (considering the boom in construction sector and industrial application) and the resources available to the promoters, it has been planned by Uttam Galva Ferous Limited (UGFL) to set up an integrated steel plant with a capacity of 6.0 MTPA along with 893 MW Captive Power Plant (CPP) at Kuduthini village, Bellary District, Karnataka.

UGFL has received an in-principle approval from Government of Karnataka (GoK) to set up a six (6.0) MTPA capacity integrated steel plant along with 893 MW Captive Power Plant at Bellary District in Karnataka under the name of UGFL. GoK has accorded approval to implement the project.

The proposed project site is notified for industrial purpose by Karnataka Industrial Area Development Board (KIADB) under Karnataka Industrial Area Development Act 1966, located at Bellary Taluk & District of Karnataka. The total land admeasuring 4877acres acquired for setting up a single unit has already been handed over to UGFL by KIADB. The proposed steel plant of UGFL is likely to be commissioned by 2027-28.

The proposed project falls in, 3(a) Metallurgical (Ferrous & nonferrous), 2(b) (Mineral beneficiation), 4 (b) Coke oven and 1(d) Thermal power plant category of MoEF&CC EIA Notification.

The proposed 6 MTPA integrated steel plant will produce Crude steel through BF-BOF-CC-RM route. The proposed project will be generating employment to the tune of 6427 employment during construction and operation phase besides the indirect employment to locals.

The plant site is located about 11 km North-West of Bellary town. On the north, an irrigation canal (Tungabhadra canal) runs adjacent to plant boundary and the railway line of South-West Railways (SWR) lies on the south. The site is about 1.5 km from National Highway

(NH-67) on the south. State Highway (SH -132) is passing along the west boundary of the site, which crosses the railway tracks of SWR and meets the NH-63 near Kuduthini village. The latitude and longitude of the site are as follows: -

| Point | Latitude | Longitude |
|---|---|---|
| 1 | 15°11'04.61" N | 76°49'29.66" E |
| 2 | 15°11'39.04" N | 76°50'46.06" E |
| 3 | 15°14'06.37" N | 76°46'33.65" E |
| 4 | 15°13'24.88" N | 76°46'18.38" E |

The major technological units envisaged for the proposed plant and their capacities is shown in **Table. 01 – 01**: -

**Table. 01 – 01: Major Technological Units**

MTPA = Million tonnes per annum

| Sl. No. | Name of unit | Configuration & Capacity of Unit | Production Capacity |
|---|---|---|---|
| 1 | Coke oven and By-product plant | 2x 60 ovens &<br>2 x 60 ovens | 2.74 MTPA |
| 2 | Beneficiation & Pellet plant | 1 x 420 $m^2$ | 4 MTPA |
| 3 | Sinter plant | 2 x 460 $m^2$ | 8.532 MTPA |
| 4 | Blast Furnace | 2 x 4200 $m^3$ | 6.464 MTPA |
| 5 | Basic Oxygen Furnace (BOF) | SMS-I 2 x 160 T<br>SMS-II 2 x 160 T<br>LRF -I 2 x 160 T<br>LRF -II 2 x 160 T<br>VD - 2 X 160 T | 6.0 MTPA |
| 6 | Continuous Casting Machine (CCM) | 2x 2.940 MTPA | 5.88 MTPA |
| 7 | Rolling Mill (RM) | 2 x 2.809 MTPA | 5.615 MTPA |
| 8 | Captive Power Plant | 2 x 200 MW<br>1 X 200 MW<br>GBPP: 110 MW & 153 MW,<br>TRT: 2x 15 MW | 893 MW |
| 9 | Oxygen Plant | 4 x 1000 TPD | 4000 TPD |
| 10 | Lime Plant | 4 x 450 TPD | 0.524 MTPA |
| 11 | Dolo Plant | 2 x 125 TPD | 0.150 MTPA |
| 12 | CDQ Process ( Additional power) | - | 40 MW |

The water requirement for the project is estimated to be about 145,080 $m^3$/day, out of which 7056 $m^3$/day of fresh water requirement will be obtained from the rain water harvesting and the remaining requirement of 138024 $m^3$/day will be met from the surface water from river Tungabhadra. Government of Karnataka (GoK) has granted permission to draw 4 TMC (12,930 $m^3$/hr) of surface water from downstream of Tungabhadra River, and water supply agreement has been signed with Govt. of Karnataka vide Agreement No 2/ 2021-22 dated 28th September 2021.

The power requirement of the project estimated to be 650 MW and shall be met from total power generation of 893 MW from the plant operations. The captive power plant generation is about 600 MW from coal based and TRT, GBPP will generate another 293 MW. 40MW additional power will be generated from the CDQ process. In case of power evacuation/drawing will be from KPTCL substation 400kV/220kV grid near Kuduthini which is about 5 km from the project site.

Blast Furnace – Basic Oxygen Converter route adopted for the steel plant will be resulted in emission of fugitive dust, particulate matter, volatile organic carbons (VOCs), oxides of sulphur and nitrogen and carbon dioxide which will be polluting the atmosphere if proper control measures are not adopted in design stage itself. Similarly, water environment of the site will be polluted due to generation of process effluent which may contain total suspended solids (TSS), BOD, COD, oil and grease, phenol, cyanides etc.

The required pollution control measures for the proposed plant shall be designed to achieve the desired level of cleanliness as per latest environmental norms and regulations without affecting the plant productivity and operational economics.

The types of process effluent streams that would generate from the steel plant complex can be grouped under the following four broad categories**:**

i) Effluent stream containing high BOD, COD, tars, phenols, cyanides etc. of coke oven plants would be separately treated in Biological Oxidation and De-phenolisation (BOD) plant. Treated effluent of BOD plant would be taken to the slag quenching.

ii) Effluent stream containing mostly suspended solids (SS), oil and grease will undergo physico**-**chemical treatment schemes like oil separation**,** settling**,** clarification**,** pH adjustment etc

iii) Effluent stream covering cooling tower blow down

iv) Effluent stream of plant sanitary wastewater**,** which will be treated in a sewage treatment plant

Slime, BF slag, LD slag and fly ash from power plant are the biggest contributors of waste products in the plant. Suitable schemes for usage and disposal shall be adopted.

The site is located in zone II of seismic zoning map of India as per IS 1893-2002 which associated with low seismic potential. The climatic details of the project site are shown in **Table. 01 – 02: -**

**Table. 01 – 02: Climatic details of the site**

| Sl. No. | Meteorological parameters |
|---|---|
| 1 | Max. Temperature - 45$^{\circ}$ C |
| 2 | Average max. Temperature- 33$^{\circ}$ C |
| 3 | Min. Temperature – 7.8$^{\circ}$ C |
| 4 | Average min. Temperature- 21.4$^{\circ}$ C |
| 5 | Avg. Rainfall – 610 mm |
| 6 | Avg. Humidity- 57% |
| 7 | Predominant wind direction- WNW |
| 8 | Max. wind speed-17m/s |

The total population of Bellary district as on 2011 was about 24.53 lakh and population around 10 km radius of study area is about 0.82 lakhs. The population density of the study area is about 264 persons/sq.km as compared to Bellary population density of 290. It may be noted that the population density of the study area is lesser than that of the District, State and National i.e., 290, 319 & 382 persons/sq.km respectively.

There are about 96 revenue villages falling under Bellary Taluk. Out of which about 15 villages are falling within 10 km radius from the project site. Among these villages, Kuduthini village is located at 1.5 km from the project site. It is expected that the total population within 10 km radius will about 82898 based on 2011 census. Based on the decadal growth rate of the Bellary district 20.99% the projected population during 2018 will be 95872.

The proposed facilities will be occupying about 4877 acres of land. The plant and auxiliary buildings will be occupying about 1846 acres. About 1642 acres which will be about 33% of the total area envisaged for greenbelt development. The details of land required for each unit is furnished in **Table. 01 – 03: -**

**Table. 01 – 03: Details of land required**

| Sl. No. | Land description | Area in acres |
|---|---|---|
| 1 | **Plant area** | |
| | Raw material | 214 |
| | Beneficiation plant & Pellet plant | 250 |
| | Base mix yard | 49 |

The following units are proposed for Construction of Integrated steel plant.

- Iron ore beneficiation plant
- Pelletizing plant
- Coke oven
- Sinter plant
- Blast furnace

| | | |
|---|---|---|
| | Coke oven plant | 59 |
| | Sinter plant | 70 |
| | Blast furnace | 150 |
| | SMS | 90 |
| | Mills | 220 |
| | Auxiliary facility & admin complex | 50 |
| | Power plant | 105 |
| | Electrical & MRSS | 30 |
| | Roads | 141 |
| | Railway | 571 |
| 2 | Water bodies | 503 |
| 3 | Waste management area | 25 |
| 4 | Water management | 60 |
| 5 | Green belt | 1642 |
| 6 | Future expansion | 406 |
| 7 | Miscellaneous & open spaces | 242 |
| **Total** | | **4877** |

- Steel making
- Continuous casting machines
- Rolling mills
- Oxygen and calcining plant
- Power plant
- Fire Station
- Canteen
- Water tanks
- Main power receiving station

- Other Facilities: Sewage Treatment Plants (STP), BOD plant, Effluent Treatment Plant (ETP), Raw Water Treatment Plant (RWTP), Rainwater Harvesting Pond, First Aid Centre, Solar Park, Diesel Storage yard, Security towers, Chemical storage yard, all roads and storm water drains etc.

Under plantation programme, green belt will be developed around the plant boundary. About 33% of the total land (1642 acres) is proposed for green belt plantation during the initial five years.

School, medical aid, park, shopping complex, training facility, supporting water supply scheme to the nearby villages, roads and other amenities will be developed.

The chosen plant site is a readily available dry and barren land and No habitation exist in the proposed plant site hence No R & R issues.

The construction work is expected to commence in year 2021 on obtaining statutory clearance and commissioning of the plant to reach the ultimate capacity is expected in 2027-28.

The estimated capital cost of the project is about Rs 36,000/- crores.

The proposed project is likely to bring in additional benefits to the areas surrounding the plant in terms of increase in the educational, health, infrastructure and employment potential.

Like in any other project, it generates the employment potential both direct as well as through contractual labour would bring in additional income for the people living around the project area.

Proposed project of UGFL would also join and strengthen the ongoing social welfare activities, contributing in terms of resource and manpower.

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# CHAPTER- 2

# INTRODUCTION

## 2.1 GENERAL

Uttam Galva Ferous Limited (UGFL), Mumbai is promoted by Miglani family of Uttam Group Mumbai. Other Associate companies of the group is:

- Uttam Galva Steels Ltd, which operates 1.0 Million Tons per Annum (MTPA) capacity plant at Khapoli, Maharashtra for manufacture of cold rolled sheets, galvanized sheets and color coated sheets.

UGFL has received an approval from Government of Karnataka (GoK) to set up a six (6.00) MTPA capacity integrated steel plant along with 893 MW captive power generation at Bellary District in Karnataka under the name of Uttam Galva Ferous Limited (UGFL). GoK has accorded approval to implement the project of 6 MTPA integrated steel plant along with 893 MW captive power generation at Bellary.

The proposed project site is notified for industrial purpose by Karnataka Industrial Area Development Board (KIADB) under Karnataka Industrial Area Development Act 1966, located at Bellary Taluk & district of Karnataka

The total land admeasuring 4877 acres acquired for setting up a single unit has already handed over to UGFL by KIADB. UGFL intend to implement the 6 MTPA Integrated steel plant project at Kuduthini and nearby villages, at Taluk & District Bellary, Karnataka. The proposed project is planned to implement during the year 2027-28.

## 2.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

UGFL has already prepared TEFR for the proposed 6 MTPA Integrated steel plant at Kuduthini village, Bellary District, Karnataka.

KIADB has allotted 4877 acres of land to UGFL for the proposed 6 MTPA Integrated steel plant at Kuduthini. The project will be handled by Shri. Shankar Ramakrishna – Group Director of the company.

Major units of the proposed steel plant will comprise iron ore beneficiation plant, pellet plant, sinter plants, blast furnaces, steel melt shops, rolling mills, calcining plants, auxiliary facilities and captive power plants. The plant will have adequate infrastructure support, such as rail linkage, road connectivity, power supply and water supply.

Keeping in view of the emerging scenario in steel, UGFL is planning to consolidate its presence in the country's steel scenario and accordingly has decided to go ahead with the

implementation of the steel complex with the state-of-the-art technology for sustainable development. The plant is envisaged to produce both flat and long products.

## 2.3 BRIEF DESCRIPTION OF NATURE OF PROJECT

UGFL has proposed to set up a 6 MTPA Integrated steel plant with recovery type coke oven at Kuduthini village, Bellary district, Karnataka. The proposed 6 MTPA steel plant shall produce crude steel through BF-BOF-CC-RM route.

The material cum process flow sheet depicting the various units envisaged is explained in the subsequent chapters. The proposed project falls in, 3(a) Metallurgical (Ferrous & nonferrous), 2(b) (Mineral beneficiation), & 4 (b) Coke oven and 1(d) Thermal power plant category of MoEF&CC EIA Notification 2006.

## 2.4 NEED FOR PROJECT AND ITS IMPORTANCE

Steel is material of choice for industrial application due to its high specific strength and relatively low cost for unit weight. Present per capita steel consumption in India is about 69 kg when compared to per capita steel consumption of 500 to 700 kg in developed countries like Japan, European countries, South Korea, USA etc. The developing countries like Brazil, Mexico, and China have per capital consumption of about 110 kg to 150 kg and the World average is about 150 kg which is also very high when compared to Indian per capita consumption. Hence there is a large scope in India to improve the per capita consumption and thereby need arise to increase the production of steel.

A high industrial growth calls for increased demand for machinery and equipment; transport facilities and infrastructure facilities like highways, bridges, housing, schools, hospitals etc, which in turn results in higher consumption of steel. Long products such as bars, rods and structural as inputs in the construction of industrial activities and its requirement are predominant in any developing economy.

Already massive infrastructure and residential construction activities have been taken up in India and this will further boost the demand for bars, rods and structural in the country. Similarly, flat products like hot rolled sheets, cold rolled sheets, plates etc serve as inputs in the construction sector and in manufacture of motor vehicles, pressure vessels, chemical equipment, pipes, railway wagons, ships & vessels, white goods etc and its demand in the country are increasing rapidly**.**

## 2.5 DEMAND - SUPPLY GAP

In 2016, the world crude steel production reached 1630 million tonnes (mt) and showed a growth of 0.6% over 2015. China remained world's largest crude steel producer in 2016 (808 mt) followed by Japan (105 mt), India (96 mt) and the USA (79 mt).

The annual steel production in India is shown in **Table. 02 – 01**: -

**Table. 02 – 01: Annual steel production in India**

| **Indian steel industry :(in million tonnes)** | | | | | | |
|---|---|---|---|---|---|---|
| Category | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17* | April-May 2017* |
| Pig Iron Production for sale | 6.870 | 7.950 | 9.694 | 9.228 | 9.391 | 1.53 |
| Sponge Iron Production | 23.01 | 22.87 | 24.24 | 22.43 | 24.39 | 4.23 |
| Total Finished Steel Production for sale (alloy/stainless + non alloy) | 81.68 | 87.67 | 92.16 | 90.98 | 100.74 | 17.48 |
| Source: Joint Plant Committee; *prov. | | | | | | |

**Demand – Availability**

- Industry dynamics including demand – availability of iron and steel in the country are largely determined by market forces and gaps in demand-availability are met mostly through imports.
- Interface with consumers exists by way of meeting of the Steel Consumers' Council, which is conducted on regular basis.
- Interface helps in redressing availability problems, complaints related to quality.

**Imports**

- Iron & steel are freely importable as per the extant policy.
- Data on import of total finished steel (alloy/stainless + non alloy) is given below for last five years and April-May 2017:

The import details of Indian steel industry are shown in **Table. 02 – 02**: -

**Table. 02 – 02: Import details of Indian steel industry**

| **Indian steel industry: Imports (in million tonnes)** | | | | | | |
|---|---|---|---|---|---|---|
| Category | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17* | pril-May 2017* |
| Total Finished Steel (alloy/stainless + non alloy) | 7.93 | 5.45 | 9.32 | 11.71 | 7.23 | 1.06 |
| Source: Joint Plant Committee; *prov. | | | | | | |

**Exports**

- Iron & steel are freely exportable.
- India emerged as a net exporter of total finished steel in 2016-17 (prov.)
- Data on export of total finished steel (alloy/stainless + non alloy) is given below for last five years and April-May 2017:

The import details of Indian steel industry is shown in **Table. 02 – 03**: -

**Table. 02 – 03: Export details of Indian steel industry**

| **Indian steel industry: Exports (in million tonnes)** | | | | | | |
|---|---|---|---|---|---|---|
| Category | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17* | April- May 2017* |
| Total Finished Steel (alloy/stainless + non alloy) | 5.37 | 5.99 | 5.59 | 4.08 | 8.24 | 1.38 |
| Source: Joint Plant Committee; *provisional | | | | | | |

Likely demand – supply of finished steel by terminal year of 12th Plan (2016-17) is likely to be 140 million tons as shown in **Table. 02 – 04** below. It could be seen from the Table that there would be sufficient growth in demand from 2011-12 to 2016-17 and also share of long and flat products in the demand scenario will be the same.

**Table. 02 – 04: Summary of Demand – Supply Projection in 12th Plan**

| **Sl. No** | **Item** | **2010-11** | **2016-17** |
|---|---|---|---|
| | | **(In Million Tonnes)** | |
| 1 | Demand for carbon steel | 62.14 | 108.30 |
| 2 | Demand for alloy steel | 3.47 | 5.00 |
| 3 | Total domestic demand | 65.61 | 113.3 |
| 4 | Net export | (-)3.34 | 2.00 |
| 5 | **Production of Steel** | **62.27** | **115.30** |
| 6 | Category wise consumption | | |
| | Bars & Rods | 24.44 | 43.60 |
| | Structural | 5.62 | 9.30 |
| | Railway materials | 1.10 | 1.40 |
| | **Total Long products** | **31.16** | **54.30** |
| | Plates | 4.76 | 7.20 |
| | HRC/skelp/sheet | 13.07 | 22.60 |
| | CR coils | 6.00 | 11.20 |
| | GP/GC | 4.74 | 8.80 |

| | | | |
|---|---|---|---|
| | Electricals sheet | 0.49 | 0.80 |
| | Tin plate | 0.4 | 0.60 |
| | Pipes | 1.54 | 2.80 |
| | **Total Flat products** | **31.00** | **54.00** |
| 7 | Total Carbon steel | 62.14 | 108.30 |
| 8 | Total Crude steel | - | 139.9 |
| 9 | Likely capacity of crude steel | **78.00** | **140.00** |

## 2.6 IMPORT Vs INDIGENOUS PRODUCTION

Demand for flat products is expected to go up further with increased production of automobiles, ships and vessels, railway wagons, pipes, consumer durables etc. It may be noted that due to non-availability of special steels, India imported more than 7.4 Mt of flat products during 2017-18.

## 2.7 EXPORT POSSIBILITY

India is exporting substantial quantity of steel products and export is likely to increase in future years also. For the last few years, Indian consumer industry is growing fast and demand for flat products has increased rapidly.

Exports may rise 30% this fiscal (2013-14) as fall of the rupee and demand in Africa are prompting firms to ship more.

Steelmakers in India, Asia's second-largest user of the alloy, are poised to boost exports to a record as demand slows at home and a plunge in the rupee to an all-time low increase the value of sales overseas.

Exports will climb 30% to 6.8 million tonnes (mt) this fiscal, according to the average estimate of 10 analysts, government officials and company executives in a Bloomberg survey (Source DNA agency dated 11.06.13).

The demand in Africa is prompting producers to ship more steel after Indian sales in the last fiscal gained at the slowest pace in four years.

Exports may help Indian steel industries to boost revenue that analysts estimate will grow at the slowest pace since at least 2007.

## 2.8 MARKET SCENARIO

The proposed steel plant of UGFL is likely to be commissioned by 2027-28. It is envisaged that wider varieties of both long and flat products will be produced, of which a significant portion would be value-added steels to cater to niche market.

Based on the assessment of steel market (considering the boom in construction sector and industrial application) and the resources available to the promoters, it has been planned to set up an integrated steel plant with a capacity of 6.0 MTPA at Kuduthini village, Bellary District, Karnataka.

## 2.9 EMPLOYMENT GENERATION

During construction phase of an integrated steel plant, there will be an ample employment opportunity (direct) for local/outside populace during and after construction work. There are other benefits, too. Important amongst them is the growth of allied steel industries around the plant engaged in supplying equipment's etc. to steel plant creates job opportunities (indirectly), and contributes significant economic growth of that area. The living conditions and welfare of people will improve by social welfare schemes which will be implemented with the project commencement.

It is expected that about 6427 job opportunities will be created due to this project. However, this number will be reached over a period of time as per the progress of project. Needless to mention that, during the construction phase of about 5 years, on an average, about 1000 laborers would get indirect employment. Allied industrial growth is expected since the project needs fabrication and supply of numerous equipment/ components. There is an estimated job creation of about 1000 people on continuous requirement by sub-vendors / contractors.

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# CHAPTER- 3

# PROJECT DESCRIPTION

## 3.1 TYPE OF PROJECT

The proposed project site is notified for industrial purpose by KIADB under Karnataka Industrial Development Area Act 1966, located at Bellary, Taluk & District of Karnataka. UGFL has obtained 4877 acres of land from KIADB for their proposed "6 MTPA Integrated steel plant" at Kuduthini village, Bellary district, Karnataka

The land admeasuring 4877 acres is notified for land acquisition and possession of entire land was already handed over to UGFL by Karnataka Industrial Areas Development Board (KIADB) situated at villages Kuduthini, Veniveerapura, Yerangaligi and Kolagallu.

The proposed 6 MTPA steel plant with Coke oven shall produce liquid steel through BF-BOF-CC-RM route.

The proposed project falls in, 3(a) Metallurgical (Ferrous), 2(b) (Mineral beneficiation), 4 (b) Coke oven plant & 1(d) Thermal power plants category of MoEF&CC EIA notification 2006.

## 3.2 LOCATION OF UGFL PROJECT SITE

The project site of about 4877 acres is located at Kuduthini village, Bellary district, Karnataka state. The plant site is located about 11 km north-west of Bellary Town. On the north, an irrigation canal (Tungabhadra HL canal) runs adjacent to plant boundary and on the south lies the railway line of South-West Railways (SWR). The site is about 1.5 km from National area (NH-67) on the south. State Highway (SH -132) is passing along the west boundary of the site, which crosses the railway tracks of SWR and meets the NH-67 near Kuduthini village. The location is basically rural and agrarian. ACC cement plant is located at the south-west corner of the plot and shares the common boundary with UGFL. The latitude and longitude of four corners of the site is as follows: -

| Point | Latitude | Longitude |
|---|---|---|
| 1 | 15°11'04.61" N | 76°49'29.66" E |
| 2 | 15°11'39.04" N | 76°50'46.06" E |
| 3 | 15°14'06.37" N | 76°46'33.65" E |
| 4 | 15°13'24.88" N | 76°46'18.38" E |

Map showing the general location, satellite view of project site is shown in **Fig. 3.1** and **Fig. 3.2**.

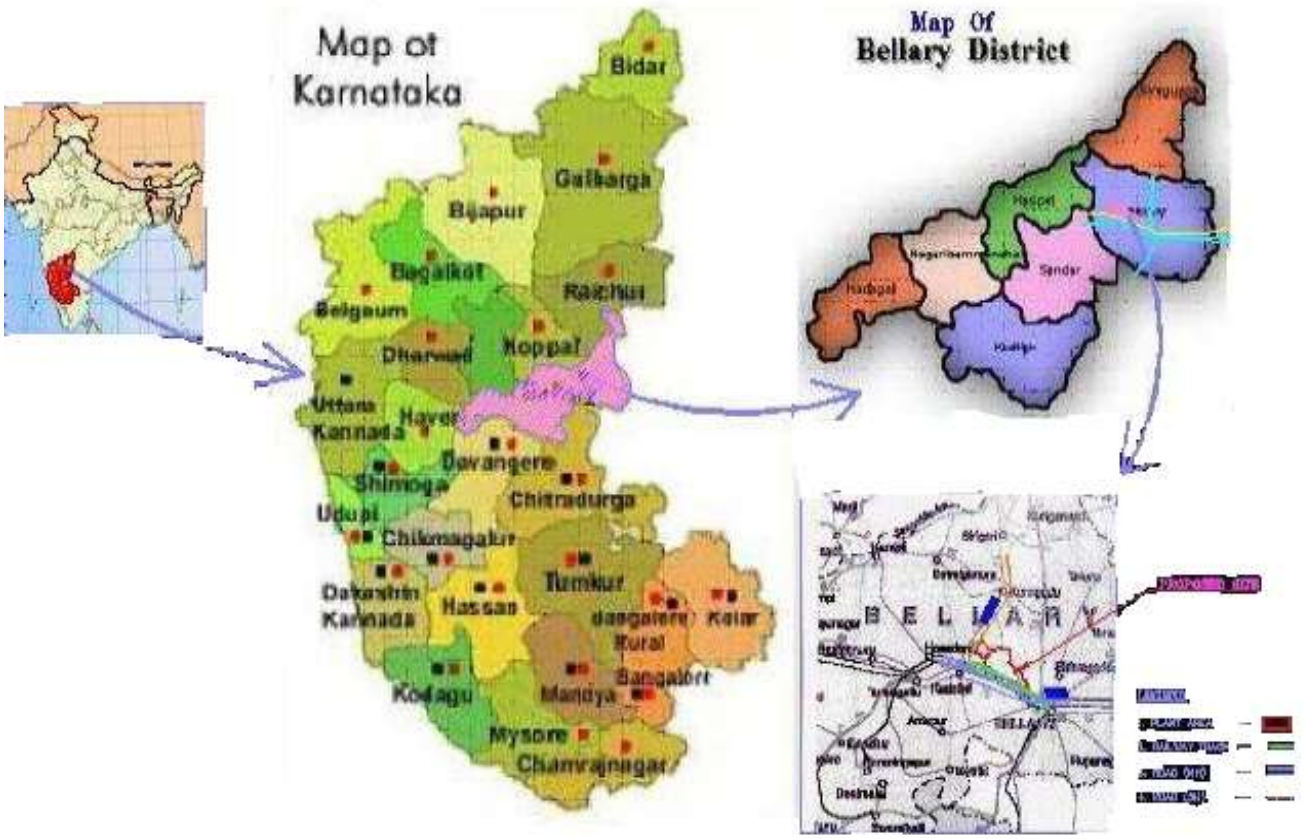


**Fig. 3.1 Location map of project site**

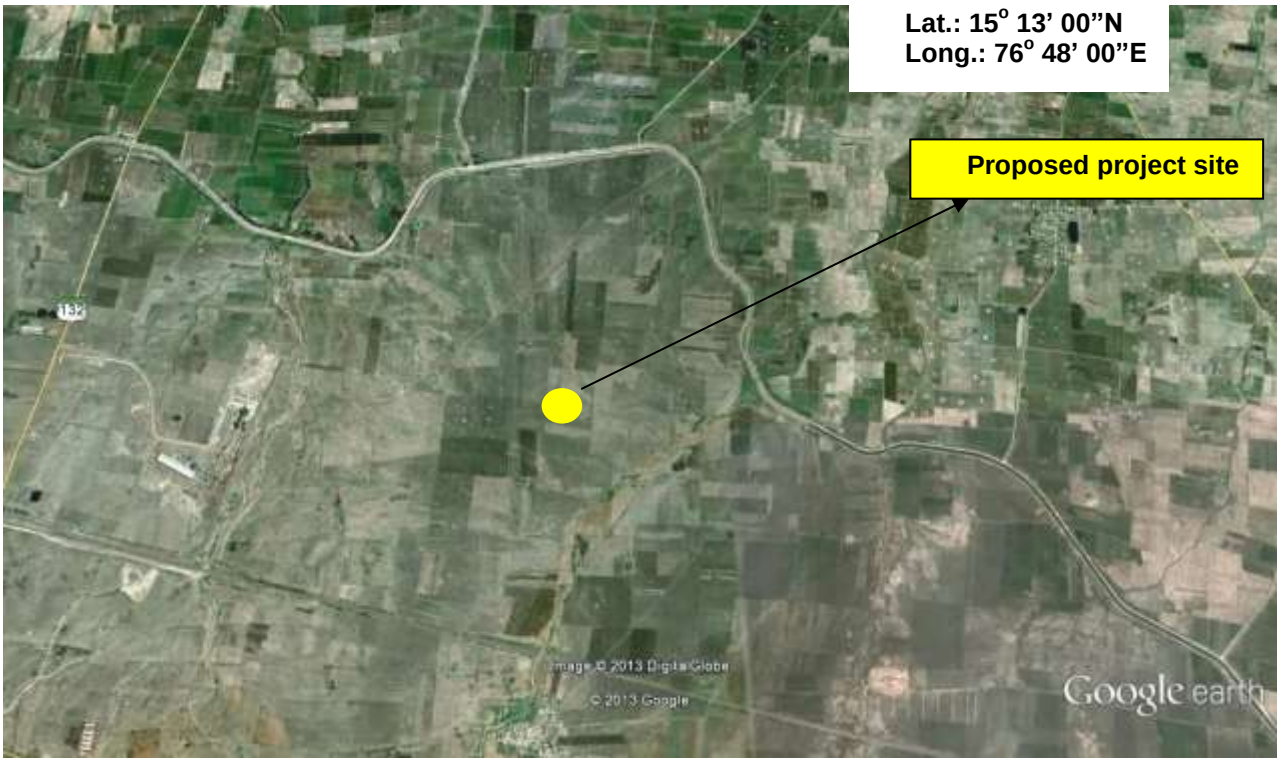


**Fig. 3.2 Satellite Map of Project site**

The block general layout for the proposed 6 MTPA integrated steel plant is shown in **Fig. 3.3.**

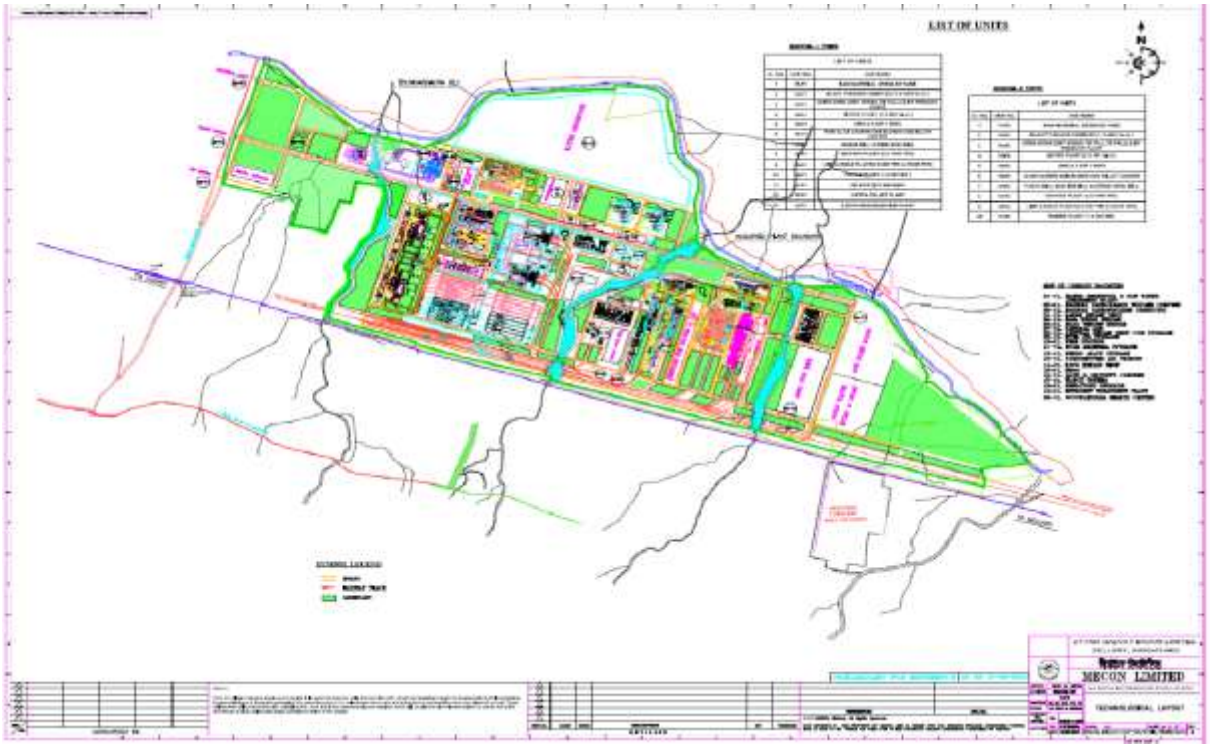

**Fig. 3.3 General Layout of Plant**

## 3.3 SITE SELECTION BASIS

The proposed project site is notified for industrial purpose by KIADB under Karnataka Industrial Area Development Act 1966, located at Bellary Taluk & district of Karnataka
The land admeasuring 4877 acres is notified for land acquisition and possession of entire land was already handed over to UGFL by Karnataka Industrial Areas Development Board (KIADB) situated at villages Kuduthini, Veniveerapura, Yerangaligi and Kolagallu.

The main features of site including environmental considerations make the site suitable for this project are given below:

- Green field project
- Readily available acquired land
- No habitation in the proposed plant sites & hence no R&R issues.
- Surrounding area of project site is sparsely populated
- Logistic support like availability of raw material, water and power
- Suitable topography for construction of facilities
- Good accessibility through road and rail
- Safe from site flooding possibility
- Suitable seismic zone
- Site is isolated from other industries
- No major storage facilities for inflammable and explosive materials
- No archeologically important heritage monuments are located within 10 km radius.
- No declared biodiversity parks/sanctuaries are in the surroundings of site.
- No perennial water sources are available within the study area.

In view of the above-mentioned facilities, which is already available at site and also the project is a green field, consideration of alternative site is circumvented.

## 3.4 SIZE AND MAGNITUDE OF OPERATION

The proposed project site is spread over 4877 acres of land. The actual footprint for the plant area will be about 1999 Acres.

The magnitude of operation is 6 MTPA Integrated steel plant, with a coke oven and a power plant.

## 3.5 PROJECT DESCRIPTION WITH PROCESS DETAILS

### Major Units

The following major technological units have been selected for the proposed plant and their capacities are indicated in **Table 03 – 01.**

**Table 03 – 01: Major technological units**

| Sl. No. | Name of unit | Configuration & Capacity of each Unit | Production Capacity as per TOR |
|---|---|---|---|
| 1 | Coke oven and By-product plant | 2x 60 ovens &<br>2 x 60 ovens | 2.74 MTPA |
| 2 | Beneficiation & Pellet plant | 1 x 420 $m^2$ | 4 MTPA |
| 3 | Sinter plant | 2 x 460 $m^2$ | 8.532 MTPA |
| 4 | Blast Furnace | 2 x 4200 $m^3$ | 6.464 MTPA |
| 5 | Basic Oxygen Furnace (BOF) | SMS-I 2 x 160 T<br>SMS-II 2 x 160 T<br>LRF -I 2 x 160 T<br>LRF -II 2 x 160 T<br>VD - 2 X 160 T | 6.0 MTPA |
| 6 | Continuous Casting Machine (CCM) | 2x 2.940 MTPA | 5.88 MTPA |
| 7 | Rolling Mill (RM) | 2 x 2.809 MTPA | 5.615 MTPA |
| 8 | Captive Power Plant | 2 x 200 MW<br>1 X 200 MW<br>GBPP: 110 MW & 153 MW,<br>TRT: 2 x 15 MW | 893 MW |
| 9 | Oxygen Plant | 4 x 1000 TPD | 4000 TPD |
| 10 | Lime Plant | 4 x 450 TPD | 0.524 MTPA |
| 11 | Dolo Plant | 2 x 125 TPD | 0.150 MTPA |
| 12 | CDQ Process (Additional power) | - | 40 MW |

❖ MTPA = Million tonnes per annum

**Process Route**

The production of liquid steel will be 6.0 MTPA and process route being adopted will be BF-BOF-CC-RM. Finished products will be different as per the market demand. The finished product envisaged are HR coils (will be produced from thin slabs in Hot Strip Mill), Billets Mill, Plate Mill, Structural Mill and Section Mill will be installed to produce plates, structural products and different sections.

**Iron making**

Blast Furnace, the age-old technology, is being continuously developed and modernized by iron makers all over the world and has more than 95 percent global share in hot metal

production. Blast furnace can also be sized according to requirements of hot metal in the plant. Only constraint for operation of BF is the requirement of coke, which would require import of low ash coking coal.

**Coke-making**

Blast furnace process will always be associated with coke making plant as coke is one of the most important raw materials for the operation of a Blast furnace. For coke making, two technologies are available.

- Conventional by-product recovery coke oven
- Non-recovery coke oven.

Conventional by-product recovery coke ovens are being used in most of the existing integrated steel plants. As these types of plants are in operation for many years, they have undergone many changes with introduction of new technologies like stamp charging, tall ovens, smokeless charging, dry quenching etc.

In non-recovery coke ovens, which are also called heat recovery coke ovens, volatile matters of coal are not recovered but burnt inside the oven chambers partially and the rest in flue tunnel. Primary air for combustion is introduced into the oven chamber through several ports above the charge level in both pusher and coke side doors of the oven. Partially burnt gases exit the top of the oven through down cover passages in the oven wall and enter the sole flue where it burns again with the introduction of secondary air, thereby heating the sole of the oven.

As the gas burns under negative pressure inside oven chambers and flue tunnels, chances of leakage to atmosphere are minimum. Due to higher coking temperature (1200-1250$^0$C) the hydrocarbons in the by-product gas are broken into combustible compounds and burn easily. Controlled introduction of tertiary air in the common flue tunnel ensures no combustible matters in the waste gases going to stack. Unlike by-product coke ovens no gas is available for use in the steel plant.

It can be seen that non recovery process is better, if thermal load of the plant is low and the heat energy from combustion of coke oven gas is not required to maintain energy balance of the plant or gaseous fuel like natural gas or coal bed methane is available for rolling mill reheating furnaces. If the energy deficiency has to be compensated by purchasing large amount of Petro fuels like LDO, LPG etc, then NR coke oven may not be economical. NR ovens are also suitable for smaller plants (less than 1.0 Mt)

Total coke requirement on full development at 6.0 MT production stage will be 2.74 million tons per year.

There will be six different mills which will need large number of fuels for pre- heating of the slabs/billets/blooms. Coke oven gas available from the by-product recovery coke ovens will meet the fuel requirement of the mills. Considering both advantages and the disadvantages of both the coke making processes and the energy requirement of the plant, By-product Coke oven is being considered for this project.

**Steelmaking**

BOF route for steelmaking, based on hot metal usage has been considered because of its high production rate, superior quality of steel and low electrical energy consumption. BOF is the preferred steelmaking route in largest size integrated steel plants in India and abroad.

Latest technology of secondary metallurgy will also be adopted for control of quality of liquid steel. A variety of secondary metallurgy technologies are available, e.g., inert gas rinsing, ladle refining furnace, vacuum degassing, vacuum oxygen decarburizing etc. The choice of one or more of secondary metallurgy process in a steel plant will depend on the grade of steel produced.

Considering the quality of steel envisaged in this project, inert gas rinsing, ladle refining furnace (LRF) and vacuum degassing facilities have been envisaged in steel melt shop for secondary metallurgical functions as well as to hold the liquid steel in ladle, as necessary to facilitate sequencing of heats in continuous casting machine and thus increasing the product yield and reducing the operating cost.

**Casting and Rolling**

The process for production of thin slabs through continuous casting route and direct on-line rolling to Hot Rolled Coils/strips (HRC) has been commercialized in the last 10 years. Thin Slab Casting & Rolling (TSCR), as the process is generally called, is the most economical, high yielding and energy saving process for HRC production. TSCR provides minimum investment and conversion cost; flexible production for nearly all kinds of steel grades and high production capacities. In India, twenty-five (25) plants are now in operation and three (3) are being set up. Total installed capacity of TSCR units in the world is now about 54 MTPA.

TSCR process is being planned to be adopted for production of HRC. The process will be of high productivity with all latest techniques of control and monitoring system, which will ensure consistent high-quality product with low energy consumption, higher mill availability and lower operating cost. Standard slab caster will be used for casting slabs, which will be rolled to plates. There will be bloom and billet caster for rolling long products.

**Process route adopted for the steel plant**

As indicated above**,** BF-BOF-CC-Rolling route is considered for production of flat and long products. By-product coke oven plant will be installed to supply coke required for BF and Sinter Plant will be installed to supply basic sinter to BF.

## 3.6 RAW MATERIAL REQUIREMENT

The major raw materials required for iron and steel making are iron ore fines, coking coal, coal for injection into blast furnace, limestone, dolomite, quartzite and non-coking coal for power generation. Iron ore fines of lower grade also will be procured for up-gradation by beneficiation technique for further use in pellet making. Small quantity of iron ore lump will also be required for steel melt shop. The raw materials will include some moisture and will undergo some losses during transportation, handling and screening. Estimated losses based on which total raw material quantity has been computed are given in **Table 03 – 02**.

**Table 03 – 02: Annual major raw material requirement**

| Raw material | Phase I | Phase II | Total | Source |
|---|---|---|---|---|
| Lump ore for SMS | 36,000 | 36,000 | 72,000 | Iron ore mines in Karnataka and Goa |
| Ore fines | | | | |
| For Sinter plant | 39,85,000 | 39,85,000 | 79,70,000 | Indigenous Sandur/ Hospet |
| For Beneficiation | 66,30,000 | Nil | 66,30,000 | Indigenous Sandur/ Hospet |
| Prime coking coal | 14,20,000 | 14,20,000 | 28,40,000 | Coking coal will be imported from Australia, Indonesia, Canada, China and Venezuela |
| Semi coking coal | 6,08,000 | 6,08,500 | 12,16,500 | Semi-coking coal will be imported from Australia, Indonesia, Canada, China and Venezuela |
| Coal for PCI | 5,81,000 | 5,81,000 | 11,62,000 | Australia/ Indonesia |
| Coal for CPP (Full power generation) | 26,20,000 | 13,50,000 | 39,70,000 | Indigenous/ Indonesia |
| Anthracite for SP | 80,000 | 36,500 | 1,16,500 | Will be imported from Vietnam and/or South Africa |
| Lime stone | | | | |
| For SP | 3,56,000 | 3,55,000 | 7,11,000 | High grade low silica limestone will be imported from Japan, Thailand, Vietnam, Middle east etc. |
| For SMS (HG) | 5,77,000 | 5,77,000 | 11,54,000 | High grade low silica limestone will be imported from Japan, Thailand, Vietnam, Middle east etc. |
| For Pellet plant | 85,500 | Nil | 85,500 | Indigenous source |

| Raw material | Phase I | Phase II | Total | Source |
|---|---|---|---|---|
| Dolomite | | | | |
| For SP | 3,96,000 | 3,96,000 | 7,92,000 | Indigenous source |
| For SMS (HG) | 1,64,000 | 1,64,000 | 3,28,000 | Indigenous source |
| Quartzite for BF | 17,000 | 17,000 | 34,000 | Indigenous source |
| Sand for SP | 70,000 | 70,000 | 1,40,000 | Indigenous source |
| Bentonite for PP | 35,000 | Nil | 35,000 | Indigenous source |

## 3.7 BRIEF OUTLINES FOR RESOURCE UTILIZATION

Resource utilization by optimization has been envisaged from design stage itself for plant related activities. The various resources likely to be used are detailed below.

i) Iron ore
ii) Coal
iii) Lime stone
iv) Dolomite
v) Water &
vi) Power

These resources are effectively used in the plant. For example, all the iron fines which are collected from raw material handling area are either sent to sinter plant for sinter making or recycled back into the system. Similarly, Coke breeze/dust area recycled back into system for coke making or to the sinter plant. Hence, sinter plant as a whole is also facilitating utilization waste generated in the steel industry.

Mill scales are used in the sinter plant. The water will be recycled back into the system. Similarly, scarp generated from rolling mill area will be used for steel making.

BOD plant sludge will be used in the coke oven. The treated effluent from BOD plant will be used for dust suppression system in raw material handling area.

Rainwater harvesting is being envisaged on large scale to utilize the rain water and reduce the water requirement from external sources.

The effluent generated from various units will be treated and recycled back into system to ensure zero discharge.

## 3.8 AVAILABILITY OF WATER AND ITS SOURCE, ENERGY POWER REQUIREMENT WITH SOURCE

**Water**

Government of Karnataka (GoK) has agreed to supply 4.0 TMC (310322 KLD) of water for the project. Water supply agreement has been signed with Executive Engineer vide No 2/2021-22 dated 28th September 2021.

The water requirement of the steel plant is proposed to be met from a new intake well on Tungabhadra River at Nadvi / Rudrapadam in Bellary District, which is at a distance 35 km on the north of the plant site.

Construction water will be made available from existing/proposed bore wells inside the plant premises.

**Power**

The power requirement of the steel plant will be met from two sources viz.-

- Captive power generation system
- Karnataka Power Transmission Company Ltd. (KPTCL)

The plant will have captive power generation from surplus off-gases and TRT system in blast furnace. The plant will also have coal-based power plant with 600 MW capacity.

GoK has agreed to supply power to the steel plant till completion of the captive power plants. The nearest 400kV/220kV grid substation of GoK is situated at Kuduthini, which is about 5 km from the plant site. KPTCL will decide as to whether metering arrangement for import and export of power will be provided at the consumer's end or at power supplier substation's end.

The alignment of water and power will be finalised during DPR stage. Construction power will be supplied by KPTCL from the nearest source.

## 3.9 QUANTITY OF WASTE GENERATED (GASEOUS, LIQUID AND SOLID) AND SCHEME OF MANAGEMENT

**Source of pollution**

Blast Furnace – Basic Oxygen Converter route adopted for the steel plant will result in emission of particulate dusts, volatile organic carbons (VOCs), oxides of sulphur and nitrogen and carbon dioxide, which will lead to pollution of air environment.

Similarly, water environment of the site will be polluted due to process effluent discharge which may contain total suspended solids (TSS), BOD, COD, oil and grease, phenol, cyanides etc.

The land environment also gets affected due to storing/dumping of solid wastes like beneficiation plant tailings, BF slag, BOF slag, mill scale, sludge, debris etc. This practice not only affects the gainful utilization of land but may also invite other secondary environmental degradations, such as, groundwater contamination, wind borne dust pollution of ambient air, aesthetic pollution and other environmental hazards.

Major sources of pollution in the plant which are of prime concern are discussed in **Table 03 – 03.**

**Table 03 – 03: Major sources of pollution**

| Proposed production facilities | Process operation | Pollutant released | Type of environmental pollution |
|---|---|---|---|
| Raw materials handling system | Raw materials stockpile, handling, crushing, conveyor, transport, etc. | Particulates, Work zone dust & noise | Air pollution, Work zone pollution |
| Iron ore beneficiation Plant | Wet grinding, spirals & HGMS for iron ore beneficiation | Particulates, Work zone dust & noise | Air pollution<br>Water pollution<br>Work zone pollution |
| Pellet Plant | Production of pellet through grate kiln process | Particulates, $SO_2$ & $NO_X$<br>Work zone dust & noise | Air pollution, Work zone pollution |
| Coke ovens | Coke making & quenching | Coal & coke dust, water vapour containing traces of coke particulates | Air pollution<br>Water pollution<br>Work zone pollution |
| Sinter Plant | Sintering of iron ore fines, coke breeze & other fines | Particulates, $SO_2$ & $NO_X$<br>Work zone dust & noise,<br>Hot water from cooling circuit | Air pollution, Work zone pollution |
| Blast Furnace | Hot metal production by melting of iron ore, sinter, coke & fluxes | Particulates, $SO_2$ & $NO_X$<br>Work zone dust & noise,<br>GCP wastewater Hot water from cooling circuit slag & sludge | Air pollution<br>Water pollution<br>Land pollution |
| Calcining plant | Calcination of limestone & Dolomite | Lime dusts, Dolo dust, $SO_2$ & $NO_X$ | Air pollution |
| Steel melt shop (SMS) | Production of liquid steel in LD Converter followed by refining of crude steel & casting into slabs & billets | Particulates GCP wastewater, hot water from cooling circuit Work zone dust Slag & sludge | Air pollution<br>Water pollution<br>Work zone pollution<br>Land pollution |

| Proposed production facilities | Process operation | Pollutant released | Type of environmental pollution |
|---|---|---|---|
| Rolling mills | Heating of feed stock in reheating furnaces & rolling to finished sections | Traces of particulates, $SO_2$, $NO_X$ Work zone noise Hot water from cooling circuit, oil & grease contaminated wastewater Mill scales | Air pollution Work zone pollution Water pollution Land pollution |
| Power plant | Generation of power through WHRB using surplus gas,<br><br>Generation of power through CFBC using thermal coal | Heat, $SO_2$, $NO_X$ & CO Backwash of DM plant resins Acid /alkali contaminated water | Air pollution Water pollution |

**POLLUTION CONTROL MEASURES**

The required pollution control measures for the proposed plant shall be designed to achieve the desired level of cleanliness as per latest environmental norms and regulations without affecting the plant productivity and operational economics.

The extent of pollution control measures is governed not only by the environment protection regulations/standards, but also on the impacts on local, regional as well as global environment. For example, if $CO_2$ emissions have local as well as global impact, emissions of dust particulates, $SO_2$ and $NO_2$ have more impact on the surroundings of the plant site.

The suggested pollution control measures for the respective production units of the steel complex are described below:

**Air pollution control measure**

**Raw materials handling:** Fugitive dust emissions generating from the handling and stockpiling of raw materials in open stockyards will be controlled by water sprinkling at regular intervals. All closed zone working areas, such as raw materials handling zone, conveyor transfer points and dust generation points at screens will be provided with multiple dust extraction (DE) systems/dry fogging (DF) system to control the fugitive dust emissions. DE system will consist of suction hood followed by bag filter, ducts, extraction fans and stack of appropriate height.

**Beneficiation and pelletizing:** Mainly beneficiation process follow wet process. The air pollution is expected from ore handling area only. To control fugitive emissions in the closed working zones, conventional bag filter based DE system will be adopted in all material

transfer points. Exhaust gas from the straight grate furnace will be cleaned in an ESP and exhausted to atmosphere through a stack of appropriate height.

**Coke ovens:** Fugitive emissions in the closed working zones, like transfer towers, coke & coal handling areas, dry fogging (DF) will be adopted instead of conventional bag filter based DE system**.**

Charging emissions will be controlled by fume extraction system consisting of evacuation through suction hoods, combustion of volatile organic carbon (VOC) and filtration through bag filters to separate the particulate dust. NOx emissions during oven firing will be controlled by incorporation of low NOx stage combustion burners. Emissions during pushing will be controlled by providing suitable hood for extraction and subsequent filtration through bag filters.

The hot coke will be quenched by coke dry quenching (CDQ) method. Sensible heat from hot coke will be recovered for power generation and dust generated during charging, handling and screening will be removed by means of bag filters.

Raw coke oven gas will be cleaned through a by-product recovery system, ammonia scrubbing and oxidative desulphurization to achieve a $H_2S$ level of less than 500 mg per N cum in the gas.

**Sinter plant:** The sinter plant proportioning house and sintering furnace fumes are the two sources of emission. The principal air pollution control system will be dust extraction (DE) or fume extraction (FE) systems and ESPs with stacks of appropriate heights.

**Blast furnace:** BF gas will be cleaned in gas cleaning plant. Other areas of air pollution are stock house and cast house. The BF stock house will be provided with DE systems complete with dust extraction hoods, ESP, ID fan and stack of adequate height. Similarly, the cast house will be equipped with DE systems along with bag filters for separation of particulates before venting through a stack of appropriate height.

**Calcining plant:** The emissions arising due to the fuel burning in lime and dolomite calcining plant will be collected and taken through a bag filter to separate out the lime fines. The fines thus collected will be recycled to the sinter plant. The kilns in the calcining plant and other dust generation areas will be provided with separate DE systems, complete with bag filters and stack of adequate height to clean the particulates.

**Steelmaking and casting:** Besides BOF gas cleaning, which is basically a process necessity, secondary emissions will be generated mainly from charging and tapping operations in the BOF and desulphurization station. The secondary emissions of the steel melting shop will be controlled by providing ESP. Ladle Furnace will be provided with separate GCP with bag filters.

The water required for cooling the hot cast sections will generate hot fumes, comprising mainly water vapour, hot wastewater and suspended particulates. Cooling chamber of caster will be provided with steam exhaust system. Mill scales will be removed in settling tanks and subsequent pressure filter system and stored to utilize in sinter plant.

**Rolling Mills:** Furnaces for heating the feed stock of the mill will use mixed gas, which will have very low sulphur. However, there will be small generation of emissions of particulates,

$SO_2$ and $NO_x$. Low $NO_x$ burners will be used in the RHF for $NO_x$ emission control. The flue gas will be vented through a stack of adequate height. Mill scales will be removed in settling tanks and subsequent pressure filter system and stored to utilize in sinter plant.

**Captive power plant (CPP):** There will be two types of CPPs in the plant. In CPP-1, surplus off- gases from the plant like coke oven gas, blast furnace gas and LD gas will be used in the boilers for generation of electric power and the flue gas generated will be vented to atmosphere through stack of appropriate height.

In CPP-2, coal will be used for generation of power which will cause fly ash emissions and bottom ash generation. Flue gases generated in this plant will be cleaned by ESP and then vented off to the atmosphere through a stack of appropriate height. Low sulphur coal is proposed to be used for controlling $SO_2$ emissions. $NO_x$ emission will be controlled by using low $NO_x$ burners and controlling excess air during combustion.

Measures to control the air pollution will ensure that the emissions confirm to the norms stipulated by the State Pollution Control Board and Central Pollution Control Board. Moreover, it will be ensured that the ambient air quality in nearby areas confirm to the National Ambient Air Quality Standards stipulated by the Central Pollution Control Board.

**Following particulate emission are projected for the plant:**

Stack emission outlet: below 30 mg**/**$Nm^3$

Open work zone: < 5 mg**/** m3

The chimney heights will be designed as per CPCB norms to ensure proper dispersion of contaminants and ensure Ground Level Concentration (GLC) of different pollutants fall within the permissible limits as per National Ambient Air Quality Standards (NAAQS).

**Wastewater generation and its disposal**

The types of process effluent streams that would generate from the steel plant complex can be grouped under the following four broad categories**:**

i) Effluent stream containing high BOD**,** COD**,** tars**,** phenols**,** cyanides etc of coke oven plants would be separately treated in Biological Oxidation and Dephenolisation (BOD) plant. Treated effluent of BOD plant would be used as make up water in other process**.**

ii) Effluent stream containing mostly suspended solids (SS), oil and grease will undergo physico-chemical treatment schemes like oil separation**,** settling**,** clarification**,** pH adjustment etc and shall be recycled back for various other use.

iii) Effluent stream covering cooling tower blow down

iv) Effluent stream of plant sanitary wastewater**,** which will be treated in a Sewage Treatment Plant and shall be use in horticulture.

Each of the production facilities will have primary effluent treatment facilities for recycling purposes. The primary effluent treatment in all the cases would be guided by the stipulated

norms as per CPCB guidelines**.** The effluent stored after treatment and primary recycling in respective plant units is planned to be utilised for controlling fugitive dust emissions and cooling of slag**,** dry fogging in the closed zone raw materials handling areas and also for plant's greenbelt development and landscaping**.**

In order to have a 'near zero discharge' of the proposed plant, the cooling tower blow down along with all other primary treated wastewater streams with high TDS levels may be further subjected to reverse osmosis (RO) treatment to reduce the TDS levels and the residual oil & grease, BOD and COD levels, so as to use the treated RO water in the plant make up water circuit.

**Solid waste generation**

The major solid waste expected to be generated from the various facilities of integrated steel plant are provided in **Table 03 – 04.**

**Table 03 – 04: Quantity of solid waste likely to be generated and planned to re-use/disposal**

| Waste generation | Total Quantity | Type of Usage/disposal |
|---|---|---|
| Filter Cake from Beneficiation plant | 16,99,200 | Sold to Cement plant |
| Dust from waste gas & DE system | 1,30,000 | Feed for SP |
| Sinter BF return | 16,59,714 | Sinter Plant |
| BF slag | 18,72,000 | Granulated slag sold to Cement plants |
| BOF slag | 8,40,000 | For road making |
| Limestone/dolomite/ lime fines | 3,20,000 | Sintering plant feed |
| Mill scale | 60,000 | Sinter plant feed |
| Refractory debris | 31,000 | Clay making for BF |
| Fly ash | 4,76,400 | Cement manufacturing |
| Bottom ash | 1,19,100 | Land fill material |
| Scarp from Mills | 2,13,100 | Recycled to SMS |
| Coke Breeze | 3,52,942 | Sinter Plant |
| Total | **77,73,456** | |

**Solid waste management**

Filter cake, BF slag, BOF slag and fly ash and bottom ash are biggest contributors of waste products in Integrated Steel Plant. Proposed schemes for usage and disposal of wastes are indicated in **Table 03 – 05**.

**Table 03 – 05: Proposed usage and disposal of solid waste**

| Sl. No. | Waste | Usage/Disposal |
|---|---|---|
| 1 | Filter Cake from Beneficiation plant | Sold to Cement plant after recovery of water |
| 2 | BF slag | It is granulated and sold to cement plants |
| 3 | BOF slag | For road making |
| 4 | Fly ash | To be sold to cement manufacturers |
| 5 | Bottom ash | To be used as land fill material |

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# CHAPTER- 4

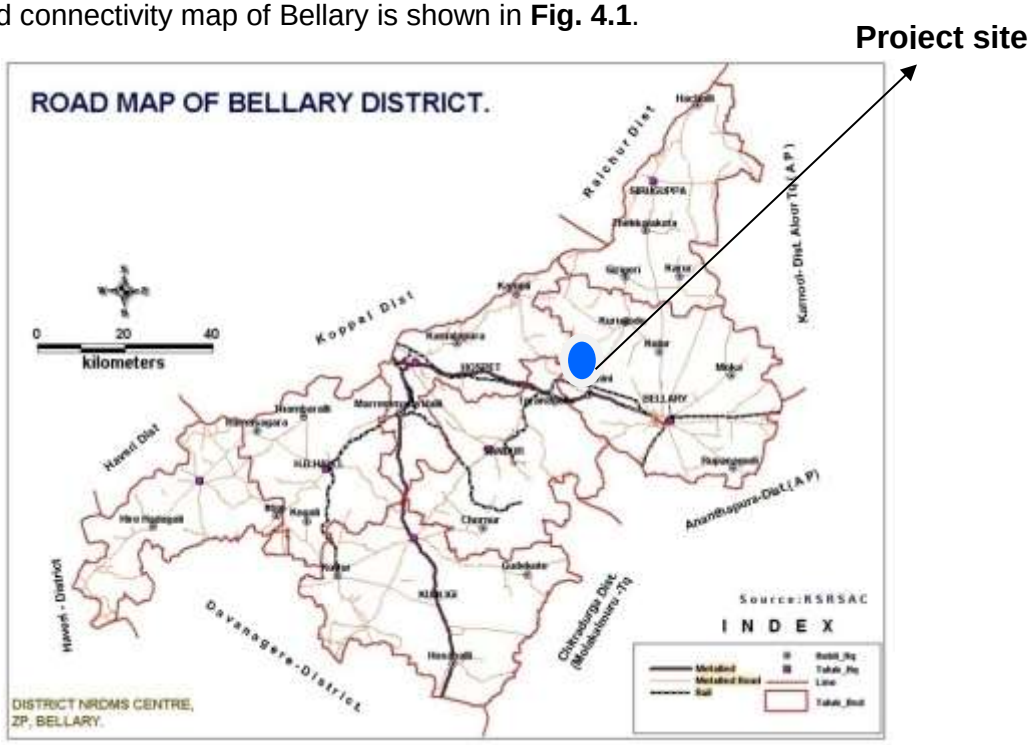
# SITE ANALYSIS

## 4.1 CONNECTIVITY

The project site is well connected by road and rail. The site is about 11 km from Bellary town. NH - 67 is about 1.5 km away from the southern boundary of project and SH-132 runs parallel to the western boundary of the project site. SH crosses the South Western Railway and meets NH near Kuduthini village.

There are two railway stations, Kuduthini and Bellary Cantonment at each end of the plant boundary. Double line broad gauge track of South West Railways (SWR) is passing very close to all along the southern boundary of the project site. Nearest seaport is at Mormu gaon (MPT) at western coast and Krishnapatnam on eastern coast.

The road connectivity map of Bellary is shown in **Fig. 4.1**.




Source: District website of Bellary

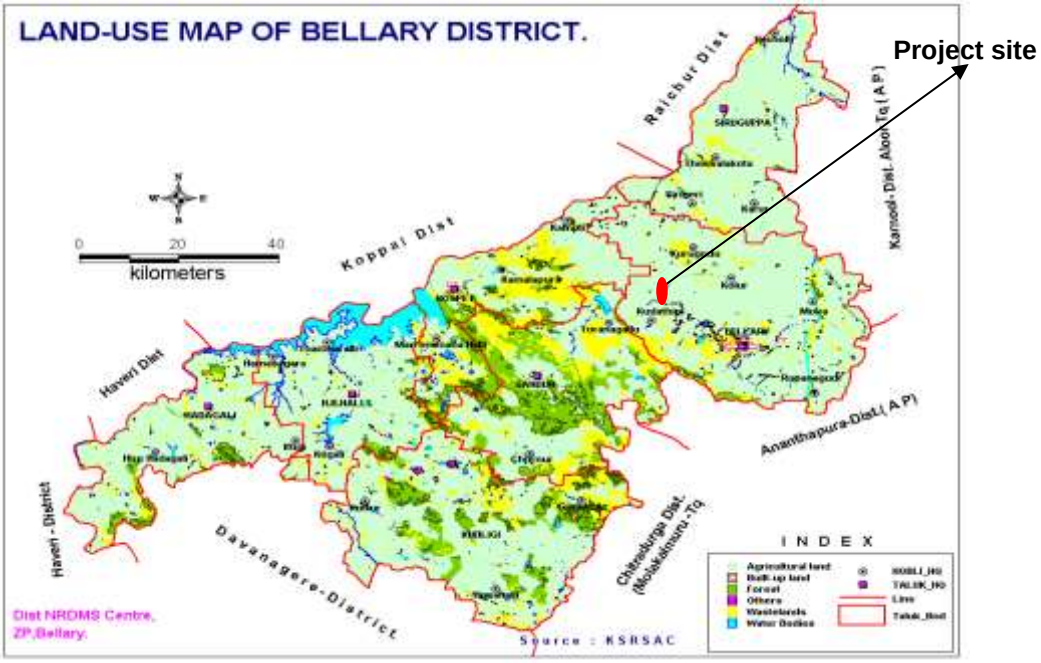
**Fig. 4.1 Road connectivity map of Bellary**

### 4.1.1 LAND FORM, LAND USE AND LAND OWNERSHIP

KIADB has allotted 4877 acres of industrial land to UGFL, near village Kuduthini, Veniveerapura, Yerangaligi and Kolagallu, in Bellary Taluk, Bellary District, Karnataka state for the Integrated Steel Plant of capacity 6.0 MTPA including 893 MW of CPP.

The proposed project site is dry and barren land mass. The land is neither vegetated nor having any habitation. The land was acquired by Govt. of Karnataka and the same was allocated to UGFL for the proposed Integrated Steel Plant. The total

geographical area of Bellary district and Bellary Taluk is 813,193 hectares and 169,027 hectares. About 4877 acres (1974 hectares) of the dry and barren land will be used for this proposed project. The land use and land cover map of Bellary is shown in the **Fig. 4.2**.




Source: District website of Bellary

**Fig. 4.2 Land use and land cover map of Bellary**

## 4.2 TOPOGRAPHY

The project site and surrounding area of 10 km radius is shown in **Fig 4.3**. The project site is mostly flat with mild undulations. No forest or environmentally sensitive area is exist nearby. The land is sloping from south towards north. Topographical information of the proposed site is available and it appears that the site grading will require minimum earthwork.

Kuduthini village is situated in SW at about 3.0 km from the project site. The net irrigated area is 37% to the net area sown. The main source of irrigation is Tungabhadra Canal. The Canal network accounts for 64% of irrigated area. There are three natural nalahs flowing through the project site from south to north.

## 4.3 EXISTING LAND USE PATTERN

The district is 15°30' and 15°50' north latitude and 75° 40' and 77° 11' east longitude. This district is bounded by Raichur district on the north, Koppal district on the west, Chitradurga and Davangere districts on the south, and Anantapur and Kurnool districts of Andhra Pradesh on the east. The proposed project site is not attracted by any other Statutory Act like CRZ. No national park, eco-sensitive area is identified within 10 km radius of study area. The land area is falling under Notified

Industrial Area of Vijayanagar Area Development Authority (VADA) and Bellary Urban Development Authority (BUDA).

## 4.4 EXISTING INFRASTRUCTURE

The project site is well connected by road and rail. Presently, the site is connected by a State Highway (SH). The project site is also connected to NH-67 at about 1.5 km. The nearest railway station is Kuduthini and Bellary Cantonment about 2 km and 7 km respectively. The nearest seaport is located at MPT, Goa. The state Govt. has committed to provide water from downstream of Tungabhadra River at Nadvi/Rudrapadam which is about 35 km from the project site.

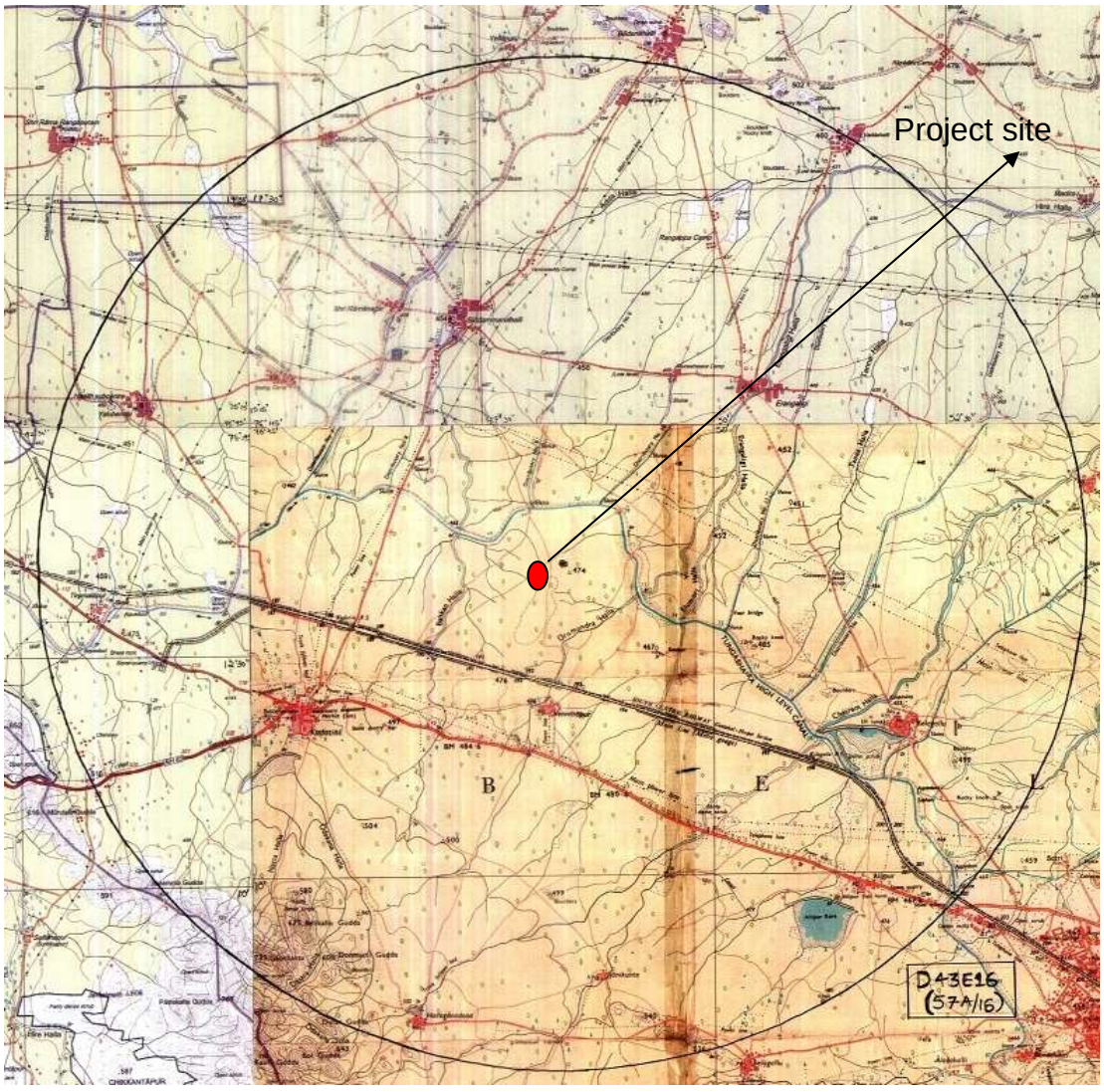



**Fig. 4.3 Topographical Map of 10km radius showing the project site**

## 4.5 SOIL CLASSIFICATION

**Site geology**

The geology of the region belongs to pre-Cambrian age. The rocks occurring in the district can be divided broadly into two types namely:

- Schistose rocks of Dharwarian age.
- Gneisses and granite belongs to Peninsular Gneissic complex (PGC) and closepet granite.

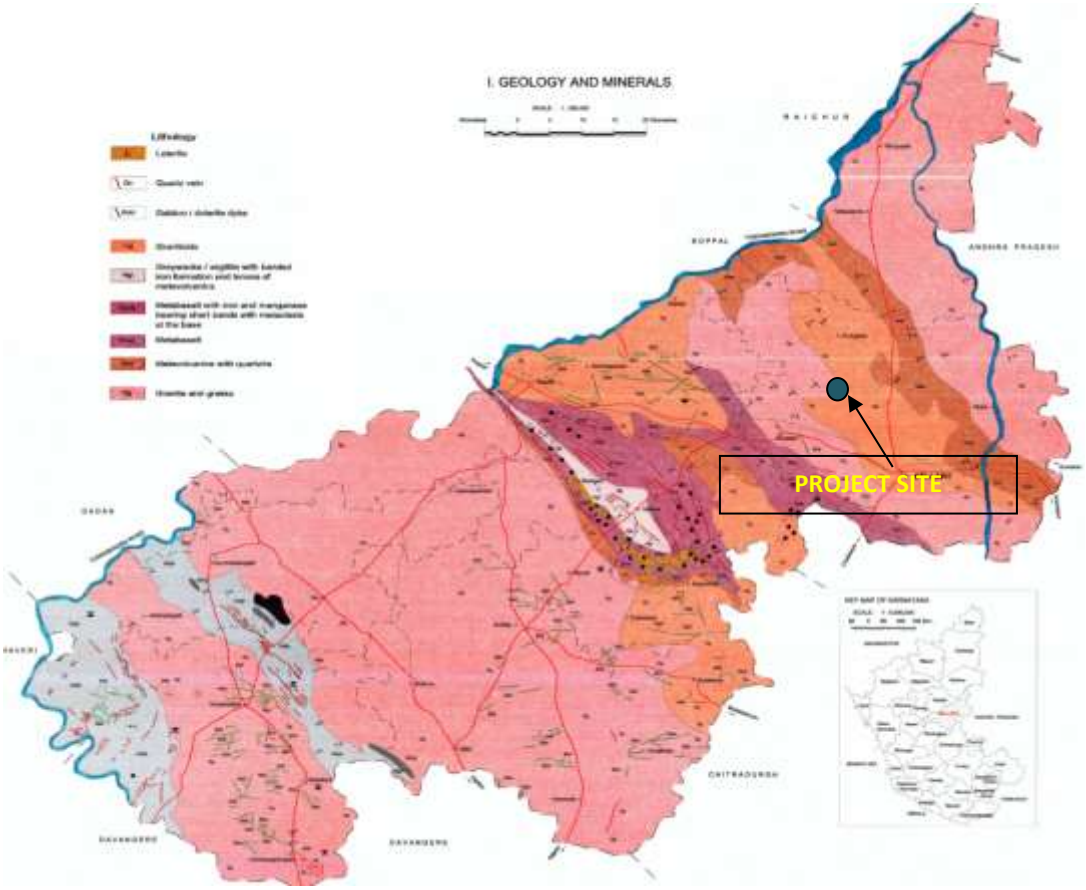
The schistose rocks occur as long and linear bands which comprises of both sedimentary and volcanic suites subjected to low grade regional metamorphism and different phases of deformation. There are a few major schist belts within the district, which trend in a general northwest - southeast direction. They are named as

- Sandur schist belt
- Pennar-Hagari schist belt and
- Southern part of Gadag belt

While the western part of the district exposed a fragment of the meta basalt - greywacke sequence of dharwar super group (Gadag belt). The major portion of Sandur belt renowned for its rich iron and manganese deposits occupies the central part of the district and Hagari segment of Jungund-Kushtagi-Hagari belt is seen in the eastern part. In all these belts, volcanic are represented by repetitive sequences of meta/basalt, meta/andesite, meta/rhyolite and sheet like bodies of meta gabbroid and meta dolerite. Meta basalt is predominant covering about 70% of the volcanic rocks. Sedimentary rocks are represented by quartzite, ferruginous/manganese phyllite, greywacke and argentiferous mica schist. The schistose rocks have undergone lower green schist to amphibolite facies of regional metamorphism.

Peninsular gneisses and closepet granite constitute about 70% of the area of Bellary district. The younger closepet granite shows intrusive relationship with the PGC and schistose rocks. The basic dykes occurring in the Bellary district are many and vary in size and composition. Thin pegmatite veins traverse the granites and occur profusely in migmatite zones around Bellary and in the schistose rocks on both the sides of Tungabhadra dam and at Kampli.

The general strike of the schistose rocks varies from NW-SE to NNW-SSE with moderate dips of $50^0$- $60^0$ both towards NE and SW. The general foliation trend of gneisses is NNW-SSE with almost sub vertical dips. The tectonic history of the rock formations reveals that the pre-cambrian schist belts have been initially folded into synclines and anticlines and the cores of anticline occupied by the gneisses and granites. These have been later refolded almost parallel to the early fold axis forming doubly plunging folds. The geology and minerals map of Bellary district is shown in **Fig. 4.4.**




Source: Geotechnical map of India

**Fig. 4.4 Geology and mineral map of Bellary district**

**Soil classification**

The soils of the district are derived from Granites, Gneisses and Schistose rocks. The sandy loam soil mixed with black and grey soil occurs along the stream beds. These are originated from gneisses and granites. They are permeable and mildly alkaline in nature. The thickness of the soil varies from 0.2 to 1.00m. The red soil are the major type of soil in the district, found mainly at elevated places especially at hills. These soils are with high permeability and neutral pH. Black soil with high initial infiltration rate when dry and cracked. On getting wet cracks will close and infiltration rate will be very low. These are derived from schistose rocks. The Black soil is found in the prolonged submerged areas and canal command areas having low Permeability. It is calcareous and mildly alkaline in nature. Fringes of hills due to decomposition of rocks and surrounding granitic and gneissic.Watershed map of Bellary district is shown in **Fig. 4.5.**

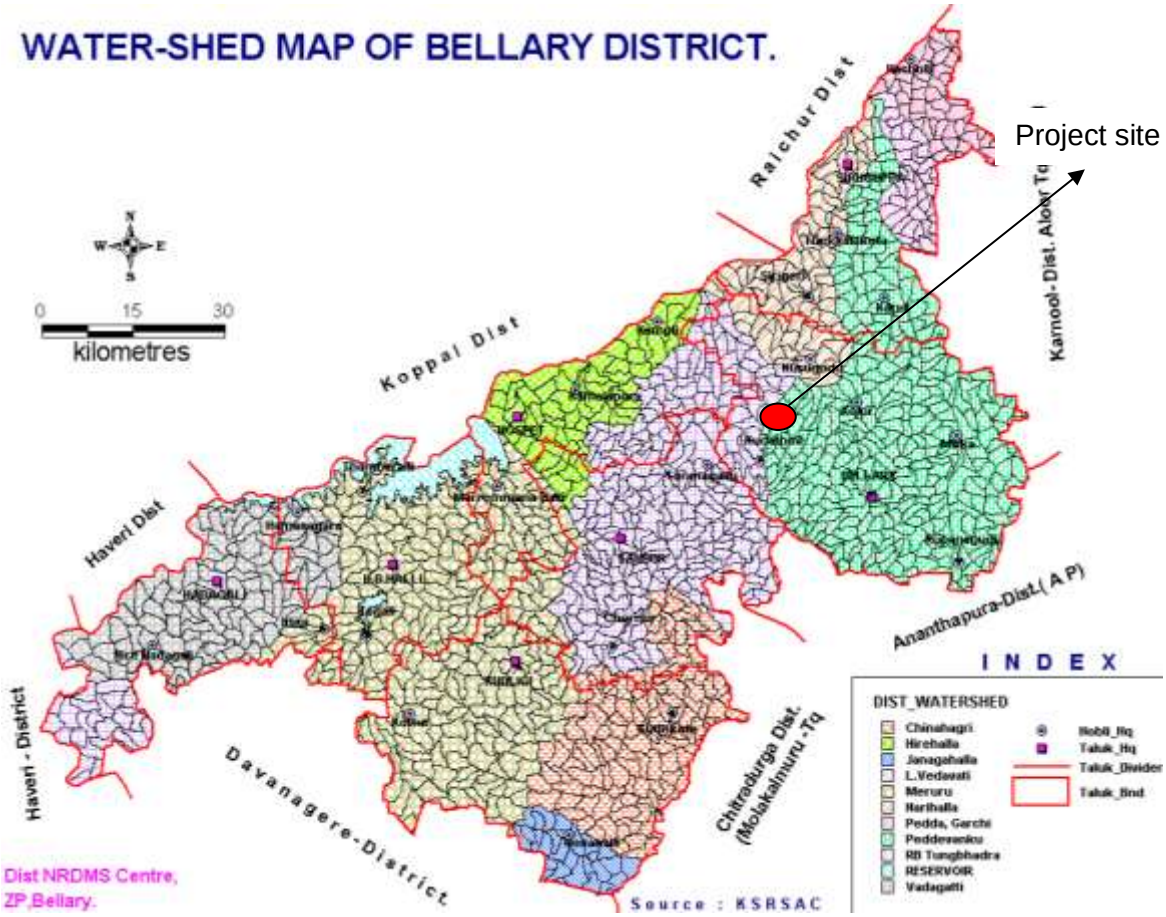



**Fig. 4.5: Watershed Map of Bellary District**

### 4.5.1 Climatic data from secondary sources

Bellary has a semi-arid climate. It has an average elevation of 495 meters. The site stands in the midst of a wide, level plain of black cotton soil. As the area lies in the rain shadow region of the Western Ghats, it receives little rain from the southwest monsoon. The climatic details are provided below in **Table 04 – 01.**

**Table 04 – 01: Climatic Details**

| Sl. No. | Meteorological parameters |
|---|---|
| 1 | High Temperature - 45° C |
| 2 | Average high Temperature- 33° C |
| 3 | Low Temperature – 7.8° C |
| 4 | Average low Temperature- 21.4° C |
| 5 | Rainfall – 610 mm |
| 6 | Humidity- 57% |
| 7 | Predominant wind direction- WNW |

| | |
|---|---|
| 8 | Max. wind speed-17m/s |

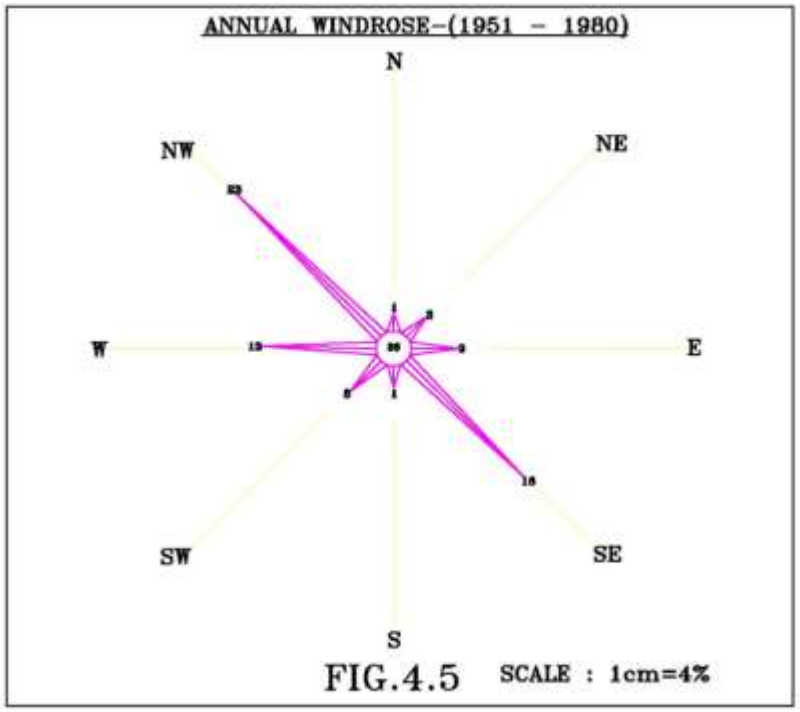



**Fig. 4.6 Overall wind rose (1951 - 1980)**

The annual wind rose is given in the **Fig 4.6**. As per the annual wind rose (1951 - 1980) the predominant wind direction is North-West.

**Rainfall**

From the **Table 04 – 02**, it is observed that 12 year data (2000 to 2011), the annual rainfall in Bellary district varied between 401 mm to 972 mm. The rainfall in Bellary Taluk varied between 254 mm to 958 mm. The average rainfall at Bellary Taluk and Bellary district is 529 mm and 633 mm. The bar graph of annual rainfall of Bellary is shown in the **Fig.4.7.**

**Table 04 – 02: Annual rainfall of Bellary**

| Sl. No. | Taluks | Year with annual rainfall in mm | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **2000** | **2001** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** | **2000 to 2011** |
| 1 | Bellary | 361 | 477 | 387 | **254** | 362 | 586 | 447 | 552 | 770 | **958** | 776 | 423 | **529** |
| 2 | Hadagali | 849 | 582 | 352 | 337 | 588 | 501 | 605 | 844 | 676 | 743 | 639 | 454 | 598 |
| 3 | H.B.Halli | 462 | 588 | 328 | 400 | 517 | 610 | 779 | 666 | 466 | 825 | 665 | 484 | 566 |
| 4 | Hospet | 672 | 759 | **399** | 667 | 523 | 1175 | 594 | 619 | 575 | 881 | **998** | **370** | 686 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | Kudligi | 579 | 585 | 303 | 369 | 780 | 614 | 427 | 489 | 459 | 1153 | 913 | 330 | 583 |
| 6 | Sandur | 812 | 713 | 733 | 444 | 635 | 968 | 669 | 753 | 1010 | 1053 | 1191 | 625 | 801 |
| 7 | Siraguppa | 645 | 781 | 307 | 370 | 739 | 742 | 601 | 909 | 536 | 1192 | 944 | 252 | 668 |
| District total | | 4380 | 4485 | 2809 | 2841 | 4144 | 5196 | 4122 | 4832 | 4492 | 6805 | 6126 | 2938 | - |
| District avg. | | 626 | 641 | 401 | 406 | 592 | 742 | 589 | 690 | 642 | 972 | 875 | 420 | **633** |

Source: District website of Bellary- 2001 census

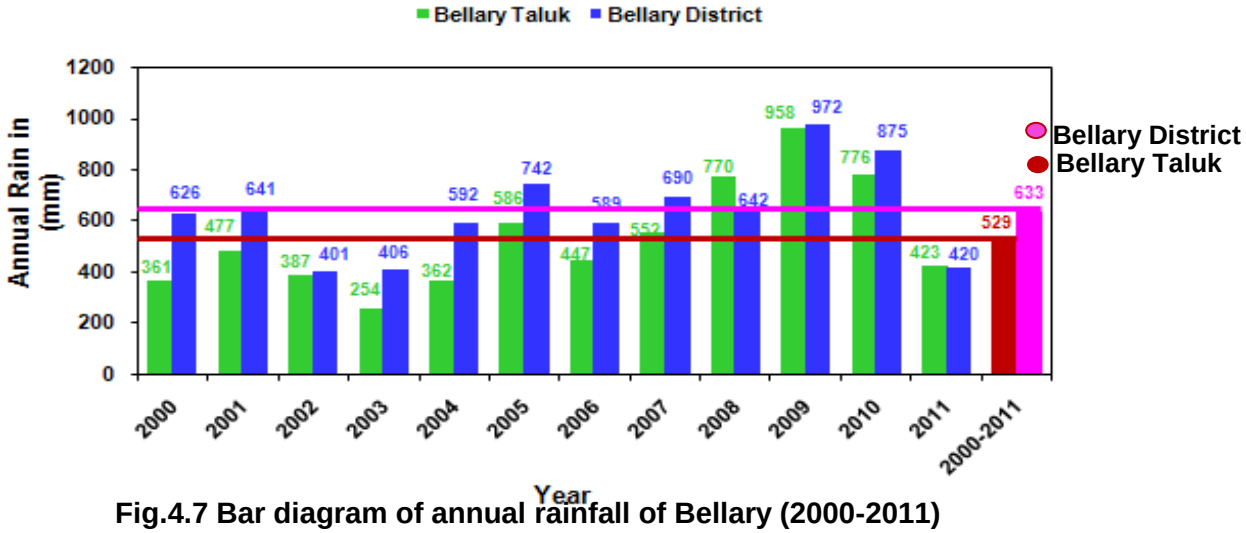



**Fig.4.7 Bar diagram of annual rainfall of Bellary (2000-2011)**

**Social infrastructure available**

**Population**

Bellary district covers an area of about 8446 square kms and is situated in the central region of the eastern sector of the state. Situated in an semiarid zone, Bellary district has a scanty rainfall, and such shortage of rains produces immense and extensive distress among the people. Prior to the major irrigation project on Tungabhadra, the district was prone to frequent famines.

The district is endowed with the major mineral deposits of economic resource such as iron ore, manganese, magnesite, copper, gypsum, gold etc. Among these, iron and manganese ores are the important ones.

Population and occupational pattern of the district are presented in **Table 04 – 03** below:

**Table 04 – 03: Profile of Bellary District**

| Item | Year | Unit | Bellary District |
|---|---|---|---|
| Population | 2011 | No. of people | 2452595 |
| Male | | | 1236954 (50.43%) |
| Female | | | 1215641 (49.57%) |
| Rural | | | 1532356 (62.48%) |
| Urban | | | 920239 (37.52%) |
| Schedule Castes | | | 517409 (21.10%) |
| Schedule Tribes | | | 451406 (18.41%) |
| Population density | 2011 | No. of people/sq. km | 290 |
| Literates | 2011 | No. of people | 1421621 |
| Male | | | 813440 |
| Female | | | 608181 |
| Average Literacy rate | 2011 | % of population | 67.43 |
| Male | | | 76.74 |
| Female | | | 58.09 |
| Sex Ratio | 2011 | Per 1000 people | 983 |
| Workers | 2011 | No. of people | |
| Total workers | | | 1116880 (45.54%) |
| Main workers | | | 969388 (39.52%) |
| Marginal workers | | | 147492 (6.01%) |
| Non-workers | | | 1335715 (54.46%) |

The district has some large-scale industries along with a large number of medium and small scale units. At the household level, cotton handloom weaving, weaving of woolen rug, manufacture and repair of leather foot-wear, pottery are of considerable importance. Trading and commercial activities also have considerable significance.

**Education**

The number of schools and colleges available in the Bellary Taluk is tabulated in **Table 04 – 04.**

**Table 04 – 04: List of number of Schools and Colleges in Bellary Taluk**

| Sl. No. | Particulars | Unit | Number |
|---|---|---|---|
| 1 | Lower primary schools | Number | 158 |
| 2 | Higher primary schools | Number | 313 |
| 3 | High schools | Number | 159 |
| 4 | P U colleges | Number | 36 |
| 5 | Degree college –govt. | Number | 04 |

| Sl. No. | Particulars | Unit | Number |
|---|---|---|---|
| 6 | Degree college –private | Number | 02 |
| 7 | Medical colleges | Number | 01 |
| 8 | Ayurvedic colleges | Number | 00 |
| 9 | Dental colleges-govt. | Number | 01 |
| 10 | Dental colleges-private | Number | 00 |
| 11 | Polytechnic colleges-govt. | Number | 01 |
| 12 | Polytechnic colleges-private | Number | 03 |
| 13 | Engineering colleges-govt. | Number | 00 |
| 14 | Engineering colleges-private | Number | 02 |
| | District Library | Number | 01 |
| 15 | Rural branch library | Number | 00 |
| 16 | Gram panchayat library | Number | 40 |

Source: District website of Bellary **-** Education Department, DDPI from DISE.

**Health Centre**

The number of hospital and public health centers available at Bellary Taluk is shown in the **Table 04 – 05.**

**Table 04 – 05: Hospitals and health centre**

| Sl. No. | Description | Bellary district | Bellary Taluk |
|---|---|---|---|
| 1. | Taluk HQ hospital | 6 | 00 |
| 2. | District Hospital | 1 | 01 |
| 3. | Govt. Hospitals | 71 | 15 |
| 4. | Nursing Home | 70 | 41 |
| 5. | Clinics | 162 | 109 |
| 6. | Allopathy Hospitals | 14 | 11 |
| 7. | Indian system hospitals | 06 | 02 |
| 8. | Private Hospitals | 232 | 150 |
| 9. | Primary health centre | 55 | 12 |
| 10. | Community health centre | 08 | 01 |
| 11. | Family welfare centre | 81 | 28 |
| 12. | Family welfare sub-centre | 369 | 80 |

Source: District website of Bellary - Education Department, DDPI from DISE.

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# CHAPTER- 5

# PLANNING BRIEF

## 5.1 Planning concept

The plant will be located near Kuduthini village of Bellary district in Karnataka. The proposed project is a green field project. The proposed project site has been shown in **Fig. 4.4.**

## 5.2 Population projection

The total population of Bellary district as on 2011 is about 24.52 lakh and Bellary Taluk constitute about 7.70 lakh. The population growth rate during 2001-2011 is about 24.92% against district growth of 20.99%. The density of the population is i.e.,370/sq. km against 290/sq.km of the district. The literacy rate of Bellary Taluk is about 67.85% as per 2011 census.

There are about 96 revenue villages are falling under Bellary Taluk. Out of which about 15 villages are falling within 10 km radius from the project site. Among these villages, Kuduthini village is located at 3.0 km from the project site. The details of the villages with the population falling in the study area of 10 km are shown in **Table 05 – 01.**

**Table 05 – 01: List of villages with population within 10 km radius**

| Sl. No. | Village name | Total no. of households | Population | | | Literature | |
|---|---|---|---|---|---|---|---|
| | | | Total | Male | Female | Male | Female |
| 1 | Yerabanahalli | 141 | 628 | 322 | 306 | 233 | 149 |
| 2 | Chikkantapur | 291 | 1449 | 742 | 707 | 513 | 332 |
| 3 | Haraginadone | 487 | 2573 | 1296 | 1277 | 773 | 514 |
| 4 | Janikunte | 348 | 1854 | 933 | 921 | 657 | 371 |
| 5 | Belagal | 1051 | 5826 | 2986 | 2840 | 1887 | 1141 |
| 6 | Kuduthini | 3980 | 18215 | 9661 | 8554 | 6461 | 3882 |
| 7 | Veniveerapura | 441 | 2326 | 1190 | 1136 | 869 | 542 |
| 8 | Thimmalapura | 451 | 2191 | 1106 | 1085 | 643 | 413 |
| 9 | Yelubemchi | 818 | 4050 | 1988 | 2062 | 1115 | 768 |
| 10 | Siddammanahalli | 1250 | 6133 | 3047 | 3086 | 1715 | 1246 |
| 11 | Badanahatti | 1587 | 8594 | 4365 | 4229 | 1739 | 1114 |
| 12 | Kolagallu | 2349 | 11585 | 5862 | 5723 | 3376 | 2296 |
| 13 | Vaddahatti | 834 | 4397 | 2161 | 2236 | 1230 | 858 |
| 14 | Somasamudra | 1536 | 7958 | 3989 | 3969 | 2458 | 1702 |
| 15 | Yarringaligi | 1055 | 5119 | 2553 | 2566 | 1586 | 1025 |
| | **Total** | **16619** | **82898** | **42201** | **40697** | **25255** | **16353** |

*Source: Census data 2011*

## 5.3 Land use planning

The proposed project site is about 11 km north west of Bellary town. In the north direction of project site an irrigation canal (Tungabhadra High Level Canal) runs adjacent to plant boundary and on the south lies the railway line of SCR (Guntakal-Hospet Section). ACC cement plant is located at south western corner of the proposed plant boundary.

The widely accepted MoEF&CC classification system which encompasses all possible categories is shown in the following **Table 05 – 02**.

**Table 05 – 02: Classification of Land use/Land cover pattern by MoEF&CC**

| | | | |
|---|---|---|---|
| **1** | Built-up land | 1.1 Built-up land urban | Core urban<br>Peri-urban |
| | | 1.2 Built-up land rural | Village<br>mixed settlement<br>hamlets and dispersed household |
| | | 1.3 Mining/Industrial | Mining/Industrial |
| | | 1.4 Transportation | Transportation |
| **2** | Agricultural land | 2.1 Crop land<br>Fallow land (Current)<br>Agricultural plantation | Crop land<br>Fallow land (Current)<br>Agricultural plantation |
| **3** | Forests | 3.1 Scrub forest<br>3.2 Forest plantation | Scrub forest<br>Forest plantation |
| **4** | Grassland & grazing land wastelands | angrove/swamp area<br>Grassland & grazing land<br>Land with scrub<br>Land without scrub<br>Barren rocky/stony<br>Waste/sheet rock area<br>Salt affected land<br>Water logged | Mangrove/swamp area<br>Grassland & grazing land<br>Scrub land dense<br>Scrub land open<br>Barren rocky<br><br>Salt affected land<br>Water logged |
| **5** | Water bodies | 5.1 River/stream/drain<br>5.2 Canal<br>5.2 Lake/ponds<br>5.3 Reservoir/tanks<br>5.4 Coastal wetlands<br>5.5 Inland wetlands | River/stream/drain canal<br>Lake/ponds<br>Reservoir/tanks<br>Coastal wetlands<br>Inland wetlands – natural<br>Inland wetlands – man-made |

The above table is the basis for classification and mapping of land use/land cover in and around M/s. UGFL project site at Bellary. As explained earlier, the above

classification system is derived by internationally accepted image interpretation techniques. It is observed that in the study area, the land use is influenced by terrain characteristics and climatic conditions. The landuse/land cover pattern of study area is shown in **Fig. 5.1**

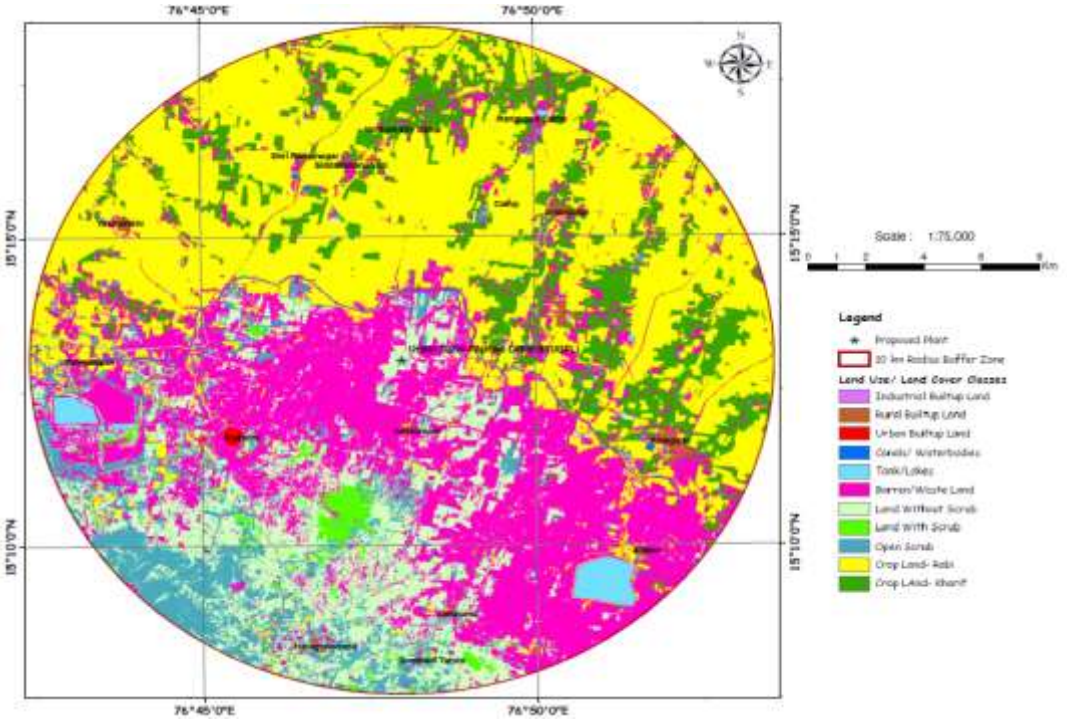


**Fig. 5.1 Land use-Land cover pattern of the study area**

## 5.4 Seismology

The site is located in zone II of seismic zoning map of India as per IS 1893-2002 which associated with low seismic potential. The detailed geological and seismological investigations revealed that the site is outside the range of capable fault within 5 km from the project site. The design basis seismic parameters are evaluated based on geological seismological information.

## 5.5 Assessment of infrastructure demand

The proposed plant will be located at near Kuduthini village. The project site is fenced with barbed wire. Inside the plant all the required infrastructure like internal roads, water supply, storm water drains will be developed as the project progress further.

## 5.6 Amenities/facilities

The site is well connected by road and rail. Presently the site is connected by a State Highway. The site is located at about 1.5 km from NH-67. The site will be made physically isolated from the surroundings by barbed wire fence/rubble masonry wall on all sides. Other physical protection measures (security) have also been adopted for the site.

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# CHAPTER- 6

# PROPOSED INFRASTRUCTURE

## 6.1 Industrial area (Processing area) - Plant Site

The layout already shown is spread over the acquired land of 4877 acres in Kuduthini and nearby villages. The following units shall be constructed in the project site.

- Iron ore beneficiation plant
- Pelletizing plant
- Coke oven & By-product plant
- Sinter plant
- Blast furnace
- BOF Steel making
- Continuous casting machines(Thin slab caster, Billet-cum-bloom caster, Slab caster, Bloom caster)
- Rolling mills ( HSM, Re-bar Mill, Wire Rod mill, Plate Mill and Structural & Section Mill)
- Oxygen and calcining plant
- Power plant
- Fire Station
- Canteen
- Water tanks
- Main power receiving station
- Other Facilities: This includes Sewage Treatment Plants (STP), BOD plant, Effluent Treatment Plant (ETP), Raw Water Treatment Plant (RWTP), Rainwater Harvesting Pond, First Aid Centre, Solar Park, Diesel Storage yard, Security towers, all roads and storm water drains etc.

## 6.2 Green belt

Green Plants remove pollutants from the air, release oxygen, attenuate noise, improve aesthetics and provide a habitat for small mammals, birds and insects. Developing plantation around and within an industrial project site is considered to be a natural means of improving the environment and is expected to offset, at least partially, the likely negative ecological impacts caused by the project.

Under plantation programme, green belt will be developed around the plant boundary. About 33% of the total land (1642 acres) is proposed for green belt plantation during the initial five years. The species to be grown in the areas should be dust tolerant and hardy species so that a permanent green belt is created.

The plants having following characteristics will be chosen for plantation.

- Ability to tolerate and remove air pollutants.
- Ability to grow in the area.

- Rapid rate of growth.
- Evergreen habit
- Large crown volume
- Small leaves with smooth surface
- Should not have adverse effects on soil chemistry and ground water.
- Have aesthetic value.

All these traits are difficult to get in a single species. Therefore a combination of several species with all these traits is sought while planning a plantation. The plantation should be planted close to the source or close to the area to be protected to optimize attenuation within physical limits.

The areas that need special attention under plantation development are:

- Along plant boundary
- Along the side of roads
- Around offices and other buildings
- Stretches of open land at project site complex

The following species are having a better chance of survival in this region. Plantations will be done at a spacing of 2 x 2 m. The expected rate of survival will be around 60%. The efforts to improve the survival of the saplings and their healthy growth will be taken up like watering, fencing, keeping watch and ward and seeking guidance from the local Forest Dept.

**Along Plant Boundary**

The row of plants facing plant should be smaller species and those facing outside should be taller species. The species suggested for plantation is given below in a table:-

| SL. NO. | COMMON NAME | SCIENTIFIC NAME |
|---|---|---|
| 1. | Kaachu | *Acacia catechu* |
| 2. | Kare Jaali | *Acacia nilotica* |
| 3. | Bilva | *Aegle marmelos* |
| 4. | Dodda mara | *Ailanthus excels* |
| 5. | Ankole | *Algangium salvi* |
| 6. | Chujjulu | *Albizia amara* |
| 7. | Baage | *Albizia lebbeck* |
| 8. | Dindiga | *Anogeissus latifolia* |
| 9. | Bevu | *Azadirachta indica* |
| 10. | Bindiru | *Bambusa arundinacea* |
| 11. | Maddi mara | *oswellia serrata* |
| 12. | Kakke | *Cassia fistula* |
| 13. | East Indian Satinwood | *Chloroxylon swietenia* |
| 14. | Ganjigarike | *Chrysopogon fulvus* |

| | | |
|---|---|---|
| 15. | Beete mara | *Dalbergia latifolia* |
| 16. | Pachari mara | *Dalbergia paniculata* |
| 17. | Shishta bage, Brithimara | *Dalbergia sissoo* |
| 18. | Gandubidiru | *Dendrocalamus strictus* |
| 19. | Tumri | *Diospyros melanoxylon* |
| 20. | Aala | *Ficus benghalensis* |
| 21. | Attimara | *Ficus racemosa* |
| 22. | Arali | *Ficus relihiosa* |
| 23. | Shivani | *Gmelina arborea* |
| 24. | Sannudippe | *Grewia tiliifolia* |
| 25. | Asanagurgi | *Hardwickia binata* |
| 26. | Tapasimara | *Holoptelea integrifolia* |
| 27. | Hole daasawaaala | *Lagerstroemia parviflora* |
| 28. | Oodi mara | *Lannea coromandelica* |
| 29. | Baela | *Limonia acidissima* |
| 30. | Ippe | *Madhuca Longifolia var.latifolia* |
| 31. | Kadavala | *Mitragyan parvifolia* |
| 32. | Haladi paavate | *Morinda pubescens* |
| 33. | Nelli | *Phyllanthus emblica* |
| 34. | Kaaduhunise | *Pithecelobium dulce* |
| 35. | Honge | *Pongamia pinnata* |
| 36. | Hone | *Pterocarpus marsupium* |
| 37. | Srigandha | *Santalam album* |
| 38. | Somi mara | *Soymida febrifuga* |
| 39. | Nerale | *Syzygium cumini* |
| 40. | Thaega | *Tectona garndis* |
| 41. | Arjuna | *Terminalia arjuna* |
| 42. | Thaare | *Terminalia bellirica* |
| 43. | Alale | *Terminalia chebula* |
| 44. | Haale | *Wrightia tinctoria* |
| 45 | Bore | *Ziziphus mauritina* |

## 6.3 Social infrastructure

School, medical aid, park, shopping complex, training facility, supporting water supply scheme to the nearby villages, roads and other amenities shall be developed. Detailing on social infrastructure is done in the **Chapter - 4** under the section social infrastructure available.

## 6.4 Drinking water management (source and supply of water)

Total water requirement for plant operation shall be 6045 $m^3$/hr. The source of the raw water is down stream of Tungabhadra River at Nadvi/Rudrapadam. Water pipeline shall be laid from Nadvi to project site for about 35km distance. It has been planned to construct water storage reservoir of suitable capacity at the project site itself to store the excess water flowing in the river during monsoon season.

## 6.5 Sewerage system

All effluent will be treated to meet the statutory norms and reused in the plant to ensure zero discharge.

About 10.5 $m^3$/hr of treated sewage will be generated from STP, and the same will be used for green belt development.

### 6.6 Solid waste management

Solid waste generated from ISP shall be reused/recycled upto maximum extent possible within plant. Those solid waste which can be used as raw material in other plant shall be sold such as Filter cake and BF granulated slag and fly ash to cement industry. While, BOF slag shall be used for road making within plant and subsequently sold to Road infrastructure developing companies.

### 6.7 Power requirement and supply/ source

The average power demand of the plant at maximum connected load is estimated to be 650 MW. The electrical Power to the tune of 893 MW shall be generated from waste gases from coke ovens/ BF/BOF, TRT from BF and CFBC based CPP. Additional power of 40MW shall be available from CDQ operation in Coke ovens unit.

It is proposed to meet the entire requirement of electric power from the captive sources taking the support of state electricity grid for stability.

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# CHAPTER- 7

# REHABILITATION AND RESETTLEMENT (R & R PLAN)

## 7.1 Rehabilitation and Resettlement (R & R) Plan

The project site of about 4877 acres, which is located at Village Kuduthini and nearby villages, in Bellary Taluk and District, Karnataka state. The chosen project site is a readily available dry and barren land and no habitation exist in that land parcel, hence no R & R issues involves.

As matter of policy, UGFL management shall plan suitable CSR in surrounding villages for upliftment of habitants and help in socio-economic development of the region.

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# CHAPTER- 8

# PROJECT SCHEDULE AND COST ESTIMATE

## 8.1 General

This chapter shall provide the information regarding the project schedule and cost estimates and expenditure on the implementation of Environmental Management plan.

## 8.2 Project schedule

The construction work is expected to commence in the year 2022 on obtaining statutory clearances and commissioning of the plant to reach the ultimate capacity is expected in 2027-28.

## 8.3 Cost Estimate

The estimated capital cost of the project is about Rs 36,000/- crores. The cost for pollution control and monitoring measures like ventilation, air conditioning, are included in the capital cost.

The recurring cost for environmental quality improvement/monitoring is separately indicated to know the yearly expenditure. Other features which form an integral part of the plant design like stacks, ash handling equipment are not included in the analysis. But, constructions of STP, BOD plant, $H_2S$ recovery plant and other environmental measures like collection pits are included in the analysis.

**Table 08 – 01** gives the breakup of the cost for various control measures.

- In addition to those indicated in the table, there are a number of other features, which forms an integral part of the plant design and contribute to either save energy or to decrease the energy consumption.
- Likewise, the costs of fire protection and physical protection measures are not considered, although there may be secondary environmental consequences due to fires or security lapses.
- The estimates of recurring costs includes only the revenue expenses for operating the respective facilities. The salary of staff and capital depreciation are not included.

**Table 08 – 01: Cost of pollution control and monitoring measures**

| Item | Capital cost (Rs. In Crores) | Recurring cost per annum (Rs. In Crores) |
|---|---|---|
| **Environmental pollution control** | | |
| Air pollution control including CDQ for coke oven | 1500 | 150 |
| Dust suppression system (dry fog for raw material handling, sinter | 650 | 65 |

| Item | Capital cost (Rs. In Crores) | Recurring cost per annum (Rs. In Crores) |
|---|---|---|
| plant, junction towers) | | |
| Primary and secondary de-dusting system at coke oven, BF, SMS and calcination plant | 1490 | 149 |
| Water pollution control (ETP-Coke oven and STP) | 600 | 60 |
| Fume extraction at rolling mill complex | 200 | 20 |
| Solid waste management includes tailing disposal, ash pond etc. | 630 | 63 |
| Noise pollution | 20 | 2 |
| Occupational health | 50 | 5 |
| **Environmental and pollution monitoring** | | |
| Environmental survey and sampling | 25 | 3 |
| Green belt development | 100 | 10 |
| Rainwater harvesting | 150 | 15 |
| Continuous monitoring | 30 | 3 |
| CER fund for PH issues | 180 | 18 |
| **Total** | **5625** | **563** |

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# CHAPTER- 9

# ANALYSIS OF PROPOSAL

## 9.1 GENERAL

Development of industrial projects does not necessarily have adverse impact on the environment. There is always an associated beneficial impact. The proposed project will fulfill the demand of nation for steel consumption. The major benefits that can be anticipated are in terms of (i) employment for the locals, both in the skilled and the semi-skilled category (ii) increased opportunities for peripheral development (iii) development of infrastructure such as schools, hospitals and roads and (iv) growth of small scale industries. In some sense, impacts from these are generally difficult to quantify in a precise manner. Since the proposed project is an green field project there will be an infrastructural development of the area which will benefit the local people enhanced livelihood.

## 9.2 EMPLOYMENT AND ECONOMIC BENEFITS

The plant will provide substantial job opportunities for the locals and persons from Bellary Taluk. Besides, about 5000 persons belonging to nearby villages are likely to be engaged every day for outsourced works as contract labour in the project activities.

In total, it is expected that around 6427 job opportunities will get created due to this ISP. However, this numbers will be reached over a period of time as per the progress of project. Needless to mention that, during the construction phase of about 5 years, on an average, about 1000 laborers will get employment opportunity.

One can also expect growth in the commercial activities commensurate with the anticipated increase in population. Migration and urbanization of adjoining areas also adds to the opportunities.

Transport and communication facilities will vastly improve. Besides the mass transport by state run buses, availability of taxis and autos will grow appreciably.

## 9.3 BENEFITS FROM WELFARE ACTIVITIES

As and when the proposed project is approved and the construction begins, M/s. UGFL would be spending CSR fund as per Government stipulation. The amount would be spent for essential purposes like Schools, medical aid, parks, and supporting water supply scheme to the nearby villages, roads and other amenities.

## 9.4 RECOMMENDATION

The proposed project is likely to bring in additional benefits to the areas surrounding the plant in terms of increase in the educational, health, infrastructure and employment potential.

Like in any other project increase in the employment potential both direct as well as through contractual labour would bring in additional income for the people living around the project area.

Proposed project of UGFL would also join and strengthen the ongoing social welfare activities, contributing in terms of resource and manpower. There will be overall socio-economic development of the surrounding region due to this project and also huge exchequer revenue shall accrue to state and central Government by way of direct and indirect taxes. Therefore, the project is having National importance and shall be permitted to be implemented.

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