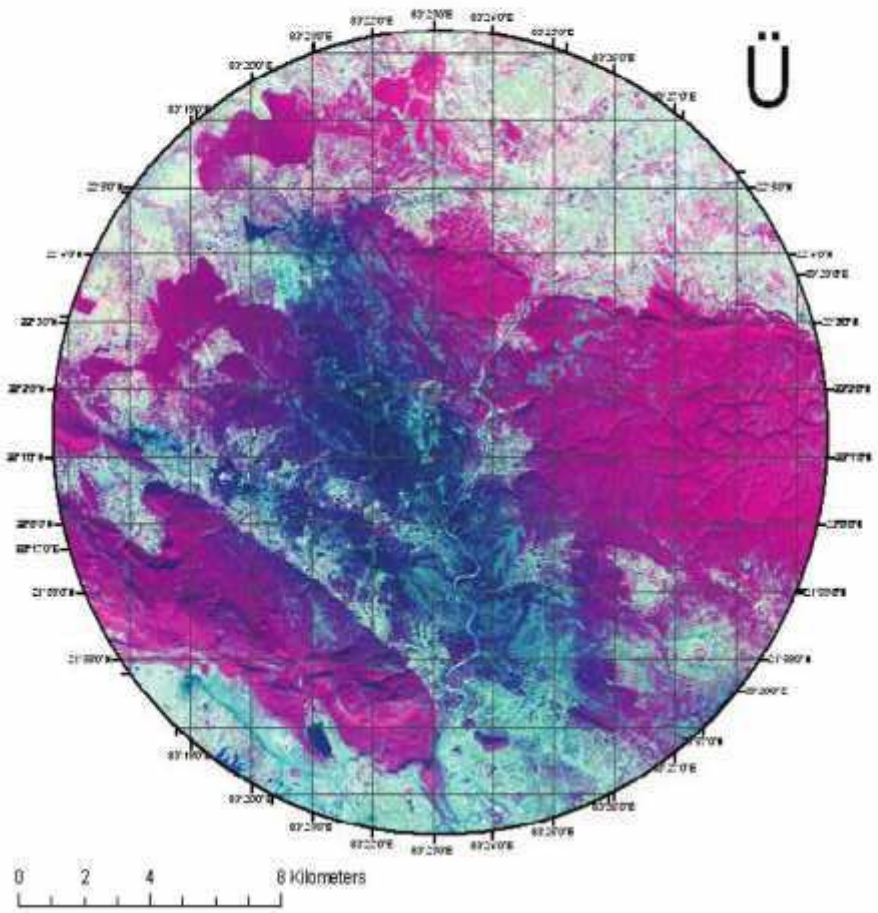

Land use/ Land Cover Map of 10 kms Area around Site (NRSA Imagery, IRS P6)

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SUMMARY ENVIRONMENT IMPACT ASSESSMENT REPORT

Expansion of Integrated Steel Plant

near village Taraimal

District Raigarh (Chhattisgarh)

NALWA STEEL & POWER LIMITED

RAIGARH, CHHATTISGARH

OCTOBER 2011

(Resubmitted on November 2013 after extension of TOR Validity)

CONTENTS

1.0 Project Description

1.1 Introduction: Nalwa Steel & Power Limited (NSPL) is operating a steel plant at village Taraimal, tehsil Gharghoda, District Raigarh, Chhattisgarh. The expansion proposal of Nalwa Steel & Power Limited includes iron and steel making, steel rolling sinter plant, coke oven, oxygen plant and producer gas plant Waste heat and char will be used for power generation. The activity falls under Category A Serial 3 (a) of EIA Notification 2006. The Terms of Reference for the EIA study was approved by the Ministry of Environment & Forests, Government of India (MOEF) in its 19th meeting held on 22-23 February 2011. The TOR letter was issued vide letter No.J.11011/1108/ 2007/ IIA-(I) dated 13th April 2011 and extension of validity of TOR vide letter dated 12th November 2013. The draft EIA report has been prepared for public hearing as per the TOR.

1.2 Project Cost: The estimated cost of expansion project is Rs.3500 crores.

1.3 Land Requirement: About 120 hectares land will be acquired for the expansion project. No displacement of human settlement is involved.

1.4 Water Requirement: 22680 kl/day water will be required for the expansion project, which will be taken from Mahanadi River and transported by pipelines. Permission to draw 20 MCM water has been given by Chhattisgarh Government.

1.5 Raw Materials: Raw Materials like iron ore, coking coal, limestone, dolomite, etc will be transported by rail upto railway siding near Karorimalnagar and then by road. Coal will be transported from captive mines at Gare IV/6 Block using conveyor.

1.6 The name and capacity of existing and proposed units are given below:

	Name of Unit	Existing Capacity	Proposed Addition	Final Capacity
1	Blast Furnace	Nil	318,500 TPA	318,500 TPA
2	Sponge Iron Plant	198,000 TPA	726,000 TPA	924,000 TPA
3	Sinter Plant	Nil	408,100 TPA	408,100 TPA

4	Coke Oven	Nil	200,000 TPA	200,000 TPA
5	Steel Making Shop (EAF)	-	624,000 TPA	624,000 TPA
6	Steel Making Shop	160000 TPA (2x12 tons + 1x30 tons Induction Furnace)	249,500 TPA (3 x 30 tons Induction Furnace)	409,500 TPA (4 x 30 tons IF)
	Total Steel Production			1033,500 TPA
7	Rolling Mill	250,000 TPA	200,000 TPA	450,000 TPA
8	Coal Washery	1320,000 TPA	4000,000 TPA	5320,000 TPA
9	WHRB based CPP	8 MW	60 MW	68 MW
10	AFBC based CPP using coal, rejects and char	16 MW	135 MW (CFBC)	151 MW
	Total Power Generation			219 MW
11	Producer Gas Plant	12000 Nm^3/hr	12000 Nm^3/hr	24000 Nm^3/hr
12	Oxygen Plant	100 Nm^3/hr	3000 Nm^3/hr	3100 Nm^3/hr
	Nitrogen		12000 Nm^3/hr	12000 Nm^3/hr
	Argon		70 Nm^3/hr	70 Nm^3/hr

Note: Coal washery has been excluded in the EIA Study

Brief Manufacturing Process

Blast Furnace: It is a vertical furnace. Sinter, iron ore, coke, quartzite and limestone are charged from furnace top that slowly travels down and comes in contact with upcoming hot air. Coke reduces iron ore to iron and also supplies heat. Iron ore gets converted to iron and impurities are converted to slag, which is taken out at regular intervals. Blast furnace gas will be used as fuel in the stoves. The molten iron is converted to pigs or directly taken to SMS.

Sponge Iron Plant: Crushed raw materials (Iron ore, coal & dolomite) are fed to the kiln. Coal provides the source of heat and also acts as reducing material to turn iron ore into iron. Sponge iron produced is separated from waste materials in magnetic separator, screened and sent to steel making shop.

Sinter Plant: Sintering process recovers iron from waste materials that would otherwise be dumped. Iron ore fines and dust containing iron, mill scales, limestone and coke and coal fines are mixed, converted to nodules and sintered in sintering furnace. Blast furnace gas will be used as fuel in the sintering furnace.

Coke Oven: Non-recovery type coke oven shall be used. Coke is formed by pyrolysis of coal (heating in absence of oxygen). Coal is compacted to form cake, which is put inside series of ovens with the help of pusher machine. The hot gases heat up the cake in the sealed oven. Volatile matter present in the coal are burnt and used for steam and power generation using WHRB. The solid carbon remaining in the oven is taken to quenching tower, where it is cooled with water spray. The coke is screened and sent to BF.

Steel Melting Shop (SMS): Pig iron, sponge iron, lime and ferroalloy is charged from the top of Electric Arc Furnace / Induction Furnace. Arcing melt the contents. Oxygen blowing is done. Steel is tapped and chemistry correction is done in laddle refining furnace. Liquid steel is casted into billets in continuous casting machine. Slag is taken out from slag tap hole.

Rolling Mill: Steel billet is rolled into different products in the Structural Mill. Producer gas will be used as fuel in the reheating furnace.

Air Separation Plant (Oxygen Plant, Nitrogen and Argon); Air separation process is done cryogenically, where nitrogen, oxygen and argon from atmospheric air are separated.

Producer Gas Plant: Steam is passed over a bed of hot coal so that it releases CO, H_2 and CH_4 (Mixture of carbon monoxide, hydrogen & methane is known as producer gas).

Power Plant: In power plant high pressure steam is produced using pressurized boilers, which are fed to turbines for generating electricity. Coal, rejects and char shall be mixed and used as fuel in FBC boilers to generate electricity. Waste heat from Sponge Iron Plant, Coke Oven gas and Blast Furnace gas shall be used in WHRB to generate electricity. Electricity shall be used for captive consumption.

2.0 Description of the Environment

Baseline environmental data generation of study area was carried out during the period 20th March 2011 to 20th June 2011. Data was generated by following the standards / approved procedures of the Ministry of Environment & Forests and the Central Pollution Control Board. Study area of 10 km radial distance around the site has been considered for environmental baseline data generation.

2.1 Micro-Meteorological Environment: Met station has been established inside NSPL premises. Historic met data was collected from India Meteorological Department. The predominant wind direction is from northeast sector. The average wind speed ranges from 0.5 to 5.7 m/s. Daily mean temperature vary from 20.4^{o}C to 42.6^{o}C. The relative humidity varied from 20 - 50%. The annual rainfall is 1602 mm.

2.2 Air Quality: The PM2.5, PM10, SO2, NO2 and other pollutant levels were monitored at eight locations in the study area. The observed mean levels of criteria pollutants are as follows; PM2.5 33 to 54 µg/m^3, PM10 39 to 74 µg/m^3, SO2 5.0 to 11.6 µg/m^3 and NO2 9.0 to 22.4 µg/m^3. The baseline air quality levels are within the National Ambient Air Quality Standards prescribed for residential and industrial area (Standards are 60, 100, 80 and 80 µg/m^3 for PM2.5, PM10, SO2 and NO2).

2.3 Noise Quality: Ambient noise levels were monitored at 8 locations in the study area. The observed Leq levels for day range from 46.8 to 52.8 dB (A) and night time

ranges from 40.5 to 42.9 dB (A). The baseline noise levels are well within the National Standards for residential area (Standards are 55 dBA-day and 45 dBA-night time).

2.4 Water Quality: Eight surface water samples and eight groundwater samples were collected from the study area for chemical and biological analysis. The surface water quality and groundwater quality of the study area are satisfactory. The pH of groundwater was found in acidic range. No metallic or bacterial contamination was found in the water quality.

2.5 Soil Quality: Six soil samples were collected from the study area and analyzed. The texture of soil is sandy loam. The organic matter, nitrogen, potassium and phosphorus content of the soil are moderate. The pH and conductivity of all the soil samples are within the acceptable range.

2.6 Ecology Quality: The canopy of the forests is dominated by sal. mahua, beeja, tendu, saja, etc are the dominant plant species of the study area. Mongoose, porcupine, jungle cat, cobra, krait, and variety of birds are the common animals of the study area. No endangered species of plants and animals are found in the study area.

2.7 Sensitive Ecosystem: Within 10 km distance of the project site, no plant or animal species were found to be on the endangered list. No ecologically sensitive area like biosphere reserve, tiger reserve, elephant reserve, migratory corridors of wild elephant, wetland, national park and wildlife sanctuary are present within 10 km distance of the project site. Reserve and Protected Forests surrounds the project site in all directions. Movement of stray elephants and sloth bear has been noticed on the north and east side of study area. Historical caves containing rock paintings (like Singhanpur caves, Usha Koti paintings, etc) are present at various locations in the Raigarh district. Several natural water reservoirs and springs are also located in the study area.

Agriculture, collection of forest produce and industrial workers dominate the occupation structure of the study area. Several sponge iron plants, induction furnaces, rolling mills, ferroalloy plants, brick kilns, power plants, and other small units are present in the study area.

3.0 Anticipated Environmental Impact & Mitigation Measures

3.1 Air Quality: The major pollutants from the project will be dust, SO_2 and NOx Particulate Matter emissions from Sponge Iron Plant, Sinter Plant and Power Plant will be controlled using Electrostatic Precipitators and the outlet emission will be restricted within 50 mg/Nm^3. Particulate Matter emissions from SMS will be controlled using Fume Extraction System connected to Bag Filters and the outlet emission will be restricted within 50 mg/Nm^3. Particulate Matter emissions from Blast Furnace will be controlled using dust catcher followed by 2-stage wet venturi scrubber and the outlet emission will be restricted within 10 mg/Nm^3. Unit-wise air pollution control systems & stack height is given below:

	Name of Unit	**Air Pollution Control Device**	**Stack height, (m)**
1	Blast Furnace	Multiclone & 2 stage wet venturi scrubber	48
2	BF Stock House	Bag Filters	30
3	DRI Plant Dedusting	Bag Filters	30
4	DRI Kiln	ESP	70
5	Sinter Plant Dedusting	ESP	45
6	Sinter Machine	ESP	80
7	SMS (EAF)	FES and Bag Filters	60
8	SMS Plant Dedusting	Bag Filters	30
9	SMS (IF)	FES and Bag Filter	30
10	SMS (IF) Dedusting	Bag filter	30
11	Rolling Mill	None	50
12	Coke Oven	Lime Scrubber	40
13	Power Plant (135 MW CFBC Boiler)	ESP	130

All internal roads will be made pucca. All roads and shop floors will be cleaned regularly. Fugitive dust from all sources like stock house, day bins, material handling, crushing, screening, etc will be controlled using plant deducting systems comprising suction, ducting and bag filters. Water spraying will be done to suppress the dust generated during construction activity.

Mathematical modeling study proved that the maximum incremental ground level concentration of PM, SO_2 and NOx from the expansion units will not violate the residential ambient air quality standard. The impact of the project will be observed at a distance upto 1.5 – 4.0 km in southeast direction. The ambient air quality will remain well within the prescribed standard hence it will not create any adverse impact on human health and ecology.

Parameter	Background level at downwind direction (max)	Predicted maximum GLC from NSPL	Resultant Concentration	NAAQS LULC: Residential, Industrial
SO_2	11.6	21.9	33.5	80
NO_X	22.4	5.6	28.0	80
PM_{10}	74	6.3	80.3	100
$PM_{2.5}$	54	6.3	60.3	60

Unit: µg/m^3, 24-hour average

3.2 Noise Quality: Unloading and hauling operations and movement of trucks and dumpers will be properly scheduled to minimize construction noise. The air compressors, rotating machines, pumps, ID fans, air blast, blowers, mill operations, turbines, will be the major sources of noise. All activities will be carried out inside sheds and maintenance program for equipment will be routinely followed. Sound absorbing materials will be provided in the room where both the source and receiver are present so that the reflecting sound is absorbed. Greenbelt will further reduce the noise level. In noisy work areas soundproof duty rooms will be provided. Workers working in noisy areas will be given ear plugs. In this manner the noise level will be

restricted within the plant boundary to meet the standards of 75 dBA during day time and 70 dBA during night time.

3.3 Water Quality: 22680 kl/day of water will be taken from Mahanadi River. Rainwater harvesting structures will be constructed as per guidelines of Central Ground Water Board. Rooftop rainwater will be diverted towards these structures for recharging the groundwater. Sedimentation pits with oil separator will be constructed to trap the silt-laden water arising from site offices, canteens and other washing facilities at the construction site. The overflow will be reused for dust suppression. Scrubbed water from blast furnace gas cleaning plant will be taken to thickener and reused for dust scrubbing. Cooling tower blow down water generated during the plant operation will be reused for slag granulation and dust suppression. Domestic wastewater will be treated in Sewage Treatment Plant and reused for gardening. No wastewater will be discharged outside the plant premises. The storm water drain will be kept separate from wastewater drains. The storm water drain will have sedimentation pits and oil-water interceptors, before discharging into nalla. Spent oil and lubricants will be collected in drums and given to authorized recyclers. The water balance and waste water management scheme is shown below:

	Name of Unit	Water Consumption kl/hour	Wastewater Generation Kl/hour	Treatment System	Reuse Scheme
1	Sponge Iron Plant	35	3.5	Settling Tank	Used for slag granulation
2	Blast Furnace (BF)	55	Nil	Wet Dust Scrubber Gas Cleaning Plant Sludge Pond	Recycled for wet scrubbing in GCP
3	Sinter Plant	10	Nil	Settling tank	Recycled for sinter nodulising
4	Steel Melting Shop & Rolling Mill	170	17	Settling Tank O&G Trap Scale Pit	Used for slag granulation
5	Oxygen Plant	50	10	Settling tank	Used for BF slag granulation
6	Coke oven	20	Nil	Settling Tank	Recycled for coke quenching
7	Power Plant	490	50	Neutralizing pit O&G Trap	Recycled for ash handling and

				Sedimentation Pits Ash storage dyke	disposal also for dust suppression
8	Producer Gas Plant	10	1	The water shall be reused for flaring in dryer kiln for drying raw materials. Coal tar shall be sold as byproduct	
9	Utilities & Misc Domestic sewage	105	30	Effluent Treatment Plant	Reused for gardening
	Total	945 (22680 kl/d)	Treated to meet the stipulated standards and then 100% reused or recycled within the plant premises. There will be no discharge outside the plant premises.		

3.4 Solid Wastes: The solid wastes like slag will be granulated and sold for cement making. SMS slag will be reused for road making. Sinter plant dust will be recycled. DRI plant char will be mixed with coal fines and middlings and reused for power generation. Ore fines, dust from air pollution control devices and mill scales will be reused in sinter plant. No solid wastes will be dumped outside the plant premises. The solid waste utilization and management scheme is shown below:

	Name of the Unit	Type of Waste	Quantity (TPA)	Utilization & Disposal Plan
1	Sponge Iron Plant	Dust Char	145200 363000	100% dust will be used in Sinter Plant 100% char will be used for power generation
2	Sinter Plant	Dust	29400	100% dust recycled in sintering process
3	Blast Furnace	Slag Sludge & Flue Dust	127400 99200	100% Slag will be granulated and sold for cement making. 100% dust will be reused in Sinter Plant.
4	Steel Melting Shop	Slag Flue dust	125090 33410	100% slag and dust will be given for metal recovery, then used in sinter plant to maintain basicity, converted to aggregates and used in road making.
5	Rolling Mill	Mill scales	2000	100% reused in Electric Arc Furnace
6	Coke Oven	Coke dust	10000	100% reused in sinter plant
7	Producer Gas Plant	Coal ash	14190	100% reused as per MOEF Notification 2009. Used in cement making, brick making, block making, aggregate making, wasteland filling and road making. Unutilized portion of coal ash will be disposed in worked out coal mines.

8	Captive Power Plant	Flyash & Bottom ash	405000	100% reused as per MOEF Notification 2009. Used in cement making, brick making, block making, aggregate making, wasteland filling and road making. Unutilized portion of coal ash will be disposed in worked out coal mines.
9	ETP, Settling Tank, Drains	Sludge	800	Dried in SDB and 100% used as base material for road making, wasteland filling, filler materials in making embankments, flyovers, etc

3.5 Soil Quality: The soil quality of the site and surroundings is sandy loam. The infiltration rate of the soil is moderate. Air pollution control devices will be installed at all points to trap the dust. Solid wastes generated from the air pollution control devices and process will be reused. No solid wastes will be dumped on land, hence there will be negligible impact on the soil quality.

3.6 Ecology Quality: Dust emission from the plant will be controlled using scrubber, ESP and bag filters. Flue Gas will be dispersed using tall stacks. All air emissions will be kept within the prescribed standards. Wastewater and solid waste will be reused. Greenery development will be intensified, 33% open spaces will be made green. Such measures will be adequate to protect the surrounding ecology.

3.7 Public Health Quality: The national ambient air quality standards prescribe level of air pollutants that will protect public health and vegetation. Air quality dispersion modeling study proved that the ambient air quality of the area will remain within the national air quality standards. Entire wastewater and solid wastes generated from the plant will be reused. No toxic chemicals or hazardous wastes will be handled in the plant. Hence there will be no risk to public health.

3.8 Landform Quality: The worst affected village from this expansion activity will be Taraimail village. Natural movement of the villagers will be disturbed. Entry roads to the village will not be disturbed. NSPL will keep a small road between their plant and expansion area for accessing the Kelo river. Dense Greenbelt (30 m wide) will be developed all along the village boundary so that the visual aesthetics is improved and

disturbance due to fugitive dust is avoided. Most of the CSR activities shall be done in Taraimal and surrounding villages.

3.9 Tree Felling and Greenery Development: Site clearing for establishing the proposed project will involve tree cutting. There are about 3000 trees on the identified land. The identified land is not forest land. Permission of Tree Cutting Officer (State Forest Department) shall be obtained to cut trees. While planning the layout it has been ensured that maximum trees are retained. Many trees will be also transplanted. 33% of the land area shall be developed as greenbelt. About 96500 trees shall be planted on 38.5 ha land area. This will mitigate the adverse impact of tree cutting.

3.10 Impact on Road Transportation: Raw materials shall be transported upto railway siding near Kirorimal Nagar by rail. From railway siding the material movement shall be done by road using dumpers. Finished product shall be transported using trailer trucks. The expected movement is 25 dumpers / trailer trucks per hour. The existing 2-lane road needs to be converted to 4-lane to bear the additional traffic load. Air pollution impact shall be significant upto 25 m on either side of the road. Mitigation measures have been suggested to minimize the adverse impact due to road transportation.

4.0 Environmental Monitoring Plan

4.1 Environmental Management Department: EMD, under the direct control of Chief Executive with environmental laboratory, scientists and engineers exists. The EMD will be strengthened by recruiting scientists, engineers, chemists and field assistants.

4.2 Activities of EMD: The following activities are recommended for EMD.

1. Regular monitoring of stack emissions, fugitive emissions work environment and report any abnormalities for immediate corrective measures.

2. Regular monitoring of ambient air quality at plant boundary and outside the plant in upwind and downwind direction.

3. Regular monitoring of re-circulating water quality, ground water quality and surface water quality.

4. Regular noise monitoring of the work zone, equipments and outside the plant.

5. Green belt plantation, maintenance, development of other forms of greenery like lawns, nursery, gardens, etc. in the plant premises.

6. Regular monitoring of quantity and quality of solid waste and their reuse options.

7. Development of schemes for water conservation, rain water harvesting and reuse of treated wastewater.

5.0 Additional Studies

5.1 Risk Mitigation Measures: Necessary risk mitigation measures, including firefighting measures will be implemented. Hazards due to mechanical injury will be reduced by use of standard design and operating procedures. Oil tanks will be located as per recommendation of Chief Controller of Explosives with necessary safety measures. Disaster Management Plan has been prepared in consultation with the District Administration to take care of public health and safety during any untoward incident. No building materials will be extracted from the project site. Excavated earth will be used for leveling and backfilling of civil foundations. It will be ensured that drains and garland drains are constructed conforming to the existing drainage pattern so that alteration is kept to the minimum and flooding does not occur. Above measures will minimize any accidental and soil erosion risks due the plant.

5.2 Rehabilitation: Rehabilitation of the land owners and project affected persons will be done as per the Policy of Chhattisgarh Government. Financial compensation based on mutually acceptable rate has been paid to land owners, whose land shall be acquired. Preference will be given to land losers for employment in the expansion

project as well as during construction. They will be absorbed as per their skill and experience.

6.0 Project Benefits

6.1 Direct Benefits: The project will overcome the demand and supply gap of steel product in the country. The project will also generate additional revenue for the State Government. The additional steel availability will boost the infrastructure sector and the overall economic scenario of the country. The project will create additional employment generation for 2000 people during the construction phase of 24-36 months. About 750 people will be directly and 1300 people will be employed through contractor during the operational phase. Local people will be preferred for employment during the construction and operation stage.

6.2 Community Development Spending Benefits: NSPL will spend Rs.175 crores for various socio-economic and community development activities. The activities cover education, health, infrastructure, culture and sports, skill development and training and women empowerment. The CSR budget will be spent in consultation with a Committee under the supervision of District Collector / State Government nominee.

6.3 Indirect Benefits: Several other types of indirect employment opportunity will be created in the surrounding area due to this project. Transport business, vehicle drivers and attendants, workshops, grocery and retail, hospitality, medical, school, coaching centers, technical institutes, hotel and restaurants, self employed persons like tailors, carpenters, plumbers, electricians, etc will get indirect job opportunity.

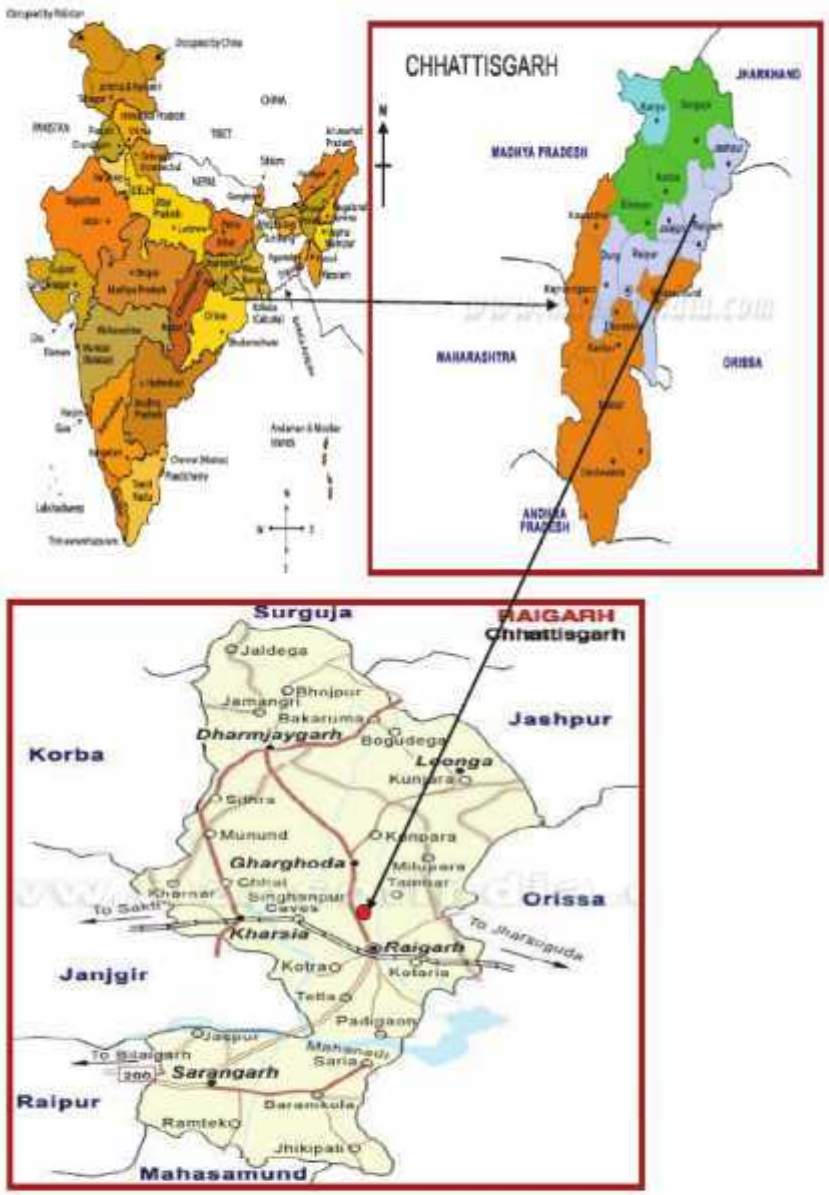
7.0 Environmental Management Plan

Environment Management Department will implement the EMP of this project. All recommendations given in the EIA report including that of occupational health, risk

mitigation and safety will be complied with. The capital cost required to implement the pollution control systems and EMP is Rs.132 crores. The annual recurring expenses will be Rs.15 crores.

EMD will ensure that all air pollution control devices, effluent treatment plant and water re-circulating systems function effectively. Schemes for resource conservation (raw materials, water, etc), rainwater harvesting and social forestry development will be taken up by EMD. Greenbelt and greenery development inside and outside the plant premises will be intensified by the EMD. Greenery on 33% land will be ensured. Guidelines issued by the Central Pollution Control Board (CPCB) on greenbelt development will be followed and district forest department will be consulted for selection of trees.

Environmental awareness programs for the employees will be conducted. EMD will also ensure cleanliness inside the plant. All records shall be submitted to the regulatory authorities, displayed at relevant places like company gate and website and maintained by the EMD.



Location Map

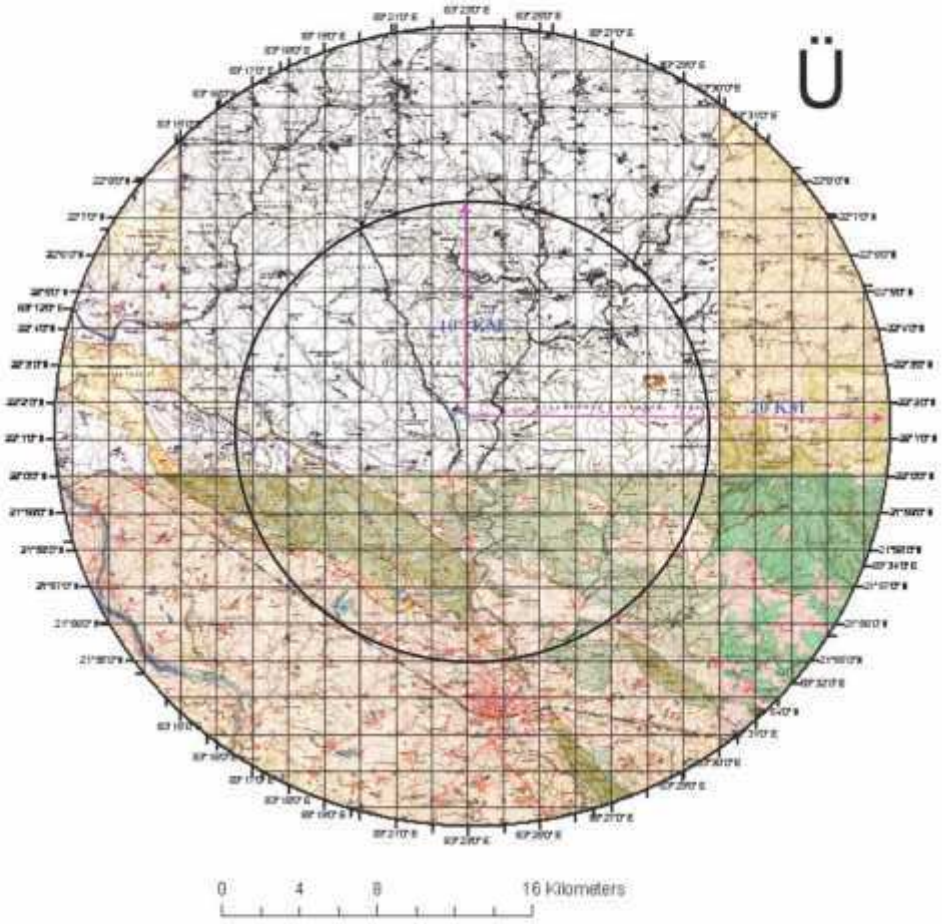


Figure 1.3. Map Showing Features within 10 km and 20 km Radius of Site