

EXECUTIVE SUMMARY

1.0 INTRODUCTION

“**MAA MANSA IRON AND POWER PRIVATE LIMITED**” has proposed to set up an Sponge Iron plant along with WHRB and AFBC based captive power generation plant to implement new manufacturing facilities for production of Sponge Iron, Ferro Alloys or Pig Iron; and Fly Ash products along with captive power generation plant comprising of Waste Heat Recovery Boilers (WHRB) and Atmospheric Fluidized Bed Combustion (AFBC) Boiler along with Steam Turbine & Generator. This is a Greenfield project and will be established in 9.64 Ha total land area.

As per Environmental Impact Assessment Notification dated 14th September, 2006 and subsequent amendment thereof, the Sponge Iron, and Ferro Alloys Plants falls under **Sector 3 (a) Metallurgical Industries** and the AFBC based power plant falls under **Sector 1 (d) Thermal Power Plant**. The overall project activity is categorized as **Category “A”** therefore require Environmental Clearance (EC) to be obtained from EAC (Industry –I), MoEFCC, New Delhi.

The application for prior Environmental Clearance (Form-1) for proposed metallurgical project was submitted to EAC, MoEF & CC (Online Proposal No. IA/CG/IND/420342/2023 on 26 April 2023 whereas, Standard ToR was granted by EAC (Industry – I) vide. no. **F. No. IA-J-11011/94/2023-IA-II (IND-I)** on dtd.4th May 2023.

Anacon Laboratories Pvt. Ltd., Nagpur, is QCI-NABET accredited in ‘**Category A**’ environment consultant organization has been assigned to undertake an Environmental Impact Assessment (EIA) study and preparation of Environment Management Plan (EMP) for various environmental components, which may be affected due to the impacts arising out of the proposed project.

EIA process requires the primary baseline data collection to know the information on the biophysical, social and economic backgrounds of Greenfield project. The Environmental Impact Assessment (EIA) report is prepared for obtaining Environmental Clearance (EC) from Ministry of Environment, Forest and Climate Change (MoEFCC), New Delhi and the Consent for Establishment from the Chhattisgarh Environment Conservation Board (CECB) for the proposed Greenfield project.

1.1 IDENTIFICATION OF PROJECT

The company “**MAA MANSA IRON AND POWER PRIVATE LIMITED**” proposes Greenfield project for steel complex involving DRI Kilns, Sub-Merged Arc Furnace, Captive Power plant through **WHRB and AFBC**, and Fly Ash Bricks manufacturing unit. The project is proposed to be located at Village – **Pali**, Tehsil - Raigarh, District – **Raigarh** (CG – 496001). The proposal is to seek Environmental Clearance based on energy efficient as well as approved technology process. The product profile has been finalized based on the market demand and the technology process compatibility.

The detail of proposed plant facilities is as follows.

TABLE 1: PROPOSED PLANT DETAILS WITH CAPACITY

S. No.	Process Plant	Proposed Configuration of the Plant	Product Name	Capacity (in TPA)
1	DRI Kiln (Coal Fired)	200TPD X 2No.	Sponge Iron	132,000
2	Sub-Merged Arc Furnace	Electrically operated Sub-Merged Arc Furnace 9 Mva x 2 nos	Ferro Alloys (SiMn)	35,000
			And/or	
			Ferro Alloys (FeMn)	44,000
			And/or	
			Ferro Alloys (FeSi)	19,000
			And/or	
3	Captive Power Plant (Boiler and TG based)	Waste Recovery Heat Boilers (WHRB)	Captive Power	10 MW
		Atmospheric fluidized bed combustion (AFBC)		20 MW
4	Fly Ash Bricks/ Block making unit	Fly Ash product making facilities	Fly Ash Bricks/ Blocks	34,600

1.2 LOCATION OF THE PROJECT

The project is proposed on the land of 9.64 Hectares which is a private land. The company has purchased the entire land, The land is under agreement with its current owner and will be registered in the name of our company and will be diverted for industrial purpose before final EC application. It is proposed that total 33.20% area will be developed as Greenbelt area. The land will be permanently diverted to industrial purpose. The land is located at Khasra No. 21/1(क), 22/2, 22/3, 22/4, 22/10, 22/16, 22/17, 22/18 and 23/2Nos. at Village -Pali, Tehsil – Raigarh, District – Raigarh(CG – 496001).

The proposed site is located at Village – **Pali**, Tehsil & District – **Raigarh** (CG – 496001). The project site can be reached from through SH-1 which is approx. 1.53 Km in East direction from the site. Nearest railway station is Kirodimal nagar Railway station which is about – 7.74Kms/ SSW and Nearest Airport is Swami Vivekananda Airport (Raipur Airport) which is at a distance of 189.63 km in SW direction from the project site.

The study area of 10 km radial distance from the project site is shown in **Figure 1**.

1.3 EIA/EMP REPORT

In line with the approved ToR obtained from EAC (Industry –I), MoEF&CC, New Delhi, baseline environmental monitoring was conducted during Pre-monsoon season (15th March 2023 – 15th June 2023) for determining the status of ambient air quality, ambient noise levels, surface and groundwater quality, soil quality, status of flora, fauna and eco-sensitive areas and socio-economic status of the villages within 10 km radius study area from the project site (**Figure 1**). The observations of the studies are incorporated in the EIA/EMP report. Impacts of the proposed project activities during construction and operation stages were identified and duly addressed in the report.

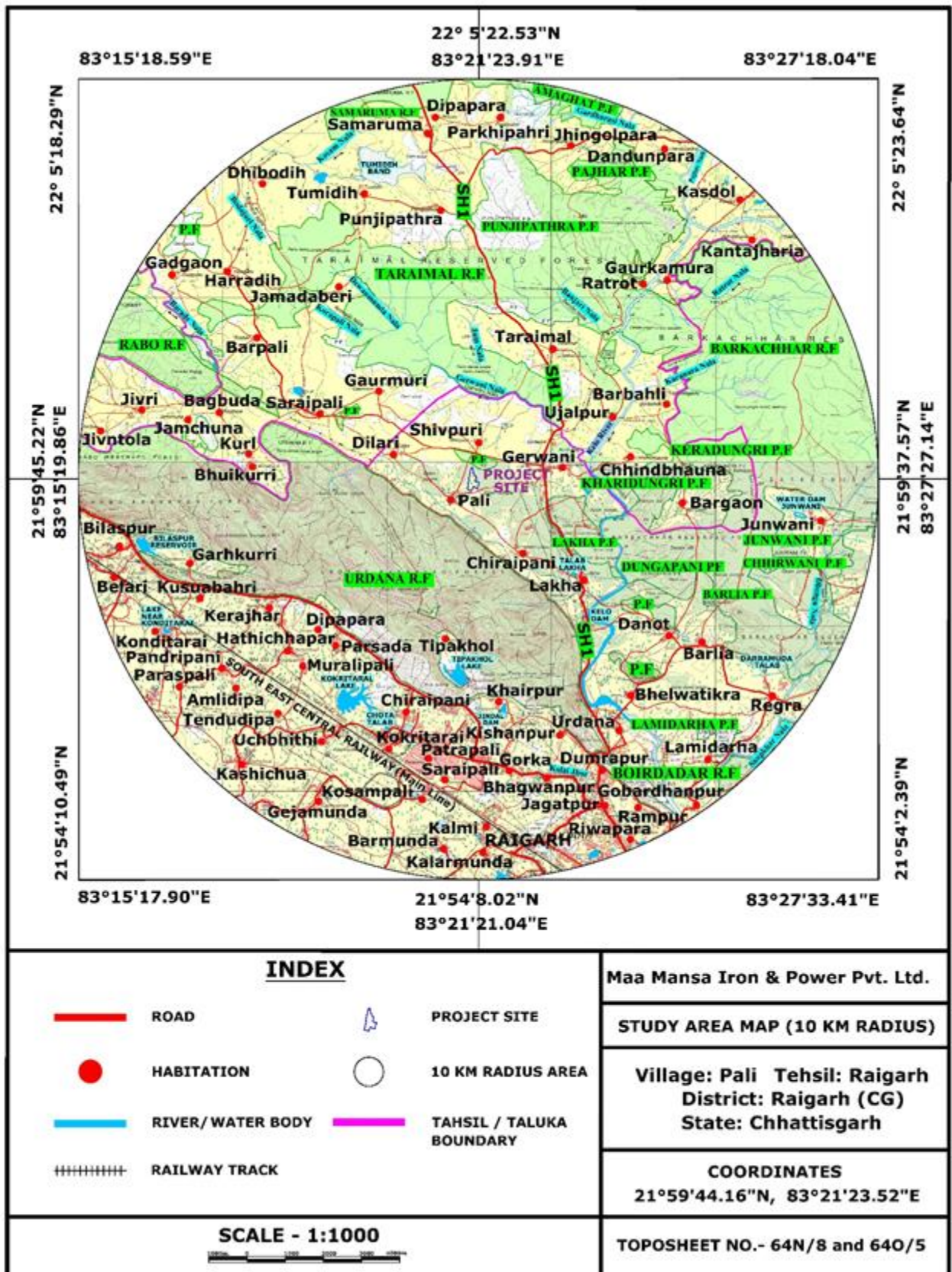


FIGURE 1: STUDY AREA (10 KM RADIAL DISTANCE)

TABLE 2: DETAILS OF ENVIRONMENTAL SETTINGS

Sr. No.	Particular	Details																														
1.	Plant Location	Village - Pali, Post- Gerwani Tahsil and District- Raigarh (Chhattisgarh) Pin Code – 496001																														
2.	Coordinates	<table border="1"> <thead> <tr> <th>Point</th> <th>Latitude</th> <th>Longitude</th> </tr> </thead> <tbody> <tr> <td>BP1</td> <td>21°59'55.33"N</td> <td>83°21'22.67"E</td> </tr> <tr> <td>BP2</td> <td>21°59'54.62"N</td> <td>83°21'24.04"E</td> </tr> <tr> <td>BP3</td> <td>21°59'47.17"N</td> <td>83°21'27.29"E</td> </tr> <tr> <td>BP4</td> <td>21°59'43.88"N</td> <td>83°21'26.42"E</td> </tr> <tr> <td>BP5</td> <td>21°59'43.25"N</td> <td>83°21'29.76"E</td> </tr> <tr> <td>BP6</td> <td>21°59'37.66"N</td> <td>83°21'28.40"E</td> </tr> <tr> <td>BP7</td> <td>21°59'39.43"N</td> <td>83°21'24.41"E</td> </tr> <tr> <td>BP8</td> <td>21°59'35.87"N</td> <td>83°21'22.86"E</td> </tr> <tr> <td>BP9</td> <td>21°59'37.01"N</td> <td>83°21'18.74"E</td> </tr> </tbody> </table> <p>Toposheet number: 64N/8 and 64O/5</p>	Point	Latitude	Longitude	BP1	21°59'55.33"N	83°21'22.67"E	BP2	21°59'54.62"N	83°21'24.04"E	BP3	21°59'47.17"N	83°21'27.29"E	BP4	21°59'43.88"N	83°21'26.42"E	BP5	21°59'43.25"N	83°21'29.76"E	BP6	21°59'37.66"N	83°21'28.40"E	BP7	21°59'39.43"N	83°21'24.41"E	BP8	21°59'35.87"N	83°21'22.86"E	BP9	21°59'37.01"N	83°21'18.74"E
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3.	Climatic Conditions	<p>Mean annual rainfall is 1394.6 mm</p> <p>Temperature: Pre monsoon 20.5°C (Min.), 41.4°C (Max.) : Winter 13.1°C (Min.), 30.8°C (Max) : Post monsoon 17.5°C (Min.), 32.4°C (Max.)</p> <p>Source: IMD, Raigarh.</p>																														
4.	Land Form, land Use and Ownership	The project is proposed on the land of 9.64 Hectares which is a private land. The company has purchased the entire land, The land is under agreement with its current owner and will be registered in the name of our company and will be diverted for industrial purpose before final EC application. It is proposed that total 33.20% area will be developed as Greenbelt area. The land will be permanently diverted to industrial purpose.																														
5.	Topo sheet no.	64N/8 and 64O/5																														
6.	Elevation	Min– 264m. Max– 276m.																														
7.	Nearest IMD station	Raigarh-16 Km/S																														
8.	Nearest Highway	SH1 (Ambikapur Highway), 1.53Km/E																														
9.	Nearest Railway Station	Kirodimal nagar Station-7.74Km/SSW																														
10.	Nearest airport	O.P Jindal Airport, Distance - 6.37Km, Direction – SSW Swami Vivekananda Airport (Raipur Airport), Distance - 189.63Km, Direction – SW.																														
11.	District Headquarters	Raigarh																														
12.	State/National boundaries	Odisha-18.56Km/E Jharkhand-89.38Km/NE																														
13.	Seismic Zone	Zone-II [As per IS :1893 (Part-I): 2002]																														
14.	Major city with 2,00,000 population	Raigarh																														
15.	Nearest village	1. Pali-0.5Km/SW 2. Shivpuri-0.58Km/N 3. Gerwani-0.96Km/ENE 4. Saraipali-1.32Km/WNW																														
16.	Hills/ valleys	1. Barade Pahad-7.09Km/WNW																														

Sr. No.	Particular	Details
		2. Hill of Urdana RF-1.12Km/SW 3. Hill near Bhelwatkra-6.18Km/SE
17.	Nearest tourist place	1. Ranaidarha Waterfall, Bhuikurri-3.36Km/W 2. Kelo Dam Park- 5.66Km/SE 3. Kelo Dam - 6.02Km/SE 4. Dileep Singh Judeo Kelo Park-5.65Km/SE 5. Regada Waterfall-9.89Km/SE 6. Nature Park, Muralipali-7.00Km/S
18.	Archaeologically important places	Singhanpur Caves-10.72Km/W
19.	Protected areas as per Wildlife Protection Act,1972 (Tiger reserve, Elephant reserve, Biospheres, National parks, Wildlife sanctuaries, community reserves and conservation reserves)	Nil
20.	Forest's land	1) Urdana RF-1.09Km/SW 2) Taraimal RF-1.95Km/N 3) PF near Shivpuri- 0.05Km/N 4) Keradungri PF-3.8Km/E 5) Barkachhar RF-4.14Km/E 6) Rabo RF-5.3Km/W 7) Lakha PF-1.70Km/SE 8) Dungapani PF-4.28Km/ESE 9) Kharidungri PF-3.81Km/E 10) PF Near village Danot-4.85Km/SE 11) PF Near village Bhelwatkra-6.13Km/SE 12) PF near village Saraipali-1.48Km/NW 13) PF near village Gadgaon-9.71Km/NW 14) Amghat PF-9.61Km/N 15) Punjipathra PF-6.53Km/N 16) Pajhar PF-8.32Km/NE 17) Junwani PF-8.16Km/ESE 18) Chhirwani PF-7.63Km/ESE 19) Barlia PF-7.38Km/SE 20) Boirdadar RF-9.96Km/SE 21) Lamidarha PF-9.87Km/SE 22) Samaruma RF-9.73Km/NNW
21.	Defense Installations	Nil
22.	Notified ECO- Sensitive Zone	Nil

Sr. No.	Particular	Details			
		S. No.	Name of the Water Body	Distance (KM)	Direction
23.	Water Bodies	1.	Kelo River	2.5	E
		2.	Tipakhol lake	4.56	SSW
		3.	Kokritaral Tal lake	6.30	SW
		4.	Kelo Dam	2.80	SE
		5.	Tumidh band	8.33	NNW
		6.	Bilaspur reservoir	8.17	WSW
		7.	Darramuda Talab Regda	8.92	SE
		8.	Jindal Dam	5.93	S
		9.	Pajhar Nadi	8.73	NE
		10.	Water Dam Junwani	9.67	ESE
		11.	Talab Lakha	2.21	SE
		12.	Chota Talab Kirodimalnagar	7.05	SW
		13.	Lake near Kondtarai	8.90	SW
Nallahs;					
		S. No.	Name of the Site	Distance (KM)	Direction
		1.	Gerwani Nala	1.94	N
		2.	Jam Nala	2.96	N
		3.	Korapali Nala	4.65	NW
		4.	Dewanmunda Nala	4.42	NW
		5.	Banjari Nala	4.52	NE
		6.	Karanara Nala	6.0	NE
		7.	Gardharasi Nala	9.91	NE
		8.	Ratrot Nala	7.35	NE
		9.	Kolai Jhor	7.89	SSE
		10.	Dhengu Nala	9.21	ESE
		11.	Sanpkhar Nala	9.82	SE
		12.	Bodojuri Nala	9.31	NW
		13.	Barade Nala	8.17	NW
		14.	Kosam Nala	9.5	NW
24.	Nearest Industries	S. No.	Name of the Industries	Distance (KM)	Direction
		1	S. S. Steel and Power	0.04	W
		2	Agroha TMT	0.21	E
		3	Shree Real Wire Pvt. Ltd. (Plant)	0.86	SW
		4	Anjani Steel & Power Ltd.	2.63	NE
		5	Chandahasini Steel	1.13	ENE
		6	Salasar Steel and Power Ltd.	0.80	E
7	Sunil Ispat And Power Limited	1.37	SE		

Sr. No.	Particular	Details			
		8	Vazron Industries Private Limited	1.25	SE
		9	Rupesh Steel Private Limited	1.47	SE
		10	Mahalaxmi Casting Pvt Ltd	1.20	SE
		11	MAA Mani Steel & Iron Company	7.34	NW
		12	Shri Hanuman Wiron Private Ltd	0.45	SSE
		13	Shambhavi Ispat	1.24	E
		14	M/s. B.S. Sponge Pvt. Ltd.	4.36	N
		15	Faboca Metals Private Limited	2.23	NE
		16	NALWA Steel and Power Ltd	3.55	NE
		17	NRVS Steels Ltd (Formerly Seleno Steel Pvt Ltd)	3.62	NNE
		18	Shyam Ispat Pvt. Ltd, Traimal	3.12	NNE
		19	Singhal Enterprises Pvt.Ltd	3.96	NE
		20	Raigarh Ispat And Power Pvt Ltd (Plant)	2.93	NW
		21	N.R. ISPAT AND POWER PVT. LTD	2.95	NW
		22	GURUSHREE INDUSTRIES PVT. LTD	1.75	WNW
		23	NDFL Power Plant	6.13	WNW
		24	Bimal Refractories Pvt. Ltd., Gadgaon	3.46	WNW
		25	SMS GATE, JSPL, Raigarh	7.14	SSW
		26	Vyom Rice Mill & G S Rice Industry	9.81	SW
		27	Tirumala Balaji Alloys Pvt. Ltd.	7.04	NNW
		28	Sadguru Ispat Pvt Ltd.	7.25	NNW
		29	Narmada Iron and Steel Pvt Ltd.	6.98	NNW
		30	Epic alloy & steel pvt. Ltd. Tumidih	6.93	NNW
		31	Scania Steel and Power Ltd.	8.06	NW
		32	V.A Power and Steels Pvt. Ltd. Tumidih	6.43	NNW
25.	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, Universities, Community Hall etc.) and Vulnerable groups who could be possibly be affected.*	S. No.	Name of the Site	Distance (KM)	Direction
		1	Fortis OP Jindal Hospital & Research Centre, Kharsia Rd, Kokaditarai	7.30	SSW
		2	ESI Hospital Parsada	5.18	SW
		3	Maa Ambey Hospital, Kirodimalnagar	7.37	SSW
		4	Primary School Shivpuri	0.87	NNE
		5	Govt. P.s. Pali	0.66	SW
		6	Govt. school Taraimal	3.49	NE

Sr. No.	Particular	Details			
		7	O.P.Jindal School Nalwa,Raigarh	3.05	NE
		8	Government School Dellari, Saraipali	2.14	WNW
		9	O.P. Jindal University (OPJU)	6.97	NNW
		10	Primary School Padakipahari	9.61	N
		11	Aalekh Mahima Gurukulam English Medium School	1.67	W
		12	Higher Secondary School, Saraipali, Raigarh	5.06	NW
		13	Government Primary School, Village-Khairpur, post, Gorka	6.53	SSE
		14	Aryan World School, Khairpur	7.5	SSE
		15	O.P. Jindal School, Raigarh (CG)	7	S
		16	Govt HIGH SCHOOL GORKHA, Kokaditarai	8.35	SSE
		17	Govt. Primary School Loharpara Regda	9.58	SE
		18	GOVT. H.S.School Danot	6.40	SE
		19	Woods Valley School, Kasdol	9.85	NE
		20	Primary school Katajhariya	9.45	NE
		21	G.A.P. Public School, Kirodimal Nagar, Raigarh, Kirodimalnagar	7.30	SW
		22	Vivekanand School, Vijay Nagar	7.43	SW
		23	Jindal Aadarsh Gramya Bharti School	7.39	SW
		24	Government Higher Secondary School	9.91	WSW
		25	Ideal Public High School Patrapali	7.61	SSE
		26	Shiv Mandir Pali	0.71	WSW
		27	Banjari Mandir	4.35	NNE
		28	Lord Shiva Temple	4.64	NE
		29	Bans Banjari Mandir	3.72	NE
		30	Sai Baba Temple Khairpur	8.45	SE
		31	Shiv Mandir Junwani	9.15	ESE
		32	Ghatoriya Mata Mandir	8.85	NE
		33	Jindal Auditorium, Patrapali	6.91	S
		34	Krishnkant - Community Center	8.21	SSW
		*All environmental regulations will be followed in the proposed project. Hence no adverse impact on hospitals, children, elderly persons.			

2.0 PROJECT DESCRIPTION

2.1 PROCESS DESCRIPTION

2.1.1 Manufacturing process of Sponge Iron (DRI)

- Iron ore, coal, dolomite/limestone is fed in the weighed quantity and the kiln is rotated at 0.5 RPM speed. A temperature between 1000C to 1050 0C is maintained in about 70% of the kiln length towards discharge end side for required reaction.
- After the reaction, the product is taken into an indirect cooling drum cooler. The product is cooled to 1000C and taken for product separation and then taken for final use.
- The kiln has three functions; heat exchange, chemical reaction in vessel and conveying solids.

2.1.2 Manufacturing Process for Ferro Alloys

- High Carbon Ferro/ Silico Manganese and other Ferro Alloys like Ferro Silicon; Ferro Manganese as a finished product will be produced through a conventional submerged arc electric furnace having Soderberg electrodes. The furnace hood will be having fourth hole for exhaust of flue gases to be treated through APCEs.
- Pig Iron is also proposed to be produced alternately from the same submerged arc furnace by using lower grades Iron ore and Magnetite Iron ores and the Pig Iron will be sold to Induction Furnaces for production of steel.

2.1.3 Process of Power Generation

WHRB based Power Generation

- The Waste heat Recovery boilers are attached with DRI Kiln. The flue gases released from DRI Kilns will be passed through Waste Heat Recovery Boiler, where waste heat will be recovered and steam will be generated in required temperature and pressure. The source of energy is the heat content in waste flue gases released from DRI Kilns.

AFBC Based Power Generation:

- In an AFBC boiler, the fluidized bed media, which consists of ash, sand, limestone and other such materials is heated to the ignition temperature of the fuel.
- Fuel, such as char, is continuously supplied to the bed as it burns very quickly in the high bed temperatures of almost 1000°C.
- The heat generated from this combustion is used to produce steam which, like in WHRB systems, will produce power through a steam generator.

2.1.4 Process of brick making from waste

- To make Fly ash bricks Fly ash, Lime, Sand and Gypsum along with slag from the induction and arc furnaces are fed into a pan mixer, where water is added in the appropriate proportion before mixing it all together.
- After mixing; the mixture is shifted to hydraulic presses for where the mixture is given its brick like shape.
- The molded bricks are then carried into the open area where they are air dried and cured in an autoclave to give them its rigidity.

2.2 LAND REQUIREMENT

The project is proposed on the land of 9.64 Hectares which is a private land. The company has purchased the entire land. The land is registered in the name of our company; and will be diverted

for industrial purpose before final EC application. The land will be permanently diverted to industrial purpose. 9.64 Ha. of land presently defined as Agricultural land and it will be permanently diverted to industrial purposes. Total **33.20%** area will be developed as Greenbelt area. The details of land use planning are provided **Table 3**.

TABLE 3: AREA STATEMENT

Land Use	Area (In Hectare)	In %
Built Up Area	2.951	30.61
Internal Road	1.112	11.54
Storage Area	0.577	5.99
Water Reservoir & RWH	0.737	7.65
Parking Area	0.097	1.01
Green Belt	3.200	33.20
Open and Misc. Area	0.966	10.02
Total	9.640	100.00

2.3 RAW MATERIALS REQUIREMENT, SOURCE & MODE OF TRANSPORT

Availability of raw material is abundant within 250 km area of Raigarh District. Fuel consumption will be mainly source from local sources. No linkage compulsion to acquire most of this raw material which are available in open market. Iron ore and coal are the basic bulk raw materials, which are also procured through market through negotiation and open bidding. Iron Ore can also be procured from NMDC and OMC through bidding. Coal is also allowed to be imported. Bulk Material like Iron Ore; Coal etc. are proposed to be brought by Rail up to nearest railway siding at Kirodimalnagar Station. From there will be transported by covered truck through road to the plant. Whereas the other raw material required for the project is Lime stone/Dolomite/ Refractory, CI/ Pig Iron Heavy Scrap; Ferro Alloys are readily available within 50 km -100 km radius and these will be transported through covered trucks.

2.3.1 Solid and Hazardous Waste Generation

The details of solid and hazardous waste generations are given in **Table 4** and **5**, respectively.

TABLE 4: SOLID AND HAZARDOUS WASTE GENERATION AND ITS DISPOSAL

Name of Waste Generated	Qty (TPA)	Proposed Disposal Plan
Char / Dolochar (SID)	39,600	Captive use in Captive Power plant
Kiln Accretion & Refractory waste (SID)	200	Shall be Sold to authorized recyclers
Bottom Flue Dust Ash (SID)	26,400	Used for Road making and Land filing.
Slag from Ferro Alloys plant	39,789	Given for road making and land fill.
Fluidized Bed Material (PP)	150	Used in own Fly Ash Brick making unit
Fly Ash from Char / Dolochar (Power Plant)	29,700	Captive use in own Fly Ash Brick unit
Ash From Coal (Power Plant)	47,646	Used in Brick making / Sold to nearby Cement plants.
Total	183,485	

TABLE 5: HAZARDOUS WASTE GENERATION

Type of Hazardous Waste	H. W. Category (as per HWM Schedule I)	Quantity (In TPA)	Disposal
Waste Oil/Used Oil	5.1	3 KL/ annum	Will be given to authorized recycler having authorization from competent authority.
The lead acid battery or dry battery	-	50 Nos.	

2.4 WATER REQUIREMENT & SOURCE

Total water requirement estimated is 1,111 KLD out of which it is proposed to use 285 KLD recycled water thus total fresh water requirement will be 826 KLD. Total Yearly water requirement will be 826 KLD * 330 days = 272,580 KLA which will be sourced from Surface water from Kelo River located at 2.5 KM/E, we will obtained from to Chhattisgarh Water Resource Department.

Further, the management had decided to implement a 50,000 KL Rain water collection Tank which will be able to collect sufficient rain water during rainy days which would continuously be collecting rain water during the rainy days. Which extends to almost 75 days. Thus, water requirement will be met through rain water collections from it for 75 days. The balance water after the rain days will be sufficient to cater water requirement of 60 days during summer season. Therefore, it is considered that about 135 days (111,950 KL) water requirement will be met through rain water and rain water collection. Therefore, the net requirement from surface source or ground water source per annum will be about 160,630 KLA. 4 Nos. of Rain Water Harvesting Structure with 1 meter (dia) and 3 meter (depth) is proposed. In addition to a 50000 KL Rain Water collection tank is proposed.

2.5 POWER REQUIREMENT & SUPPLY

The total power requirement is 30 MW it will be met through captive power plant and additional backup power connected load of 5 MW will be sourced through State Grid (CSPDCL). In addition to this total 2 Nos of 750 kVA DG sets are proposed for emergency backup.

2.6 MANPOWER REQUIREMENT

M/s. MMIPPL will provide employment to 450 peoples as direct employment which includes 42 people as administrative staff and 408 people will be production staff. Preference will be given to localpeople, depending upon their qualification and skill.

2.7 FIRE FIGHTING FACILITIES

In order to combat any occurrence of fire in plant premises, fire protection facilities are envisaged for the various units of the plant. All plant units, office buildings, laboratories, etc. will be provided with adequate number of portable fire extinguishers to be used as first aid fire appliances.

2.8 PROJECT COST

The project cost of the project is estimated as **Rs. 24000.00 Lakhs**

3.0 EXISTING ENVIRONMENTAL SCENARIO

3.1 BASELINE ENVIRONMENTAL STUDIES

Baseline environmental studies were conducted at project site along with 10 km radial distance from the project site. The baseline environmental quality data for various components of environment, viz. Air, Noise, Water, and Land were monitored during **Pre-monsoon season (15th March 2023 – 15th June 2023)**

3.2 METEOROLOGY & AMBIENT AIR QUALITY

Summary of the Meteorological Data Generated at Site (15th March 2023 – 15th June 2023)

Predominant Wind Direction	Pre-monsoon Season
First Predominant Wind Direction	WSW (17.97%)
Second Predominant Wind Direction	W (16.35%)
Calm conditions (%)	1.52
Avg. Wind Speed (m/s)	2.95

The status of ambient air quality within the study area was monitored for pre-monsoon season at 8 locations. All these 8 sampling locations were selected based on the meteorological conditions considering upwind and downwind, cross wind directions and reference point. The levels of Respirable Particulate Matter (PM₁₀), Fine Particulates (PM_{2.5}), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x) and carbon monoxide (CO), Ammonia, Ozone, Benzene and BAP were monitored. The details of Ambient Air Quality Monitoring Results are summarized and given in **Table 6**.

TABLE 6: SUMMARY OF AMBIENT AIR QUALITY MONITORING RESULTS

Sr. No.	Location		PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	Ozone	NH ₃
			µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	µg/m ³	µg/m ³
1	Project Site	Min	68.1	29.5	10.4	26.4	0.344	10.4	7.4
		Max	81.6	40.6	16.3	39.2	0.517	18.7	13.3
		Avg	76.4	36.1	13.1	32.1	0.428	14.6	10.2
		98 th	81.4	40.4	15.8	38.5	0.506	18.5	13.0
2	Pali	Min	56.5	26.1	8.7	19.9	0.330	9.6	6.6
		Max	78.2	37.6	13.2	31.1	0.418	16.9	9.4
		Avg	67.8	31.5	10.5	25.1	0.381	13.3	7.9
		98 th	77.2	36.7	12.9	30.5	0.416	16.4	9.3
3	Gerwani	Min	63.5	29.4	9.1	22.6	0.297	11.0	6.7
		Max	82.4	41.9	14.3	32.0	0.638	21.5	12.2
		Avg	73.0	35.9	11.7	28.4	0.426	16.2	9.2
		98 th	81.9	41.4	14.0	32.0	0.630	21.4	11.9
4	Ujalpur	Min	57.9	22.6	6.9	15.2	0.259	8.1	4.4
		Max	73.2	33.7	9.9	23.1	0.390	13.3	8.5
		Avg	66.6	27.2	8.3	19.5	0.317	11.3	6.5
		98 th	72.9	32.6	9.6	22.7	0.376	13.3	8.2
5	Dilari	Min	59.2	23.2	9.2	23.9	0.317	11.7	5.6
		Max	78.4	39.0	12.1	35.2	0.409	17.1	8.4
		Avg	70.6	33.1	10.8	29.2	0.361	14.2	7.1
		98 th	78.3	38.4	12.1	34.4	0.403	16.9	8.4
6	Saraipali	Min	59.1	23.3	8.2	22.8	0.338	10.0	7.1
		Max	80.2	34.9	11.8	31.6	0.465	14.9	11.1
		Avg	68.7	29.2	9.7	26.8	0.405	12.7	8.7
		98 th	79.2	34.7	11.7	31.2	0.461	14.8	10.8
7	Shivpuri	Min	57.2	21.8	7.5	20.9	0.304	9.3	6.2
		Max	72.2	30.8	11.2	28.8	0.395	13.6	10.4
		Avg	65.3	26.5	9.1	24.3	0.344	11.4	7.9
		98 th	71.7	30.4	10.9	28.1	0.389	13.4	9.9
8	Chiraipani	Min	56.4	18.5	7.5	18.4	0.281	8.5	6.0
		Max	71.3	31.9	9.8	26.1	0.380	12.6	8.8
		Avg	63.8	24.3	8.5	21.5	0.322	10.6	7.4
		98 th	70.3	30.6	9.7	25.6	0.376	12.4	8.7
CPCB Standards			100 (24hr)	60 (24hr)	80 (24hr)	80 (24hr)	2 (8hrs)	100 (8hr)	400 (24hr)

From the above results, it is observed that the ambient air quality at all the monitoring locations was within the permissible limits specified by CPCB.

3.3 AMBIENT NOISE LEVELS

Ambient noise level monitoring was carried out at the 8 monitoring locations. The monitoring results are summarized in **Table 7**.

TABLE 7: SUMMARY OF AMBIENT NOISE LEVEL MONITORING RESULTS

Sr. No.	Monitoring Locations	Equivalent Noise Level	
		Leq _{Day}	Leq _{Night}
Residential Area			
1	Pali	53.7	41.3
2	Dilari	52.8	40.5
CPCB Standards dB(A)		55.0	45.0
Commercial Area			
3	Saraipali	61.3	46.4
4	Chiraipani	58.7	43.9
CPCB Standards dB(A)		65.0	55.0
Silence Zone			
5	Shivpuri (Primary School)	48.1	37.6
6	Gerwani (Govt. High School)	49.3	38.5
CPCB Standards dB(A)		50.0	40.0
Industrial Area			
7	Project Site	62.3	50.2
8	Nr. CSPTCL – 220 kv s/s	61.9	48.6
CPCB Standards dB(A)		75.0	70.0

Source: Field monitoring and analysis by Anacon Laboratories Pvt. Ltd., Nagpur

3.4 SURFACE AND GROUND WATER RESOURCES & QUALITY

3.4.1 Regional Geology

Site Specific Geology

The study area is mainly covered by rocks of Archaean to Cretaceous age, with some isolated pockets of Recent to Sub-recent alluvium. Based on the water-bearing property, the rocks of the study area can be divided into (i) hard rocks, comprising crystalline metamorphic, and consolidated sedimentary rocks of the Chhattisgarh Supergroup; and (ii) Soft rocks, comprising semi-consolidated rocks belonging to the Gondwana Supergroup and younger alluvium. The crystalline rocks are part of the Chhotanagpur gneissic complex. These are mainly composed of granite gneiss.

Major rock types present in the study area are sandstone, interbedded sandstone-shale, fine-grained sandstones, and shales. The sandstones are rich in iron content and have a dirty to brownish colour. Granite gneiss occupies small, isolated patches.

Geomorphology

Broadly, the entire study area is divided into two physiographic regions: Mahanadi plain (Chhattisgarh plain) and Northern hills of Chhotanagpur plateau. The study area is gently undulating, and pediments and pediplains are the most prominent geomorphic units. Moderately dissected lower plateau mainly concentrated in the north eastern part, and dissected hills and valleys, ridges are noticed in the southern part of the study area. This region has a general slope

towards the south. This is characterized by hilly tract and intermediate plains, flanked by high mounds or hillocks. The foothills are characterized by pediments. The study area is drained by the Kelo River, which is a tributary of the Mahanadi River.

3.4.2 Hydrogeology and Aquifer Systems

The occurrence of groundwater and its distribution in space are highly influenced by the underlying geological formations and hydrogeological characteristics of the surroundings. The porous, weathered, jointed, and fractured zones present in the rocks or formation provide scope for groundwater occurrence, storage, and movement. The hydrogeology of the area broadly describes the disposition of water-bearing formations, occurrence of groundwater and its yield potential, groundwater regime conditions and depth to water levels in different seasons, etc.

The aquifer material controlling groundwater flow can be broadly divided into two major media (1) Fractured media and (2) Porous media. The shallow aquifers both in hard and soft rocks are extended widely and largely in use. The weathered mantle and shallow fractures mainly constitute the shallow aquifers. The thickness of weathered mantle varies from 5 to 20 m bgl. The deeper aquifers have been identified in both hard and soft rocks. The depth of the deeper aquifer varies between 60 to 120 m bgl.

Pre-monsoon depth to water level varies from 5-15 mts.

Post-monsoon depth to water level varies from 3-10 mts.

3.4.3 Water Quality

A] Surface Water Quality

Parameters	Unit	Baseline Monitoring Period (15 th Mar, 2023 – 15 th June, 2023)	IS 2296:1992; Class C (Drinking water source after conventional treatment and disinfection)
		Range	
pH	-	7.12 – 8.34	No relaxation (6.0 to 9.0)
EC	µs/cm	342.40 – 1011.04	-
TDS	mg/l	214 – 568	1500
Total hardness	mg/l	158.66 – 349.48	-
DO	mg/l	5.7 – 6.5	4.0
BOD	mg/l	6.14 – 19.32	3.0
COD	mg/l	22.91 – 61.45	-
Chloride	mg/l	24.56 – 185.28	600
Sulphate	mg/l	10.12 – 61.17	400
Nitrate	mg/l	4.33 – 8.11	50
Fluoride	mg/l	0.15 – 0.43	1.5
Iron	mg/l	0.15 – 0.36	0.5
Cadmium	mg/l	BDL (DL - 0.001)	0.01
Arsenic	mg/l	BDL (DL - 0.01)	0.2
Zinc	mg/l	0.11 – 0.24	15
Lead	mg/l	BDL (DL - 0.001)	0.1
Chromium	mg/l	BDL (DL - 0.03)	0.05
Total Coliform	MPN/100 ml	76 – 426	5,000

B] Groundwater Quality

Parameters	Unit	Baseline Monitoring Period (15 th Mar, 2023 – 15 th June, 2023)	Permissible Limit
		Range	
pH	-	7.19 – 7.81	No relaxation (6.5 to 8.5)
EC	µs/cm	487.62 – 731.00	-
TDS	mg/l	301 – 434	2000
Total hardness	mg/l	157.83 – 265.88	600
Chloride	mg/l	43.14 – 70.65	1000
Sulphate	mg/l	21.15 – 62.15	400
Nitrate	mg/l	8.96 – 15.89	No relaxation (45)
Fluoride	mg/l	0.14 – 0.54	1.5
Iron	mg/l	0.15 – 0.34	No relaxation (1.0)
Cadmium	mg/l	BDL (DL - 0.001)	No relaxation (0.003)
Arsenic	mg/l	BDL (DL - 0.01)	No relaxation (0.01)
Zinc	mg/l	BDL (DL - 0.1)	15
Lead	mg/l	BDL (DL - 0.001)	No relaxation (0.01)
Chromium	mg/l	BDL (DL - 0.03)	No relaxation (0.05)

C] Location wise Water Quality Assessment

S. N.	Locations	WQI	Quality	Remark
1.	Project Site	56.55	Good	Water quality assessments based upon above physico-chemical parameters showed quality of ground water samples is good.
2.	Pali	61.48	Good	
3.	Gerwani	59.98	Good	
4.	Ujalpur	55.44	Good	
5.	Dilari	58.47	Good	
6.	Saraipali	61.84	Good	
7.	Shivpuri	52.70	Good	
8.	Chiraipani	50.24	Good	

C. Bacteriological Characteristics

Coliform group of organisms are indicators of faecal contamination in water. All surface water samples were found to be bacteriologically contaminated. Presence of total coliforms in surface water indicates that a contamination pathway exists between any source of bacteria (septic system, animal waste, etc.) and the surface water stream. A defective well can often be the cause when coliform bacteria are found in well water. For surface water, treatment followed by chlorination or disinfection treatment is needed before use for domestic purpose. Groundwater samples were not found to be bacteriologically contaminated.

3.5 LAND USE LAND COVER CLASSIFICATION

The land-use & land cover map of the 10 km radial study area from the periphery of project site has been prepared using Resource SAT-1 (IRS-P6), sensor-LISS-3 having 23.5m spatial resolution and date of pass 24th May 2021 satellite image with reference to Google Earth data. In order to strengthen the baseline information on existing land use pattern, the following data covering 10 km radius is approximate about 21°54'22.76"N to 22° 5'4.17"N latitude and 83°15'36.06"E to

83°27'6.36"E longitude and elevation 205 to 606 meters are used as per the project site confined within that area. The Land Cover classes and their coverage are summarized in **Table 8**.

TABLE 8: LU/LC CLASSIFICATION SYSTEM WITHIN 10 KM STUDY AREA

Sr. No.	Level-I	Level-II	Area (Sq. Km ²)	Percentage (%)
1	Built-up land	Settlement	15.58	4.92
		Industrial Settlement	4.95	1.56
		Road Infrastructure	3.40	1.07
		Railway Line	1.20	0.38
2	Agricultural Land/ Crop Land	Single Crop	80.42	25.40
		Double Crop	37.53	11.85
3	Forest Area	Reserved Forest	128.63	40.62
		Protected Forest	23.48	7.42
		Fairly Dense Jungle	0.43	0.14
		Dense Mixed Jungle	0.31	0.10
		Open Jungle	7.85	2.48
4	Scrubs/Wastelands	Open Scrub	4.94	1.56
		Wasteland	1.98	0.63
5	Waterbodies	River/Nala/Stream	2.42	0.76
		Dam/Pond/Lake	3.52	1.11
Total			316.64	100

3.6 SOIL QUALITY

The project site and its terrain consist of flat to moderately steep slopes. The terrain is characterized by forest, agricultural land, land, various settlements, waterbody and open scrub/wasteland. It is also observed that the open scrub area and barren land are dominant in North and North West Portion of the study area. The following observations are as follows:

Parameters	Unit	Results	Fertility Status
pH	-	6.34 – 6.93	Slightly acidic to Neutral
Organic Carbon	%	0.65 – 1.73	Average to more than sufficient
Nitrogen	Kg/hect	162.75 – 285.07	Better
Phosphorus	Kg/hect	18.38 – 32.05	Less to medium
Potassium	Kg/hect	117.58 – 231.14	Very less to medium
Sodium Absorption Ratio	-	0.98 – 1.65	Excellent (Little or No Hazard)

3.7 BIOLOGICAL ENVIRONMENT

Floral composition in Study Area:

Total 169 plant species were enlisted within the study site out of which habitat wise details are given as follows: Trees: 94, Shrubs: 22, Herbs: 24, Climbers: 12, Grasses & Bamboos: 14, and Parasite: 3 species observed in the study area.

Endemic Plants of the Study Area

Among recorded plant species none were assigned the status of endemic plant of this region.

RET (Rare, Endangered and Threatened species) Status

According to IUCN Status report 2013 out of total 169 plant species identified within study area among the observed species *Chloroxylon swietenia* which is Vulnerable (VU) species as per IUCN

RED list. The other identified plant species in the study area belongs to least concern (LC), Data Deficient (DD) and Data not available (NA), as per IUCN status. Thus, none of reported species in study area belongs to Rare, Endangered or Threatened category.

Fauna Details:

- **As per IUCN RED (2013) List**

Among the reported animals, the categorization of species as per IUCN is as follows:

Mammals: *Elephas maximus* – Asiatic Elephant (Endangered), *Melursus ursinus* – Sloth Bear (Vulnerable), *Hyaena hyaena* – Hyena (Near Threatened)

Reptiles: *Python molurus* – Indian Python (Threatened), *Varanus bengalensis* - Bengal Monitor Lizard (Near Threatened)

Avifauna: All species are Least Concern as per IUCN.

- **As per Indian Wild Life (Protection) Amendment Act, 2022**

Among mammals; Asiatic Elephant (*Elephas maximus*), Sloth Bear (*Melursus ursinus*), Mongoose (*Herpestes edwardsii*), Hyena (*Hyaena hyaena*), Jungle cat (*Felis chaus*), Indian Fox (*Vulpes bengalensis*) are Categorized under Schedule – I. Whereas, Rhesus macaque (*Macaca mulatta*), Wild boar (*Sus scrofa*), Hares & Five striped squirrels is protected as schedule –II animals. Fruit bat & Rats dose not protected in Schedule.

Among the reptiles, Indian Python (*Python molurus*), Bengal Monitor Lizard (*Varanus bengalensis*), Indian Cobra (*Naja naja*), Common rat snakes (*Ptyas mucosa*) categorized as Schedule –I.

Among the birds in the study area, Indian Peafowl (*Pavo cristatus*), is included in schedule-I, while other birds are included in schedule-II.

A thick green belt around the periphery of plant site is recommended to provide safeguard for surrounding area in line with project activities.

3.8 SOCIO-ECONOMIC ENVIRONMENT

Information on socio-demographic status and the trends of the communities in the 10 km radius was collected through primary social survey and secondary data collection from census 2011 & District Census hand book 2011. Summary of the socio-economic status of the study area is given in **Table 9**. Details regarding education and infrastructure facilities 2011 are presented in **Table 10** respectively

TABLE 9: SUMMARY OF SOCIO-ECONOMIC ENVIRONMENT OF VILLAGES WITHIN 10 KM RADIUS AREA

Total villages	51
Total households	12362
Total population	49078
Male Population	25307
Female population	23771
SC Population	5804
ST Population	15314
Total literates	32547
Total Illiterates	16531
Total workers	18976
Total main workers	14964
Total marginal workers	4285
Total non-workers	29829

Source: Primary census abstract 2011, District Raigarh State Chhattisgarh.

TABLE 10: IN PERCENTAGE DETAILS REGARDING INFRASTRUCTURE FACILITIES WITHIN 10 KM RADIUS STUDY AREA

Infrastructure Facilities	Availability (In Percentage) As per Year 2011, Census District Raigarh
Educational Facilities	96
Drinking water	100
Road	94
Electricity	100
Communication	85
Transportation	60
Medical	21
Bank & Society	25
Drainage	58
Recreation	67

Source: Primary census abstract 2011, District Raigarh, State C.G

Salient Observation of the Survey/Study Area.

A number of aspects were studied in the villages surveyed for socio- economic studies. Following are the observations found during interviews, focused group discussions and as per the Questionnaire.

Housing Pattern:

The people in study area economically not so good and hence many houses in the area are seen old. It is observed that, the housing pattern in study area varied from hatched to pucca (pakka) houses. Near about 50% of the houses were in pucca (pakka) form whereas 30% in semi pakka form and 20% houses were observed in kaccha form.

Employment:

Main occupation in the study area is Labour work, Agriculture, activities associated with Agriculture. The practices being adopted for agriculture are the conventional methods of farming but to get more yield out from the farms, modern agricultural practices need to be accepted. Other income generation sources of the area, small business; private jobs, etc. The labours are getting daily wages in the range of Rs. 300-500, depending on type of work they set.

Fuel:

The primary sources of cooking fuel were LPG, cow dung, wood, etc.

Main crops:

The principal crops grown in agricultural Commodities are Rice and Millets etc. Vegetables and Fruits were also seen in the study area. During discussion with villagers/ farmers it was revealed that, more than half the agriculture is rainfed. Farmers having irrigation facilities do more than one season farming.

Migration from Other States:

A large part of population is seen to be migrated from other places as there are plenty of industries present in the study area.

Language:

Chhattisgadi is the mother tongue of most of the population in state, along with Chhattisgadi, Hindi and English are all official languages. Hindi and English are official languages because they are official languages of India's central government.

Sanitation:

Toilet facilities were not proper in the villages. Community toilets should be built in most of the villages. The 85 % of the houses are toilet facility. There was no proper drainage line in the villages.

Drinking Water Facilities:

Wells and bore wells are the sources of drinking water and the water quality is good to drink. People are also using hand pumps for the drinking water. The villages are having water ponds and water is available summer also.

Education Facilities:

The villages have primary and secondary schools but for higher education, students have to go to Gharghoda and Raigarh. Some schools were having lack of good toilet facilities and needs to be renovated.

Transportation Facility:

For transportation purpose auto, jeep and private bus services were available in the study area; however, villagers reported that transportation facilities were not frequently available. Private vehicles like bicycles & motor cycles were also used by villagers for transportation purpose.

Communication Facilities:

For communication purpose mainly mobile phones, newspapers & post offices were present in the villages.

Medical Facilities:

Malnutrition is a major problem in infants and children in many villages. The Primary & secondary data reveals that there are only 12 nos. of Sub Health Centers are there in the Study area. Patients have to go to bigger cities in case of major diseases.

Electricity:

All villages were availing electricity facility for domestic and agriculture purposes. Solar Street lights were seen in some of the villages.

Market Facility:

Study area predominantly comes in rural area. In villages, small shops were available for daily need things. Weekly market facility was available in some villages. Wholesale market was available at Raigarh.

Recreation Facilities: Television and radio are the main recreation facilities in the study area. Newspaper/ magazine facilities are also used by villagers.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 AIR ENVIRONMENT

Impact on Air Environment

The impact on air environment mainly depends on magnitude of operation and threshold limit of the project. The source of emission will be mainly in form of fugitive emission and point source.

The mathematical **Model AERMOD** was used for predicting the GLCs, which is entirely in line with the requirement of Central Pollution Control Board, New Delhi. In 1991, the U.S. Environmental Protection Agency (EPA) in conjunction with the American Meteorological Society (AMS) formed the AERMOD. AERMOD is a steady-state plume model aimed at short-range (up to 50 km) dispersion from stationary industrial-type sources.

The impact of a source or group of sources on air quality is evaluated using mathematical models. The widely accepted interpretation models simulate the relationships between air pollutant emissions and its impact on air quality. For the present study, this model is used for the prediction of maximum ground level concentrations.

Presentation of Results

For the short-term simulations for point emission sources, the concentrations were estimated around 441 receptors to obtain an optimum description of variations in concentrations over the site in 10 km radius covering 16 directions. The predicted incremental GLCs for PM₁₀, PM_{2.5}, SO₂, NO₂ and CO are presented below:

PREDICTED INCREMENTAL GROUND LEVEL CONCENTRATIONS

Pollutant	Incremental Concentration ($\mu\text{g}/\text{m}^3$)	Distance (m)	Direction
PM ₁₀	1.02	1000	E
PM _{2.5}	0.34		
SO ₂	4.98		
NO _x	5.70		
CO	5.58		

4.1.1 Details of Air Pollution Control System/Mitigation measures

S. No.	Facilities	Air Pollution Control equipment	Emission Level
1	DRI Kiln with WHRB's	i. Dust extraction system, Electro Static Precipitators (ESP) having 4 field with a Chimney ii. Bag Filters (High efficiency) for Product house; Kiln discharge end and transfer points.	PM <30 mg/Nm ³
2	AFBC Boiler	Electro Static Precipitators (ESP) having 4 Feld with a Chimney and Bag Filters at Coal conveyors	PM <30 mg/Nm ³
		Lime Dosing	SO ₂ <100 mg/Nm ³
		Low NOx burners with 3-stage combustion, flue gas recirculation and auto combustion control system will be provided	NOx <100 mg/Nm ³
3	Ferro Alloys and/or Pig Iron	2 Sets of Bag Filter with Chimney with 4th hole extraction system.	PM <30 mg/Nm ³

4.1.2 Additional Measures to reduce/control pollution control

- Roads will be frequently sprinkled with water.
- Most of the materials like Sponge Iron ore, pig iron will be stored under covered shed.
- In case of storage of Sponge Iron, pig iron in open, it will be covered by tarpaulins to prevent spread of dust from it during transportation.
- Regular sweeping of road by using vacuum cleaner will be carried out
- Regular maintenance of vehicles and machineries will be carried out in order to control emissions.
- Green belt development will be taken up all along the roads, plant premises etc.
- Protective appliances will be provided to all the workers exposed in dusty atmosphere.
- Avoiding overloading of the trucks.

- Workers will be equipped with all personal protective devices like Gum Boot; hand gloves; Safety helmet; Safety goggles, earplugs at work place.
- By controlling the speed of the truck.
- Proper gradient of roads to reduce cumulative noise.
- Transportation of materials will be limited to day hours only.
- Wheel washing system will be implemented
- Periodical maintenance of process machinery.

4.2 NOISE IMPACTS

- Day and night sound pressure levels are often used to describe the community exposure. The nearest human settlement Pali is 0.65 KM (SW) away from project site and resultant noise level at this village are 53.9 dB(A) & 43.9 dB(A) at day night respectively.
- Full body vibration and hand-arm vibration impacts will be felt by operators sitting in heavy machineries and operating vibrating devices, respectively. Necessary precautions in workplace environment shall be exercised to reduce workplace vibration impacts.

Mitigation Measures

- Site specific mitigation measures will be adopted at project site to attenuate noise levels to safe limits. It can be further concluded that in actual conditions due to presence of various topographical features in the path of sound propagation the noise levels will be further attenuated.
- Dense plantation will help to reduce noise pollution in the following ways –
 - The sounds that are produced by the leaves helps muffle the noise.
 - Hedging makes a thick front of the wall and blocks the noise.
 - Thick tree trunks create a sound-absorbing buffer zone.
 - They help in filtering the noise
- Equipment will be standard and equipped with silencer. The equipment will be in good working conditions, properly lubricated and maintained to keep noise within permissible limits.
- Most of the equipment's will be placed in closed room
- Equipment's will be placed on acoustic floor to reduce vibration and noise
- High noise zone will be marked, and earplugs will be provided to the workmen near high noise producing equipment.
- Use of PPE'S awareness program will be provided to all workers.
- Proper shifting arrangement will be made to prevent over exposure to noise and vibration.
- Silent DG sets will be used site.
- Speed limits will be enforced on vehicle.
- Regular noise & vibration monitoring will be carried for all equipment's to check compliance with prevailing rules.

4.3 IMPACT ON WATER ENVIRONMENT

The proposed implementation of the project may have some impact on the water environment. The impact may be on the source of water in the form of depletion of water resources of the area and in the form of deterioration of quality of natural water resources due to discharge of plant effluent.

Mitigation Measures

- The project will have a 350 KLD ETP Unit to treat Industrial waste water and 20 KLD STP for treatment of domestic waste water. The project site is located in an area classified as 'Safe Zone' as per the guidelines of CGWB, moreover the source of water will be surface water.
- Total 285 KLD treated water will be reused/recycled in process.
- 16 KLD treated domestic water through STP will be used green belt development.
- Raw material from the proposed project will be stored on concrete layer thus no seepage from the raw material piles anticipated.
- The material will be stored under adequate shed in order to prevent the leachate through runoff.
- Separate stockyards for storage of Raw materials, finish products and solid waste will be maintained.
- All stockyards will be designed with the impervious flooring to prevent leachate percolation.
- Garland drain will be provided to all stockyards area to prevent run-off containing suspended solids by routing the storm water drains through catch pits/sediment traps.
- Any spillage of hazardous waste (used oil/spent oil, ETP Slag, etc.) or contamination will be immediately removed.
- Periodic ground water monitoring at project site as well as nearby villages will be carried out.
- Rain water charged to ground water
- Closed circuit circulation system will be followed.

4.4 IMPACT ON BIOLOGICAL ENVIRONMENT

Ecology & Biodiversity: Aspect - Impact identification and mitigation measures suggestion for proposed Greenfield project.

Sl.	Project Aspects / Activities	Impacts	Mitigation Measures Suggested
1.	Transportation, unloading & storage of Material and Movement of vehicle inside plant, Dust and sound generation due to proposed activities	Impact on adjoining protected forest in North direction in a scale of 4 out of 5 due to proposed project activity.	20 M thick greenbelt will be developed towards north direction from the project site.
2.	Gaseous emission from Stack, Movement of vehicle inside plant and Raw material & finished product transportation, Product manufacturing	Decline in photosynthetic activities, Stomatal index may be minimized, Crop yield will be reduced in absence of site-specific mitigation	Air quality modelling outputs study revealed that, the resultant concentrations of particulate matter, sulphur di-oxide and oxides of nitrogen are well within the prescribed limits. The impact due to proposed project would be minimal as project activity will be carried out within the plant boundary limit with proper control measures. Greenbelt area of 3.2 Ha. (33.20%) will be

Sl.	Project Aspects / Activities	Impacts	Mitigation Measures Suggested
		measures	proposed for project with local species with broad leaves and higher canopy and fast-growing tree species. Total plants are 8000 nos. are proposed. Indigenous species for plantation is recommended
3.	Study of impact on Elephant and other Schedule – I animals	Stray elephant movement was reported forests within study area.	Project activity located in non-forest land. No National Park, Wildlife Sanctuary, Biosphere Reserve, Tiger Reserve, defined Migratory corridors, etc. within the 10 km radial distance from the project site. Moreover, elephant movement is reported in search of food and water in the study area. The proposed project does not involve destruction of habitat moreover in order to improve habitat of schedule – I species within 10 study area, Biological conservation plant is prepared with budgetary provision of Rs. 12 Lakhs allocated.

4.5 IMPACT ON SOCIO-ECONOMIC ENVIRONMENT

Positive Impacts

- There would be a multiplier effect on the creation of indirect employment through the local community establishing small shops like tea stalls, supply of intermediate raw materials, repair outlets, hardware stores garages etc.
- Economic growth due to development of area and increase in quality of life.
- Improvement in green cover due to the plantation of trees in the Study area, also are leading to a decrease in environmental pollution.
- Improvement in social and infrastructural development by the industries as a part of CER and EMP.

Negative Impacts.

- Environmental pollution due to emission of pollutants may affect the health of the people.
- There may be increase in vehicles due to the proposed project leading to extra pressure on the traffic.
- During operation phase heavy vehicle movement lead to dispersed dust particles which affects the health of the workers and Local Peoples. Trucks, tankers and other vehicles may cause additional air pollution to the surrounding areas. The effects may be more prominent in nearby villages.
- Possibilities of Hazards and accident which may cause harm to the workers working or loss of life of the workers.
- Generation of Solid and Hazardous waste will be there, if the waste is not managed properly, it may cause contamination of the area, environment and health of the nearby population.
- If influx of workers from outside areas, then there may an increased pressure on residential accommodation the neighbourhood.

Mitigation Measures

In order to mitigate the adverse impact likely to arise in social, cultural and economic aspects in the surrounding region due to the proposed project and improvement in quality-of-life following mitigation measures should be adopted:

- Adequate pollution control Equipment as per the CPCB Guidelines should be adopted and proper maintenance of industrial and pollution control equipment should be done to ensure minimum pollution.
- The efficiency of the pollution control equipment should be checked periodically to comply with the emission standards provided by CPCB and minimise the pollution levels.
- Ensure that roads are properly signed, vehicles are well maintained and drivers are well trained and safety conscious.
- A Safety Environment should be prepared and every worker has to be trained with all safety equipment. All health and safety measures should be adopted by the company to ensure the safety of the workers and the surrounding society.
- Project proponent should take appropriate steps to keep environment clean and Green belts development/ Plantation along with the internal Road.
- Transportation of hazardous waste should be done as per CPCB Guidelines. The heavy trucks are covered to prevent spillage or dusting. The drivers should be imparted training.
- Priority will be given to local people on employment.
- Social infrastructure development activities should be proposed by the company.

5.0 ANALYSIS OF ALTERNATIVES (SITE AND TECHNOLOGY)

Site Selection

The proposed site to establish green field Sponge Iron and Ferro Alloys plant with captive power plant at Village- Pali, Tahsil and District- Raigarh, Chhattisgarh was selected after considering a number of alternative locations. A number of factors influence the feasibility of location for such projects in which availability of adequate land and access to power infrastructure and transport network and adequate surface water are important.

One of the merits for selecting this site was that the seller company Ganpati Iron and Steel has also got the TOR on this land but they have dropped the project vide TOR No. 549/SEACCG/RAIPUR/794 Dated 27-07-2019 and surrendered existing ToR at SEIAA, CG.

Thus the availability of Logistic Support; Water; power; manpower; adequate land and safe distance from the habitat area as well as back ground existing pollution levels were some of the criteria of selecting the sites.

Alternative sites Evaluated : The company has considered 4 alternative sites. Out of these 4 locations 3 locations were not found suitable, it was found difficult to set up the proposed plant due to non-availability of adequate surface water, sufficient land in single patch or lack of willingness of Villagers to grant NOC. Road and Rail connectivity was also observed to be inadequate in all the other 3 sites.

Thus, in view of the above study of alternative sites, **Site no. 4 at Village Pali, Tahsil and District- Raigarh (C.G.)** has been selected as it meets most of all the criteria.

SELECTION OF ALTERNATIVE TECHNOLOGY

The basic principle for selection of technology for proposed project is based on environmental applicability, technical and financial viability are followed. Selection of suitable production process and the capacity of the production units form the nucleus around which the basic concept of a plant is developed. While the selection of a process takes into account factors like type of product, availability of local raw material, process status, specific energy consumption, level of energy required, environment, and pollution etc., the capacity selection of major units would depend on the volume of production, available unit sizes, economies of scale, etc.

6.0 ENVIRONMENTAL MONITORING PROGRAM

An Environmental Management Cell (EMC) will be established for the proposed project under the control of by General Manager (Plant Head) with a direct reporting to Board of Directors.

The company has proposed to Capital Cost of Rs. 15 Lakhs and Recurring Cost of Rs. 9.7 towards Environment Monitoring Program. NABL/MoEFCC accredited lab (Third party) will engaged to monitor all the environmental components as per CPCB/CECB norms.

7.0 ADDITIONAL STUDIES

7.1 PUBLIC CONSULTATION

The Draft EIA-EMP report for greenfield project is prepared as per the TOR issued by EAC (Industry -I), MoEF&CC, New Delhi and the report is submitted for public consultation process as per the provisions of EIA Notification 2006 and amendments thereof.

After completing the public consultation process, the points raised and commitment of project proponent during the public hearing will be incorporated in the final EIA-EMP report for final submission to Environmental Clearance.

7.2 RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

The assessment of risk in the proposed project has been estimated for fire, explosion and toxicity and corresponding mitigation measures are suggested in the EIA/EMP report.

Hazard analysis involves the identification and quantification of the various hazards (unsafe conditions) that exist in the project site. On the other hand, risk analysis deals with the identification and quantification of risks occurring due to the plant equipment and personnel exposed, due to accident resulting from the hazards in the plant. The occupational and safety hazards and preventive measures, process hazards and their preventive measures, and storage hazards and preventing measures are provided in details in Chapter 7 of the EIA report.

The main objective of the risk assessment study is to determine damage due to major hazards having damage potential to life and property and provide a scientific basis to assess safety level of the facility. The secondary objective is to identify major risk in manufacturing process, operation, occupation and provide control through assessment and also to prepare on-site, off site plans to control hazards.

The assessment of risk in the proposed project has been estimated for material handling, movement of Trucks/Tippers, Dust hazards, Hazards, shock hazards, etc. and corresponding mitigation measures are suggested in the EIA/EMP report.

8.0 PROJECT BENEFITS

Proposed Social Welfare Arrangement

M/s. MMIPPL will also support social welfare activities under CSR obligation under companies act.

The Social welfare/CSR activities will aim at strengthening the bond between the project authorities and the local population in the vicinity of project area. In line with CSR policy, M/s. MMIPPL will carry community welfare activities in the following areas:

- Community development
 - Health & medical care
 - Roads
 - Education
 - Drainage and sanitation
 - Drinking water supply occasionally in the event of water scarcity through tankers, etc.
- A provision of Rs. 120 Lakhs is made under CER. However, as per MoEF&CC vide its OM dated 30th September 2020 has provided that the CER value for the project based on Public Hearing outcome and as per the commitments made by the project promoters during the Public hearing. Thus, CER are made in the proposal as per requirement considering O.M. dated 01/05/2018 and 30.09.2020 issued by MoEF&CC, New Delhi. The final heads of expenditure and amount will be decided as per Public consultation and requirement of the region to improve and strengthen surrounding environment which may be slightly impacted due to implementation of the proposed project activity
- The project benefits also entail revenue earnings to national and state exchequer through GST (Estimated Rs. 200 Crores Gross GST), road tax, income by registration of trucks & trailers, income tax, corporate tax, etc.
- It is estimated that **Total 450** people will get direct employment due to proposed Greenfield project; the priority of management is to fulfill the requirement through local peoples. In addition, there will be indirect employment to more than **1000 persons** (as drivers, conductors and attendants of new trucks, passenger carrying vehicles, technicians in workshops and garage besides the plumbers, electricians and masons).
- Transporters and Erection people will also get opportunity for manufacture their respective plant and Machinery and equipment. This will add to GDP of the Nation.
- The company is likely to add more than Rs 690 Crores per annum Turnover to the GDP due to which about Rs 200 Crores/annum Gross GST will be payable to the Govt. The salary wages payment will be above Rs. 2.8 Crores per year. Payment towards power to the state grid will be more than Rs 25 Crore/annum. All these will help to grow the National GDP and local area economy too.
- Preference will be given to local people, depending upon their qualification and skill. The salary wages payment will be above Rs.2.8 Crores per year.

9.0 ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan comprising following set of mitigation, management, monitoring and institutional measures to be taken during implementation and operation of the project, to eliminate adverse environmental impacts or reduce them to acceptable levels.

- Overall conservation of environment.
- Minimization of natural resources and water.
- Ensure effective operation of all control measures.

- Monitoring of cumulative and longtime impacts.
- Ensure effective operation of all control measures.
- Control of waste generation and pollution.

The company will invest about Rs. 1500 Lakhs Capital cost on environment management plan and spent about Rs. 63 lakhs per year for operation and maintenance.

10.0 CONCLUSION

The proposed project of M/s. MMIPPL will be beneficial for the overall development of the nearby villages. Some environmental aspects like dust emission, noise, wastewater, traffic density, etc. will have to be controlled better than the permissible norms to avoid impacts on the surrounding environment. Necessary pollution control equipment like bag house, water sprinklers, enclosures, etc. are integral part of the plant infrastructure. Additional pollution control measures and environmental conservation measures will be adopted to control/minimize impacts on the environment and socio-economic environment of the area. Measures like development of green belt and plantation in nearby village and along transport road, adoption of rainwater harvesting/recharging in the plant and in nearby villages will be carried out. The proposed CSR/CER activities to be initiated by the industry will be helpful to improve the social, economic and infrastructure availability status of the nearby villages.

Thus, it can be concluded that with the judicious and proper implementation of the pollution control and mitigation measures, the proposed project will not add adverse pollution levels to the environment, moreover, it will be beneficial to the society and will help to reduce the demand-supply gap of steel to some extent and will contribute to the economic development of the region and thereby the country.

11.0 DISCLOSURE OF CONSULTANTS

The Environmental studies for proposed project of M/s MMIPPL are carried out by M/s. Anacon Laboratories Pvt. Ltd., Nagpur (M/s. ALPL). Anacon established in 1993 as an analytical testing laboratory and now a leading Environmental Consultancy firm backed by testing lab for environment and food in Central India region. M/s ALPL is a group of experienced former Scientists from the Government Institutions and excellent young scientist of brilliant career with subject expertise. It is recognized by Ministry of Environment & Forests, New Delhi for carrying out environmental Studies & accredited by Quality Council of India (QCI) for conducting Environmental studies having Accreditation Certificate No.: NABET/EIA/2023/SA0160 (Rev.01) dtd. 13 March, 2023 valid till Sept. 27, 2023 as per QCI-NABET letter No. QCI/NABET/ENV/ACO/23/2788 dt. June 28, 2023 as category 'A' consultant organization in 19 Sectors.