EXECUTIVE SUMMARY

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1.0 INTRODUCTION

M/s. Sadguru Ispat Pvt. Ltd. (hereafter referred as SIPL), at present, is operating under with Environment Clearance (542/E.C./Raigarh/800 dated 22.07.2019) issued by SEIAA, Chhattisgarh and consent under Air and Water Act (vide Consent No.793/R.R./T.S./C.E.C.B./2019 dated 03.09.2019 renewed up to 31.08.2021) with capacity of 57321 TPA production of MS Ingot/Billet through Induction Furnace and CCM. Now the company have decided to expansion its capacity of MS Ingot/Billet production from 57321 TPA to 148000 TPA through total 4 Nos. of 12 MT Induction Furnaces. The existing 10 MT X 2 Nos. will be augmented to 12 MT and 2 Nos. new 12 MT Induction Furnace will be implemented, thus resulting in total 12 MT X 4 Nos. in order to produce 148000 TPA MS Ingot/Billet. To fulfill statutory requirement for the proposed expansion project and to obtain environmental clearance from SEAC-SEIAA, Chhattisgarh. Form - 1, pre - feasibility report, along with proposed ToR was submitted for proposal number SIA/CG/IND/63277/2021 on 11 May 2021 and subsequently ToR granted by SEIAA vide File No. ToR Letter No. 807/S.E.A.C., C.G./Udyog/ Raigarh/ 728/ Nava Raipur Atal Nagar dated 28th June 2021

As per Environmental Impact Assessment Notification dated 14th September, 2006 and subsequent amendment thereof, the proposed project falls under "**Category B**", secondary metallurgical project, schedule "**3(a)"** and requires Environmental Clearance (EC) to be obtained from SEAC/SEIAA, Chhattisgarh.

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 expansion project.

The Environmental Impact Assessment (EIA) and Environment Management Plan report is prepared for obtaining Environmental Clearance (EC) from SEAC/SEIAA, Chhattisgarh and the Consent for Establishment from the Chhattisgarh Environment Conservation Board (CECB) for the proposed expansion project.

Anacon Laboratories Pvt. Ltd. has conducted the baseline study for 10 Km radius study area surrounded to the project site during Post monsoon season (1st October, 2020 to 31st December, 2020) accordingly, EIA study report is prepared.

1.1 IDENTIFICATION OF PROJECT

M/s. SIPL has proposed expansion in production capacity expansion from 57321 TPA to 148000 TPA M.S. Ingot/ Billet production through implementation of additional 12 MT X 2 Nos. Induction furnace and upgradation of existing 10 MT X 2 Nos. to 12MT X 2 Nos. (final 12MT X 4 Nos.) Induction furnaces at Plot No. 154, Sector – F, OP Jindal Industrial Park, Punjipathra, Village – Tumidih, Tehsil –Gharghoda, District – Raigarh (Chhattisgarh).

As per approved ToR, 57321 TPA MS Ingot/Billets produced from 10 MT X 2 Nos. Induction furnaces will be expanded to achieve 148000 TPA MS Ingot/Billets through implementation of 12 MT X 2 Nos. additional Induction furnaces and upgradation of existing 10 MT 2 Nos. Induction furnaces to 12 MT each, thus resulting in 12 MT X 4 nos. Induction furnaces.

1.2 LOCATION OF THE PROJECT

Plant is located at Plot No. 154, Sector – F, OP Jindal Industrial Park, Punjipathra, Village – Tumidih, Tehsil –Gharghoda, District – Raigarh (Chhattisgarh). The nearest city is Raigarh which is around

19.1 km in SSE direction. Nearest airport is Jharsuguda Airport which is around 75 km at ESE direction. The nearest habitation is Punjipathra which is 0.70 km at NE direction from the project site. The nearest roadway is State Highway 1 (SH-1) Ambikapur Highway which is 1.4 km in E direction. The nearest railway station is Bhupdeopur Railway Station which is 12.64 km in the SW direction. 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 SEAC, Chhattisgarh, baseline environmental monitoring was already conducted during Post monsoon season (1st October, 2020 to 31st December, 2020) has been considered 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 expansion project activities during construction and operation stages were identified and duly addressed in the EIA- EMP report.

EIA/EMP report alongwith the proposed management plan to control / mitigate the impacts. Environmental Management Plan is suggested to implement the pollution control in the project.

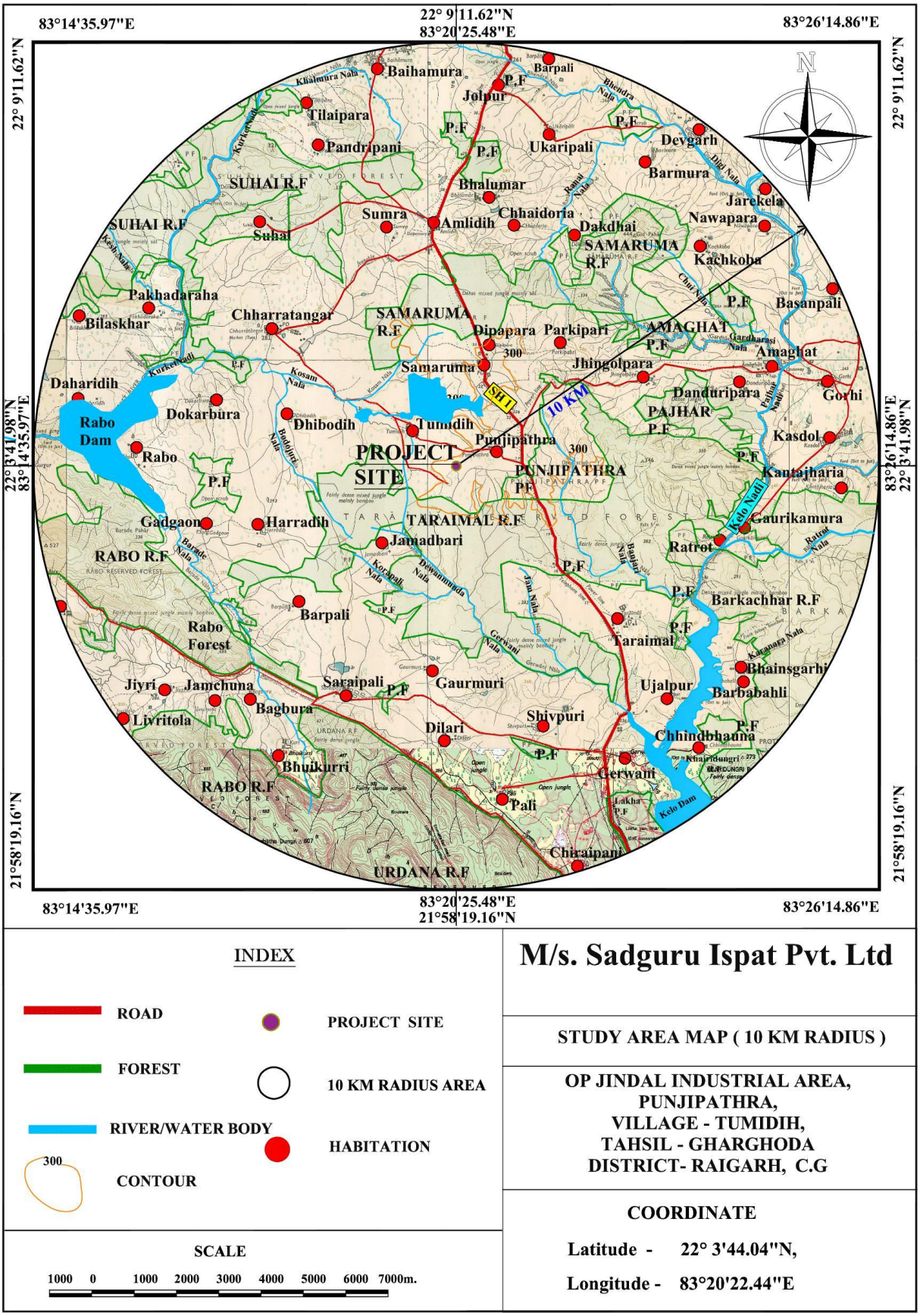

FIGURE 1: STUDY AREA (10 KM RADIAL DISTANCE)

TABLE 1
DETAILS OF ENVIRONMENTAL SETTINGS

Sr. No.	Particulars	Details
1.	Project Location	Plot No. 154, Sector-F, OP Jindal Industrial Park, Punjipathra, Village-Tumidih, Tehsil-Gharghoda, District-Raigarh (C.G.)
2.	Co ordinate	**Latitude** / **Longitude** / **Latitude** / **Longitude** i. 22°3'47.52"N / 83°20'20.30"E / ii. 22°3'48.14"N / 83°20'23.73"E iii. 22°3'41.64"N / 83°20'24.90"E / iv. 22°3'41.19"N / 83°20'21.58"E
3.	Toposheet No.	No.64 N/8
4.	Climatic Conditions	Mean annual rainfall is 1394 mm Temperature : Pre monsoon 20.5^0 C (Min.) 41.4^{0}C(Max.) : Winter 13.1^{0}C (Min.) 30.8^{0}C (Max) : Post monsoon 17.5^0 C (Min.) 32.4^{0}C(Max.) Source: IMD, Raigarh.
5.	Nearest IMD station	IMD Raigarh, 18.4 km SSE
6.	Land Form, land Use and Ownership	Total land involved is 2 Ha. Land. The land is already acquired by the company having Plot No. 154, Sector-F, OP Jindal Industrial Park. About 34.22% (0.68 Ha.) land has been developed as green belt. The land is within the industrial area, thus, no change will be there in land use.
7.	Site topography	Min - 310m msl, Max - 318m msl
8.	Nearest roadway	SH-1 (Ambikapur Highway) – 1.4 Km, E
9.	Nearest Railway Station	Bhupdeopur Railway Station – 12.64 Km , SW
10.	Nearest Air Port	Veer Surendra Sai Airport also known as Jharsuguda Airport – 74.5 Km, ESE
11.	Nearest Port	NA
12.	Nearest water bodies	Kelo River – 7.22 Km, E. / Karapali Nala – 3 Km, SW Barrage near Tumidih – 1.0 km, N / Dewanmunda Nala – 1.1 Km, W Rabo Dam – 7.0 km, WNW / Jam Nala – 2.8 Km, SSE Kosam Nala – 2.5 Km, NW / Gerwani Nala – 4.1 Km, SE Bodojuri Nala – 3.7 Km, W / Kelo Reservoir – 7.1 Km, SE Pajhar Nadi – 7.30 Km, E
13.	Nearest State/National Boundaries	Odisha – 22.3 Km, ESE
14.	Nearest major city with 2,00,000 population	Nearest city – Raigarh – 19.1 Km, SSE
15.	Nearest village/ major town	Nearest village is Punjipathra – 0.70 Km, NE
16.	Distance from sea coast	Bay of Bengal – 345.5 Km, SE
17.	Hills/valleys	NA
18.	Nearest tourist place	NA
19.	Areas occupied by sensitive man-made land uses (hospitals, schools, places of worship, universities etc.)	Govt. School Jamadabri – 2.9 Km, SW Govt. High School Gadgaon – 6.1 Km, SW Govt. Primary School, Jinghol – 4.8 Km, NE OP Jindal School – 14.6 Km, S Govt. college Tamnar – 11.7 Km, ENE O.P Jindal University – 0.8 Km, E Fortis OP Jindal Hospital – 15.0 Km, S ESIS Hospital Taraimal – 5.2 Km, SE ESIS Hospital Parsada – 11.1 Km, SSW Banjari Mandir – 3.6 Km, SE Budhi maai Temple – 11.1 Km, ENE Community Hall Gorhi – 8.0 Km, ENE

Sr. No.	Particulars	Details			
20.	Nearest Reserved/ Protected forests	Urdana RF	6.5 Km, SW	PF (Near Vill. Jamadbhari)	3.3 Km, SW
		Barkachhar RF	8.1 Km, SE	Rabo RF	6.2 Km, SW
		Kharidungri RF	8.3 Km, SE	Samaruma RF	2.8 Km, NW
		Taraimal RF	0.8 Km, SW		
21.	Areas already subjected to pollution or environmental damage	Project located within OP Jindal Industrial Park. This park does not classify or notify as severally or critically polluted area.			
22.	Seismic zone	Project site falls in Zone-II as per IS 1893 (Part-I): 2002. Hence, seismically it is a stable zone.			

2.0 PROJECT DESCRIPTION

2.1 PROCESS DESCRIPTION

2.1.1 Manufacturing Process of Steel Melting Shop with CCM

- The manufacturing process identified for the proposed expansion unit is one which is well established and proven and presently being followed by majority of similar manufacturing units mostly in small or medium scale sector.
- In order to achieve high energy efficiency four numbers of new Induction furnaces (12 MT capacities each) with higher power input capacity will be setup also in place of the existing furnaces with completely automatic charging facility as well as power sharing panel also. Electronic software will be installed to monitor the input power and maintaining power factor to almost unity level.
- The melting process involves taking sample of Sponge Iron & Pig Iron; Iron Powder and mild steel scrap, Defective Billets or scrap from user units is taken from raw material storage. This is then tested for its chemical composition and noted. Before preparation of charge necessary ingredients like Ferro Manganese, Ferro Silicon etc. are added by weight, Flux is taken up in crucible and then charge is put into it. Melting of steel along with other alloying element is accomplished in the crucible of coreless M.F. Induction Furnace.
- The high A.C. Current is passed through the copper oil wrapped around the outer periphery of crucible. By transformer action the A.C. Current induces much higher secondary current at 1000 hertz in charge through the coil. Enormous heat it thus developed by resistance which causes the melting of charge. As soon as the molten pool is formed very pronounced stirring action in the molten metal takes place which helps in accelerating the melting. Deoxidizing agents and sometimes specific alloying elements are also added at suitable intervals during melting. Melting of homogenous mass occurs at 1600^0C. If necessary superheating up to 1650 ^{0}C as done for specific time. After completion of melting cycle of an hour the homogeneous molten mass is poured hydraulically into the ladle.

❖ **Continuous Casting Machine (CCM):**

- The ladle containing liquid steel will be placed on the CCM platform and continuous casting of hot billet will be carried out in the same for which CCM is setup, the casting will be done through a highly automated controlled cooling software governed mechanism by which the casted billet will be so cooled that the temperature of billets do not fall below 1050^0C. The cast the molten metal in required shapes.

2.2 LAND REQUIREMENT

The expansion will be carried out on existing land of area 2.00 Ha. already available at Plot No. 154, Sector-F, OP Jindal Industrial Park, Punjipathra, Village - Tumidih, Tehsil - Gharghoda, District-Raigarh (C.G.) The land is already occupied by the company. The existing shed is enough to accommodate additional 2 Nos. of Induction furnaces; therefore there will be no change in area statement. The land details are provided as follows:

TABLE 2
AREA STATEMENT

Land use type	Area (in sqm)	Percentage (%)
Built Up area	5364	26.82%
Paved Area	798	3.99%
Open Area	6995	34.98%
Green Belt	6843	34.22%
Total :	**20000**	**100.00**

2.3 RAW MATERIALS REQUIREMENT, SOURCE & MODE OF TRANSPORT

The raw material 249914 TPA will be transported through truck. It is estimated that approx. 51 trips per day i.e. 102 trucks per day required for transportation of raw materials and finished products of the plant.

2.3.1 Solid and Hazardous waste generation

The details Solid and Hazardous waste generation are given in **Table 3.**

TABLE 3
SOLID AND HAZARDOUS WASTE GENERATION

Waste for disposal sent outside	Existing quantity (in TPA)	Quantity after expansion (in TPA)	Utilization/disposal method
Defective Billet	1800.00	5648.00	Reused in own Induction Furnaces.
Mill Scale	891.00	4752.00	Sold to Ferro Alloys/ Pelletization plants.
Slag	6910.00	18420.00	Will be given to metal recovery units and/or sent to Jindal Slag dumping yard.
Refractory Waste	45.00	119.00	Given to recycler/landfill.
Total	**9646.00**	**28939.00**	

2.4 WATER REQUIREMENT & SOURCE

The daily makeup water requirement in peak situation at 100% capacity utilization, after proposed capacity expansion, is estimated to be 95 KLD out of which 89 KLD will be used for cooling purpose and 6 KLD is estimated for human consumption. Water will be source from groundwater. For existing capacity NOC from CGWA has been obtained and for additional capacity necessary NOC permission from CGWA will be obtained. As per CGWA, the area falls under safe zone. Major water requirement for proposed project will be used for cooling purposes and all cooling systems will be designed in a closed loop system. Therefore, 100% of waste water will be recycled and zero discharge condition will be maintained.

2.5 POWER REQUIREMENT & SUPPLY

Power requirement will be around 15 MW which will be drawn from JSPL power supply network. In addition to this, DG sets are proposed for emergency backup.

2.6 MANPOWER REQUIREMENT

M/s. SIPL will provide employment to about 135 (60 existing + 75 additional) peoples which includes total 15 administrative staff (10 existing + 5 proposed) and 120 Production staff (50 existing + 70 proposed). Preference will be given to local people, 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. 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 proposed cost of expansion is estimated as Rs. 808 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. Project site is considered as OP Jindal Industrial Park. The baseline environmental quality data for various components of environment, viz. Air, Noise, Water, Land were monitored during **post monsoon season (1st October 2020 – 31st December 2020)** along with secondary data.

3.2 METEOROLOGY & AMBIENT AIR QUALITY

Summary of the Meteorological Data Generated At Site (1st October 2020 – 31st December 2020)

Predominant Wind Direction	Post Monsoon Season
First Predominant Wind Direction	NNE (64.25%)
Second Predominant Wind Direction	N (31.66%)
Calm conditions (%)	0.46
Avg. Wind Speed (m/s)	2.38

The status of ambient air quality within the study area was monitored for post-monsoon season of the year 2020 at 8 locations covering project site. The levels of Respirable Particulate Matter (PM_{10}), Fine Particulates ($PM_{2.5}$), Sulphur Dioxide (SO_2,), 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 3 (A)**.

TABLE 3 A
SUMMARY OF AMBIENT AIR QUALITY MONITORING RESULTS

Sr. No.	Location		PM_{10} µg/m³	$PM_{2.5}$ µg/m³	SO_2 µg/m³	NO_2 µg/m³	CO mg/m³	Ozone µg/m³	NH_3 µg/m³
1	Project site (OP Jindal Industrial park)	Min	61.1	22.5	15.4	18.5	0.277	8.8	5.4
		Max	87.8	35.9	20.2	30.8	0.353	12.6	10.8
		Avg	76.6	29.2	18.6	25.2	0.319	10.8	8.2
		98th	87.4	35.9	20.1	30.6	0.346	12.3	10.6
2	Punjipathra	Min	66.9	26.4	13.5	18.0	0.293	7.9	4.9
		Max	89.0	42.5	21.7	23.9	0.331	12.7	9.1
		Avg	72.5	31.2	17.6	21.2	0.304	9.9	7.2
		98th	88.3	41.9	21.6	23.5	0.329	12.0	9.1
3	Dhibodih	Min	51.1	18.7	14.0	15.9	0.242	7.1	3.9
		Max	73.7	28.0	20.7	30.4	0.355	11.2	6.8
		Avg	61.5	24.0	16.5	23.7	0.295	8.8	5.5
		98th	73.0	27.9	20.6	30.0	0.351	11.1	6.8

Sr. No.	Location		PM_{10} µg/m^3	$PM_{2.5}$ µg/m^3	SO_2 µg/m^3	NO_2 µg/m^3	CO mg/m^3	Ozone µg/m^3	NH_3 µg/m^3
4	Harradih	Min	46.1	20.7	17.0	18.2	0.269	5.1	4.5
		Max	71.1	34.3	22.5	24.0	0.345	13.8	9.3
		Avg	65.1	25.6	19.2	21.7	0.311	9.4	6.9
		98th	71.1	34.0	22.3	23.8	0.338	13.5	9.2
5	Barpali	Min	43.5	19.5	12.4	19.1	0.273	5.1	3.9
		Max	67.5	30.8	16.4	27.0	0.359	12.0	10.9
		Avg	58.8	23.4	14.2	22.8	0.316	8.5	7.2
		98th	66.9	30.3	16.3	26.8	0.358	12.0	10.7
6	Gaurmuri	Min	51.5	21.1	11.0	20.7	0.321	6.9	4.3
		Max	73.6	28.1	17.4	28.6	0.369	11.3	11.2
		Avg	64.1	24.5	13.3	24.3	0.344	8.9	7.7
		98th	73.5	28.0	17.3	28.3	0.369	11.2	10.5
7	Parkipari	Min	42.2	16.7	9.4	20.3	0.230	5.6	7.3
		Max	68.9	27.2	14.9	28.1	0.319	10.1	12.2
		Avg	54.5	21.5	11.8	24.4	0.284	7.5	9.2
		98th	68.6	26.7	14.9	28.0	0.316	9.8	12.0
8	Kantajharia	Min	53.8	23.1	8.9	18.5	0.229	7.0	5.0
		Max	75.1	30.4	12.1	23.8	0.283	12.8	11.4
		Avg	60.9	26.5	10.5	21.5	0.257	9.8	7.7
		98th	73.4	30.3	11.9	23.7	0.282	12.6	11.2
	CPCB Standards		**100 (24hr)**	**60 (24hr)**	**80 (24hr)**	**80 (24hr)**	**2 (8hr)**	**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 4.**

TABLE 4
SUMMARY OF AMBIENT NOISE LEVEL MONITORING RESULTS

Sr. No.	Monitoring Locations	Equivalent Noise Level	
		Leq_{Day}	Leq_{Night}
Residential Area			
1.	Taraimal	48.7	39.2
2.	Gaurmuri	51.8	42.1
CPCB Standards dB(A)		**55.0**	**45.0**
Commercial Area			
3.	Jamadbari	53.2	41.9
4.	Dhibodih	54.4	43.7
CPCB Standards dB(A)		**65.0**	**55.0**
Silence Zone			
5.	Samaruma	47.6	37.4
6.	Tumidih	48.8	38.1
CPCB Standards dB(A)		**50.0**	**40.0**
Industrial Area			
7.	Project Site (OP Jindal Industrial park)	62.3	53.4
8.	Punjipathra	56.2	47.7
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 Local Geology

10 km radius study area is mainly comprised of sedimentary rock formations, like sandstones, arenites, conglomerates, shale etc. All these formations are of Proterozoic age and of Gondwana age. There are no major geological structure present in study area as far as concern with construction of buildings and other structure. Study area falls in seismic zone-II i.e. low damage risk zone.

Site specific Geology:

Project area is mostly covered by soil cover which is having thickness of around 0.5-1.0m. Outcrops are very rare in project site.

3.4.2 Hydrogeology

Most of the study area is covered by sedimentary formations. Sandstones are good aquifer as it holds and transmit very good amount of water. The ground water occurs in both phreatic and semi-confined to confined condition. One distinct perennial auto flow zone has been demarcated in Tamnar block in the Mand river sub-basin.

Depth to water level scenario in the study area :

Pre-monsoon Water levels- 4.5 to 7 m bgl

Post-monsoon water levels: 0.3 to 3.5 m bgl

3.4.3 Geomorphology

Study area is comprises of gently sloping plains on Proterozoic age and on Gondwana rocks. Flood plains are observed along River courses. There are no major geomorphological structures present in study area.

3.4.4 Water Quality

Groundwater and surface water quality was assessed by identifying 8 groundwater (Borewell/ handpump) locations in different villages and 5 surface water samples.

A. Groundwater Quality

The physico-chemical characteristics of groundwater are compared with the IS-10500 standards. The analysis results indicate that the pH ranged between 7.11-7.94. The TDS was ranging from 502-574 mg/l. Total hardness was found to be in the range of 232.91-272.43 mg/l. The fluoride concentration was found in the range of 0.34-0.62 mg/l. The nitrate and sulphate were found in the range of 2.00-17.28 mg/l and 16.43-28.17 mg/l respectively. Heavy metals content found (i.e., As, Al, Cd, Cr, Cu, Pb, Mn, Zn and Hg) is given in **Ch 3, Table 3.4.3**.

Sr. No.	Locations	WQI	Quality	Remark
1	Project site (OP Jindal Industrial park)	56.32	Good	**Water quality assessed based upon above physico-chemical parameters and all samples are physico-chemically good.**
2	Punjipathra	53.71	Good	
3	Dilari	57.90	Good	
4	Shivpuri	60.11	Good	
5	Taraimal	54.97	Good	
6	Ratrot	51.58	Good	
7	Dhibodih	52.87	Good	
8	Chhaidoria	58.04	Good	

B. Surface Water Quality

The analysis results indicate that the pH ranged from 7.32-8.16 which are well within the specified standard of 6.5 to 8.5. The pH of water indicates whether the water is acid or alkaline. The TDS was observed to be 440-484 mg/l which is within the permissible limit of 2000 mg/l. The total hardness recorded was in the range of 177.52-189.93 mg/l as $CaCO_3$ which is also within the permissible limit of 600 mg/l. The levels of chloride and sulphate were found to be in the range of 47.76-131.59 mg/l and 26.53-32.68 mg/l respectively.

Dissolved oxygen (DO) refers to the amount of oxygen (O_2) dissolved in water. Because fish and other aquatic organisms cannot survive without oxygen, DO is one of the most important water quality parameters. The reported value of range of 6.1-6.4 mg/l. Phosphorus (as PO_4) is an important nutrient for plants and algae. Because phosphorus is in short supply in most fresh waters, even a modest increase in phosphorus can cause excessive growth of plants and algae that deplete dissolved oxygen (DO) as they decompose. The reported value for PO_4 ranged from 0.10-0.18mg/l.

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 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 15th April 2020 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°58'04.21"N to 22°08'37.34"N latitude and 83°14'51.13"E to 83°26'29.52"E longitude and elevation 230 – 588 meter are used as per the project site confined within that area.

The Land Cover classes and their coverage are summarized in **Table 5.**

TABLE 5
LU/LC CLASSIFICATION SYSTEM

Sr. No.	Level-I	Level-II	Area (Sq.Km²)	Percentage (%)
1	Built-up land	Settlement	10.25	3.26
		Industrial Infrastructure	8.69	2.77
		Road Infrastructure	0.74	0.24
2	Agricultural Land	Cropland	98.57	31.4
		Barren Land	1.1	0.35
3	Forest Land	Reserve forest / Protected Forest	163.92	52.2
4	Scrubs	Open Scrub	6.87	2.19
5	Water bodies	Canal/River/Pond/ Tank	22.36	7.12
6	Others	Brick Kiln	0.56	0.18
		Mining Area	0.94	0.29
	Total		**314**	**100**

3.6 SOIL QUALITY

For studying soil quality of the region, sampling locations were selected to assess the existing soil conditions in and around the proposed project site representing various land use conditions. The physical, chemical properties and heavy metals concentrations were determined. The samples were collected by ramming a core-cutter into the soil up to a depth of 30 cm. Total 8 samples within the study area were collected and analyzed.

Physical Characteristics of Soil

From the analysis results of the soil samples, it was observed, the bulk density of the soil in the study area ranged between 1.423-1.701 g/cc which indicates favourable physical condition for plant growth. The water holding capacity is between 13.31-31.65%. Infiltration rate, in the soil is in the range of 15.63-33.36 mm/hr

Chemical Characteristics of Soil

pH is an important parameter indicative of alkaline or acidic nature of soil. It greatly affects the microbial population as well as solubility of metal ions and regulates nutrient availability. Conductivity, a measure of soluble salts in the soil is in the range of 239.1-889 µS/cm. The important soluble cations in the soil are calcium and magnesium whose concentration levels ranged from 164.99 - 402.37 mg/Kg and 100.47-278.64 mg/Kg respectively. Chloride is in the range of 178.72-872.57 mg/Kg.

3.7 BIOLOGICAL ENVIRONMENT

Floral composition in Study Area

Floral characteristics at select forests and surrounding areas including villages were studied during Post Monsoon Season - 2020. Forest Plan of Raigarh District as secondary data was studied for primary survey. Total 143 floral species were observed in the study area. The details about the floral composition are as follows.

a. **Trees:** Total 94 species were found in the study area
b. **Shrubs (small trees):** Total 16 species were enumerated from the study area.
c. **Herbs:** In the study area 5 species were observed.
d. **Bamboo & Grasses:** 15 species were enlisted from the study area
e. **Climbers and Twiners:** Total 12 species of climbers/ twiners were recorded in the study area.
f. **Parasite/epiphytic plant:** 1 species enlisted in the area

RET (Rare, Endangered and Threatened species) STATUS

According to IUCN Status report 2013 out of total 143 plant species identified within study area among the observed species *Chloroxylon swietenia* which is Vulnerable (VU) species as per IUCN Ret 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

The IUCN Red List is the world's most comprehensive inventory of the global conservation status of plant and animal species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity.

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)

Avifauna: Nil as per IUCN

As per Indian Wild Life (Protection) Act, 1972

Wild Life (Protection) Act, 1972, as amended on 17th January 2003, is an Act to provide for the protection of wild animals, birds and plants and for matters connected therewith or ancillary or incidental thereto with a view to ensuring the ecological and environmental security of the country.

Some of the sighted fauna was given protection by the Indian Wild Life (Protection) Act, 1972 by including them in different schedules. Among the birds in the study area, Pea fowl (*Pavo cristatus*), is included in schedule I of Wild life protection Act (1972), while many other birds are included in schedule IV.

Among the reptiles, *Python molurus* (Indian Python) and *Varanus bengalensis* (Bengal Monitor Lizard) categorized as Schedule –I Whereas, Indian Cobra (*Naja naja*), Common rat snakes (*Ptyas mucosus*), are provided protection as per Schedule-II of Wild life protection act, (1972).

Among mammals; *Elephas maximus* – Asiatic Elephant and *Melursus ursinus* – Sloth Bear Categorised under Schedule – I. Whereas, Mongoose (*Herpestes edwardsi*), *Macaca mulata* (Rhesus macaque), Jungle cat (*Felis chaus*), Indian Fox (*Vulpes bengalensis*) are schedule –II animals. Wild boar (*Sus sucrofa*) and *Hyaena hyaena* (Hyena) is protected as Schedule-III animal and Hares & Five striped squirrel are included in schedule IV of Wild Life Protection act 1972. Fruit bat & Rats protected in Schedule V of Wild Life Protection act 1972.

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 6.** Details regarding education and infrastructure facilities 2011 are presented in **Table 7**.

TABLE 6
SUMMARY OF SOCIO-ECONOMIC ENVIRONMENT OF VILLAGES WITHIN 10 KM RADIUS AREA

No. of villages	46
Total households	10040
Total population	40724
Male Population	20788
Female population	19936
SC Population	3237
ST Population	16936
Total literates	26233
Total Illiterates	14491
Total workers	18580
Total main workers	13314
Total marginal workers	5266
Total non-workers	22144

Source: Primary census abstract 2011, state Chhattisgarh.

TABLE 7
INFRASTRUCTURE FACILITIES AVAILABLE IN THE STUDY AREA

Yr. 2011	In percentage (%)									
	Education	Drinking water	Road	Power	Communication	Transportation	Govt. PHC & SC	Bank & Society	Drainage	Recreation
Availability	98	100	96	100	78	61	20	7	63	67

Source: Primary census abstract 2011, State Chhattisgarh.

3.8.1 Salient Observation of the Socio-Economic Survey

- **Employment**: Main occupation in the study area was agriculture and Labor Work its allied activities eg. Cattle rearing, dairy farming, agro-horticulture, bamboo-agricultural crop patterns, floriculture, bee-keepings etc. Other income generation sources of the area, small business; private jobs etc. The labors were getting daily wags in the range of 300-350 Rs, depending on type of work they set. It is observed that the Raigarh District is having huge scope for employment as industrialization is more in this area. But due to lack of Vocational training centers in the area the Industries are outsourcing some of the key employees from other areas.
- **Agriculture and labor** - Main occupations are mostly day labour and agriculture but other business includes preparation of leaf tray, leaf cups, collection of Mahua for the preparation of countryside liquor. People in the study area resort to rearing of livestock as a source of income. As per the local interview during field survey, it was observed that the most common animal reared by the people is cow, buffalo, poultry and goat.
- **Major crops of study area, production & yield**: About 45% of the study area, as per site survey, belongs to the agricultural land category. Both (Rabi and Kharif) type of cropping practice is prevailing in this area and the type of crops includes paddy, ragi, green gram and black gram. Til, groundnut, mustard, jute, sugar cane etc are the major commercial crops grown in the study area. Banana and mango are the major fruits grown in this area.
- **Migration from other states**: Main industries were coal washery, power plant, steel industry etc. in the study area Migration from other states eg. UP, Bihar & Odisha for employment purpose found in the study area.
- **Education facilities**: The Primary & secondary data reveals that literacy levels in all the villages is varying from 60 to 80 %. Most of the students in Villages in the study area are going to Raigarh town for their studies which is about 19 Kms. from the plant. The schools are also not having proper infrastructure facilities. College facility is available in Traimal and Raigarh in the study area.
- **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. Bhupdeopur Railway Station – 12.64 km.
- **Medical facilities:** The Primary & secondary data reveals that there are only 09 nos. of Sub Health Centers & 01 nos. of PHC's in the Study area. During FGD villagers made various issues in health care facilities, such due to COVID-19 crisis ,public health in particular workers' health and safety, converge not properly working health facilities available at PHCs, Laboratory testing and Delivery facilities at Government Health Centers, availability of clean toilet and drinking water at PHCs, and distance of the nearest health center from the Village. To control the spread of diseases (COVID-19 ,Malaria & viral fever) and reduce the growing rates of mortality due to

lack of adequate health facilities, special attention needs to be given to the health care in rural areas. The key challenges in the healthcare sector are low quality of care, poor accountability, lack of awareness, and limited access to facilities. It is also observed that Malnutrition is the common in most of the villages.

- **Drinking water, sanitation & infrastructure**: It was observed that only 31 villages have Pucca Road facilities. It means nearly 75.60 % of the villages have road facility. It was observed that there is good improvement in Power Supply. As the study area comprises of few Power Plants. This ultimately solved the Power cuts & Power Fluctuations in the villages of entire Raigarh District. It is observed that the source of water for Drinking & Agriculture in most of the Villages is groundwater. And the remaining villages which are proximate to the River use that as source of drinking water & for Agriculture. Tap water and water tanker is also provided by panchayat in summer, but supplied water quantity is not sufficient. For treating water, the Panchayat needs adequate funds to take any actions. Overhead Water Tanks are also installed in few villages It was observed that most of the Houses in the villages are not having sanitation facilities including in several schools. It was observed that now a day's Internet is playing major role in society, but in the study area only one Internet shop is available. Need to go to Raigarh.
- **Communication Facility:** Communication facility is good in the Study area. Maximum villagers are having Mobile Phone, news paper, television facility. It indicates that the study area is well progress in communication.
- **Transportation:** Lack of access for transportation, irregular bus/auto facilities were seen in the villages. School/college going students facing problem to attend schools/colleges which were at long distance.
- **Banking facility**: The study area has almost all the schedule commercial banks with ATM facility at urban areas and the district HQ.
- **Women empowerment:** Most of the women population is having local woman saving group and engaged in household activities. Women literacy was satisfactory in the study area (According to Primary Data Collection, only 20% Female population were workers) Since Most of the villages is having local Mahila Mandal and Women self-help groups were exist in the study area only for money savings purposes. Women literacy was satisfactory in the study area
- **Sports & social ailment issues:**
  - Social ailment issues like child marriage, alcoholism among tribes.
  - It is observed during FGD that there are only a few people got the benefit of Self employment scheme and needs substantial improvement.
  - It is observed that there is no encouragement for sports as there are less Schools & Colleges in the Study area. Raigarh is the only place where Sports training facilities are available in entire District.

3.8.1.1 Awareness and opinion of the respondents about the project

Public opinion is the aggregate of individual attitudes or beliefs. It is very important to take opinion of the villagers about the project. The awareness will not only promote community participation but also enable them to understand the importance of the project and encourage them to express there view. To know the awareness and opinion of the villagers about the project, group discussion, meeting with school teachers/village leaders were carried out in the study area.

- In core zone villages, majority of the respondents were aware about the project site but they were unaware about the project activity
- The respondents were known about expansion activities of small MS Ingot industries in Industrial Park, the project and they opined positively because the activity would definitely contribute development in the study area
- Village leaders asked to give employment opportunities to local people.
- According to the respondent air Pollution was increased due to industries area and directly affecting health of nearby villagers.
- The conditions of people within study area are very worst during COVID 19 Pandemic. People are not getting proper employment. Most of the People lose their jobs during lockdown period. People want special needs to be given bed, oxygen cylinder, and medicine for villagers.

3.8.1.2 Interpretation

Socioeconomic survey was carried out to know the infrastructural activities amenities available within 10 km radius from Project Site. The information regarding facilities available and the opinion of the people was sought by floating questionnaires and interaction with the people. This is done for observing the impact due to the project wrt social aspects so that proper actions / measures could be taken up for the benefit of the people (economically and wrt quality of life) and the project.

During the primary survey it was observed that almost pakka road facility is available in all villages within 10 km radius. Literacy rate of the study region is from 68%. On the basis of survey for literacy rate data it is interpreted that there is need to promote educate more and more people. Almost all the villages have more than 56 % people as non-workers. It indicates that the problem of unemployment can be solved by providing proper training and education. There is also need to establish more industries so that maximum number of employment can be generated. Basic amenities like Education facilities Health care facilities, water supply, electric power supply, mode of transportation etc. are available in all villages.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 AIR ENVIRONMENT

The implementation of proposed expansion project will have impact on the air quality parameters like PM_{10}, $PM_{2.5}$, SO_2, NO_X and CO. The raw material handling plant along with proposed Induction Furnaces, steel melting shops will emit dust and fumes. Apart from the above, there will be fugitive dust emissions due to transportation, storage and processing of raw materials.

The mathematical Model ISCST-3, was used for predicting the GLCs, which is entirely in line with the requirement of Central Pollution Control Board, New Delhi. The maximum ground level concentrations (GLCs) for particulate matter and gaseous concentration SO_2, NO_2 due to existing as well after expansion main process and standby activities were carried out. The predicted 24 hourly maximum contribution in AAQ concentrations from exisiting and after expansion facilities for particulate matter (Inductiion furnace) 0.11 µg/m^3 and 0.2µg/m^3, occurring at a distance of about 5.3 km each respectively in SSW and S direction and exiting emissions already reported in current baseline scenario. And emissions from standby DG sets for particulate matter, SO_2 and NO_2 are found to be 0.11 µg/m^3, 0.008 µg/m^3 and 0.95 µg/m^3 occurring at a distance of about 3.1 km each respectively in SSW and S direction in existing and After expansion scenario, there is no significant change in short term modelling results. No significant incremental concentration was found due to proposed expansion activities with respect to existing scenario. The mitigation measures adopted are:

- Roads are being / will be frequently sprinkled with water.
- Most of the materials like Sponge Iron ore is being /will be stored under covered shed.
- In case of storage of Sponge Iron in open, it is being/ will be covered by tarpaulins to prevent spread of dust from it during transportation.
- Regular maintenance of vehicles and machineries is being/ will be carried out in order to control emissions.
- Green belt development would be taken up all along the roads, plant premises etc.
- Protective appliances are being/ will be provided to all the workers exposed in dusty atmosphere.
- Avoiding overloading of the trucks.
- Workers are being/ 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 is being/ will be limited to day hours only.
- Periodical maintenance of process machinery.

4.2 NOISE ENVIRONMENT:

During the normal operation of manufacturing process noise will be generated due to Induction Furnaces, CCM, FD/ID Fan, and DG Set, etc. the ambient noise levels are expected to increase significantly with the attributes of the respective equipment, but this noise will be restricted close to the concerned equipment. The preventive measures are given below:

- Equipment should be standard and equipped with silencer. The equipment should be in good working conditions, properly lubricated and maintained to keep noise within permissible limits.
- High noise zone should be marked and earplugs shall be provided to the workmen near high noise producing equipment. The workmen should be made aware of noise and vibration impacts on their health and mandatory use earplugs.
- Proper shifting arrangement shall be made to prevent over exposure to noise and vibration.
- Tall trees with heavy foliage shall be planted along the boundary / project site / plantation area, which will act as a natural barrier to propagating noise.
- Silent DG sets shall be used at project site.
- Speed limits shall be enforced on vehicle.
- Use of horns / sirens shall be prohibited.
- Use of loud speakers shall comply with the regulations set forth by CPCB.
- Regular noise monitoring shall be carried at construction camp / project site to check compliance with prevailing rules.

4.3 WATER ENVIRONMENT:

The implementation of proposed 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.

The various control measures that will be adopted are:

- No pre-treatment of raw water is required. As the water will be used for cooling purpose only.
- No wastewater generation from the process
- Closed circuit cooling system will be implemented.
- Rain water recharged to ground water.
- Waste water generated through sanitary/toilet activities. This will be treated in STP and treated water will be used for plantation purposes and dust suppression.
- All stock piles will be on pucca flooring to prevent for any ground water contamination.

Vehicular Movement

All the major raw materials and finished products will be transported through covered trucks by road.

4.4 BIOLOGICAL ENVIRONMENT

There is no ecological sensitive area like national park, sanctuary, biosphere reserve, within 10 km radial distance from the project site. No forest land is involved at project site.

Surrounding Pollution Aspects

The increase concentration levels of particulate matter, SO_2, NO_x, in the atmosphere could, lead to decline the rate of photosynthesis, thus retarding the growth of plant. However, air quality modeling 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 expansion project would be minimal as project activity will be carried out within the plant boundary limit with proper control measures.

Study of impact on Mammals

The project lies within the industrial area, no forest land involved in the project. However, considering study area, stray elephant movement was reported forests within study area. These forest areas are far away from the project site. The proposed project does not involve destruction of habitat as there is no forest land exists in the project site moreover in order to improve habitat of schedule – I species within 10 study area, biological conservation plan prepared and it will be implemented.

Greenbelt development

The expansion will be carried out on land of area 2.00 Ha. M/s. SIPL will have 34.22% (i.e. 0.68 Ha.) of the total area reserved for green belt development. As on date around 350 Nos. of plant are already grown within plant premises, additional native species sampling 1350 nos. (total 1700 saplings, considering 2500 trees/ha) will be planted.

4.5 SOCIO-ECONOMIC IMPACTS:

The land use is not going to be significantly changed as the proposed expansion will be carried out within existing plant premises, thus there will be no issue of involvement of any agriculture land or settlement on the contrary there will be positive impact on the socio economic environment of the area. Increase in direct/indirect job opportunity shall take place. Services in the locality shall be used and accordingly growth in economic structure of the area will take place.

5.0 ENVIRONMENTAL MONITORING PROGRAM

An Environmental Management Cell (EMC) will be established for the proposed expansion project under the control of Board of Directors followed by General Manager. The EMC will be headed by an Environmental Manager having adequate qualification and experience in the field of environmental management. Environmental monitoring of ambient air quality, surface and ground water quality, ambient noise levels, etc. will be carried out through MoEF&CC accredited agencies regularly and reports will be submitted to CECB/MoEF&CC.

6.0 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.

A detailed Disaster Management Plan for facing disasters due to natural effects and human reasons is prepared and incorporated in the EIA/EMP report for ensuring safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of Disaster Management Plan, it will be widely circulated and personnel training through rehearsals. Site facilities, procedures, duties and responsibilities, communications, etc. are considered in details in the Disaster Management Plan.

7.0 PROJECT BENEFITS

Proposed Social Welfare Arrangement

The proposed project would provide development of area and consequent indirect and direct job opportunities which would finally result in improvement in the quality of life of people in the central region. M/s. SIPL will carry community welfare activities in the following areas:

- Community development
- Education
- Health& medical care
- Roads

The project proponent will comply with its obligation for CSR as per Company's Act too.

Although the MOEFCC vide its OM dated 30th September 2020 has provided that the CER value for the project would be based on Public Hearing outcome and as per the commitments made by the project promoters during the Public hearing however the provisions for CER are made in the proposal as per TOR which required to consider as per O.M. dated 01/05/2018 and 30.09.2020 issued by MoEF&CC, New Delhi proposals regarding Corporate Environment Responsibility (C.E.R.).

The proposed expansion cost of the project is Rs. 800 Lakhs and CER cost proposed Rs. 8.00 Lakhs which will be spent for the Improvement of Environment.

8.0 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.

Judicious use of the environmental management will be implemented with addressing of components of environment, which will be likely affected during construction and operation of the proposed expansion project. The capital cost required to implement the EMP for proposed expansion project is estimated to be Rs. 66 Lakhs. The annual recurring expenses will be Rs. 14 Lakhs has been allocated for implementation of the Environmental Management Plan for proposed project.

9.0 CONCLUSION

The proposed expansion project of M/s. Sadguru Ispat Pvt. Ltd. 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. forms 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 expansion 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.

10.0 DISCLOSURE OF CONSULTANTS

The Environmental studies for proposed project of M/s Sadguru Ispat Pvt. Ltd. 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/1922/RA 0150 dtd. 03 Feb 2020 Valid till September 30, 2022.