

PUBLIC HEARING
EXECUTIVE SUMMARY

For

**PROPOSED EXPANSION OF INDUCTION FURNACE
CAPACITY FROM 36,000 TPA TO 72000 TPA,**

AT

**PLOT NO. 96, 97, SILTARA PHASE II INDUSTRIAL AREA,
VILLAGE SILTARA, TEHSIL & DISTRICT – RAIPUR,
CHHATTISGARH**

PROJECT PROPONENT

M/s. SUNIL SPONGE PVT. LTD.

Environmental Consultant

M/s Anacon Laboratories Pvt. Ltd., Nagpur

QCI-NABET Accredited EIA Consultant for Metallurgical Industries (Sector 8)

MoEF&CC (GOI) Recognized Laboratory

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EXECUTIVE SUMMARY

1.0 INTRODUCTION

M/s. Sunil Sponge Pvt. Ltd. (hereafter referred as SSPL) is in operation of its unit with existing facilities of Sponge Iron Kiln to produce sponge iron from coal based DRI kiln process from iron ore of production capacity 60000 TPA (100 TPD X 2 Nos.), 1 No. X 12 MT Induction Furnace to produce 36000 TPA MS Billets, waste heat recovery boiler (3 MW X 2Nos.) and biomass based power plant of 5 MW located at Siltara Phase II Industrial area, Village Siltara Tehsil and District –Raipur, Chhattisgarh.

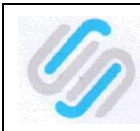
For the first Sponge Iron Kiln, CTE, CTO and CTO for Air and Water consents (valid upto 30.06.2023) were obtained on 10/09/2003, 27/07/2005, and 05/09/2018, respectively. Again, for the second 100 TPD Sponge Iron Kiln of annual capacity 30000 TPA along with 12 MT IF, CTE was obtained on 07/04/2006, CTO on 06/07/2006, for Sponge Iron Kiln and for 12 MT IF CTO was obtained on 05/09/2018. The company had obtained CTE for WHRB 3 MW X 2 Nos. on 04/02/2010 and CTO granted on 20/06/2012. It is a clean technology process which does not require any fuel and is exempt from seeking EC. CTE for biomass based 5 MW power plant obtained on 06/03/2014. CTO for the same was obtained on 07/09/2018.

In the meantime, it was decided to set up another 12 MT induction Furnace to produce another 36000 TPA Mild Steel Billets within the existing shed and premises of the existing 12 MT Induction Furnace. Thus the company applied to seek EC in 2015 but due to delays in preparation of EIA, the process of seeking EC was not completed. But in ignorance of the requirement of EIA notification 2006 it has implemented a 12 ton Induction furnace which will be used to produce 36000 TPA MS Billets from Sponge iron.

Now the company has 12 MT X 2 Nos. induction furnace, out of which only 1 No of 12 MT furnace is in operation whereas second 12 MT Induction Furnace is not yet started commercially. The second 12 MT furnace has only been installed.

The SEAC CG letter dtd. 29/08/2017 revealed that proposed expansion of Induction Furnace capacity 36000 TPA to 72000 TPA is violation under the provision in EIA Notification, 2006, thus, the project proponent was advised to file violation case under the provision of MoEF&CC notification vide S.O. 804(E) dtd. 14/03/2017. Thus, the proposal has been submitted to the Ministry for consideration in pursuance of the Ministry's Notification dated 14th March, 2017 due to violation of the EIA Notification, 2006.

As per Environmental Impact Assessment Notification dated 14th September, 2006 and subsequent amendment thereof, the overall project falls under "**Category A**", Schedule **3(a)** Metallurgical industries of the Schedule to the EIA Notification, 2006, and requires prior EC from the MoEF&CC based on the appraisal by Expert Appraisal Committee (Violation Projects), MoEF&CC, New Delhi. Terms of Reference (ToR) issued by Ministry of Environment and Forest & Climate Change, New Delhi vide letter no. F. no. 23-121/2018-IA.III(V) dtd. 18/07/2019. The project at a glance is provided in **Table 1**.



**TABLE 1
PROJECT AT A GLANCE**

Sr. No.	ACTIVITIES	PARTICULARS
1.	Final observations/recommendations of the SEAC to the SEIAA/State Government The SEAC CG letter dtd. 29.08.2017 revealed that proposed expansion of Induction Furnace capacity 36000 TPA to 72000 TPA is violation under the provision in EIA Notification 2006. Although additional furnace for 36000 TPA installed on dated 20.09.2007 but yearly production till today is less than 36000 TPA	29.08.2017
2.	Online Application (Form I & PFR) Submitted for Grant of ToR to EAC (Violation Projects), MoEFCC, New Delhi.	12 th Sept. 2017
3.	ToR Presented before EAC (Violation Projects), MoEFCC, New Delhi.	25 th Feb. 2019
4.	ADS generated by Member Secretary	08 th Mar. 2019
5.	ADS response submitted to project proponent ("Detailed pre-feasibility report as per the Ministry OM dtd. 30.12.2010")	05 Apr. 2019
6.	Presentation for further consideration for Terms of Reference proposal	22 nd May 2019
7.	Grant of ToR by MoEFCC (Violation Projects), New Delhi (vide letter no. F. no. 23-121/2018-IA.III(V) dtd. 18/07/2019.	18 th July, 2019
8.	Baseline Monitoring Carried out	Dec'2019 to Feb'2020

1.1 IDENTIFICATION OF PROJECT

SSPL has proposed production capacity expansion from 36000 TPA to 72000 TPA MS billet production through implementation of additional Induction furnace at Plot No. 96, 97, Siltara Phase II Industrial area, Village Siltara, Tehsil & District – Raipur, Chhattisgarh.

1.2 LOCATION OF THE PROJECT

Plant is located at Plot No. 96, 97, Siltara Phase II Industrial area, Village Siltara, Tehsil & District – Raipur, Chhattisgarh. The nearest city is Raipur which is around 14.1 km in south-south-east direction. Nearest airport is Raipur which is around 23.49 km at south-south-east direction. Nearest railway station is Mandhar, 7.4 km, S. The nearest roadway is Mundrethi to Siltara Road, adjacent to site NE, NH-200- 2.2 km, SE and NH – 6 Km, S. The nearest habitation is Sondra at 1.7 Km distance in South-South-West direction. The proposed expansion project will be coming up within the existing premises. Index map of project location is given in **Figure 1**. Study area map of 10 km radius is given in **Figure 2**. Details of the environmental settings are given in **Table 2**.

**TABLE 2
DETAILS OF ENVIRONMENTAL SETTING**

Sl	Particulars	Details
1.	Project Location	M/s Sunil Sponge Pvt. Ltd. Plot No. 96, 97 Village- Siltara (Siltara Phase II Industrial area) Tehsil-Raipur, Dist.- Raipur (Chhattisgarh)
2.	Co ordinate	Latitude : 21 22'42.29"N ; Longitude: 81 38'50.78"E
3.	Toposheet No.	64 G/11 (F44P11)
4.	Climatic Conditions	Mean annual rainfall is 1252.8 mm Temperature : Pre monsoon 20.6 ^o C (Min.) 41.7 ^o C(Max.) : Winter 13.3 C (Min.) 31.0 C (Max)



Proposed expansion of Induction Furnace of capacity from 36,000 TPA to 72000 TPA, at Plot No. 96, 97, Siltara Phase II Industrial area, Village Siltara, Tehsil & District – Raipur, Chhattisgarh.
M/s. Sunil Sponge Pvt. Ltd.



Sl	Particulars	Details
		: Post monsoon 17.3 °C (Min.) 31.8 °C (Max.) Source: IMD, Raipur
5.	Nearest IMD station	Nearest city - Raipur ~14.1 km, SSE
6.	Land Form, land Use and Ownership	The industry is located in Industrial estate developed by CSIDC undertaking of Government of CG. This land is already acquired by company. Total area is 7.47 Acres, among which green belt will be covered under 2.98 Acres (40%).
7.	Site topography	Project site located at 275 m (MSL) max
8.	Nearest roadway and highways	Mundrethi to Siltara Road , adjacent to site NE NH-200- 2.2 km, SE & NH – 6 Km S
9.	Nearest Railway Station	Raipur Railway Station 5 km, SE Mandhar Railway station 7.4 km, SE
10	Nearest Air Port	Nearest airport- Swami Vivekananda International Airport, Raipur, 23.49 Km, SSE
11.	Nearest Port	NA
12.	Nearest lake	NA
13.	Nearest State/National Boundaries	NA
14.	Nearest major city with 2,00,000 population	Nearest city - Raipur ~14.1 km, S
15	Distance for sea coast	NA
16	Hills/valleys	None
17	Nearest Reserved/Protected forests	None
18	Nearest water bodies	Kharun river 2.4 Km WNW, Chhokra Nala – 1.4 Km W, Kulhan Nala – 9.7 Km ENE
19	Seismic zone	The proposed expansion project site falls in zone-II as per IS 1893 (Part-I): 2002. Hence, seismically it is a stable zone.
20.	Areas already subjected to pollution or environmental damage	Siltara, Urla, Rawabhata industrial area are falls within 15 Km which are severally polluted (air regime).

Source: Field Studies, Anacon Laboratories Private Limited



Proposed expansion of Induction Furnace of capacity from 36,000 TPA to 72000 TPA, at Plot No. 96, 97, Siltara Phase II Industrial area, Village Siltara, Tehsil & District – Raipur, Chhattisgarh.
M/s. Sunil Sponge Pvt. Ltd.

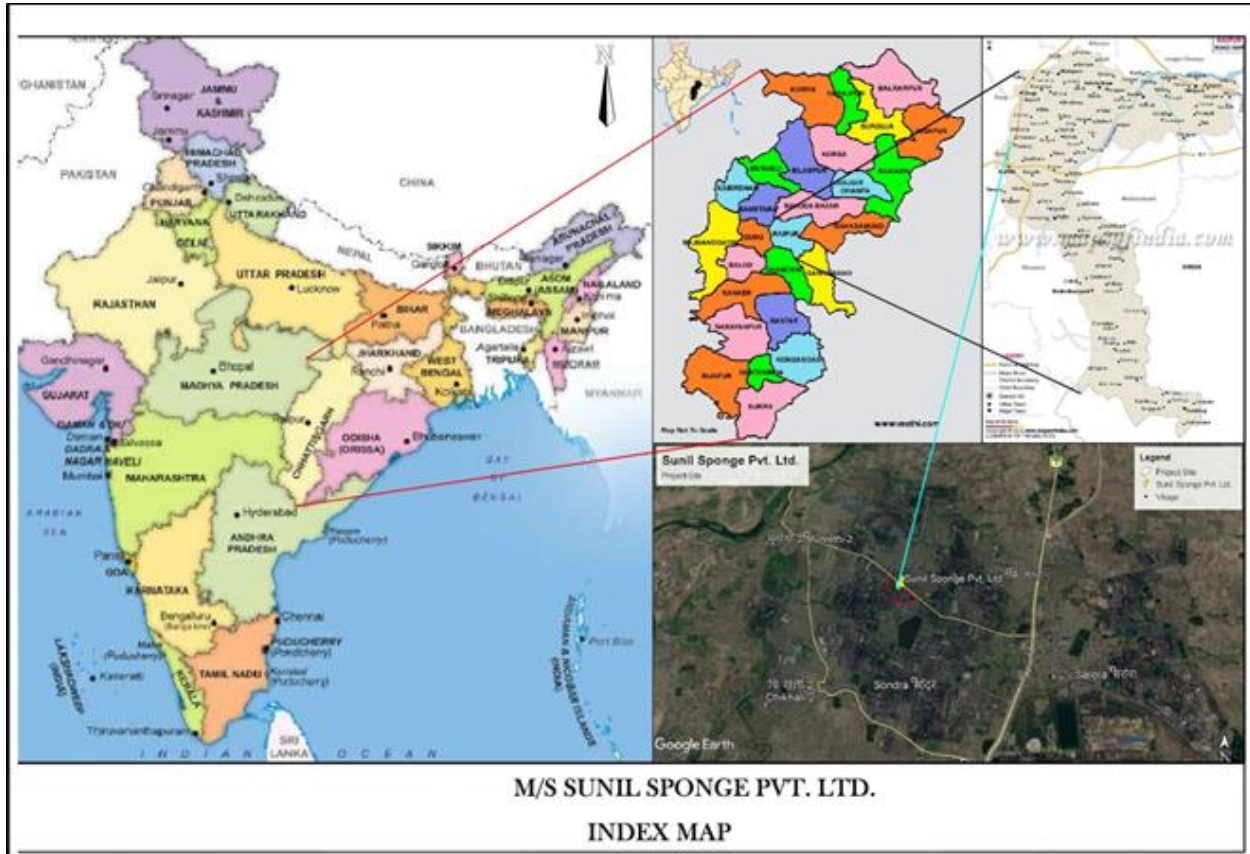
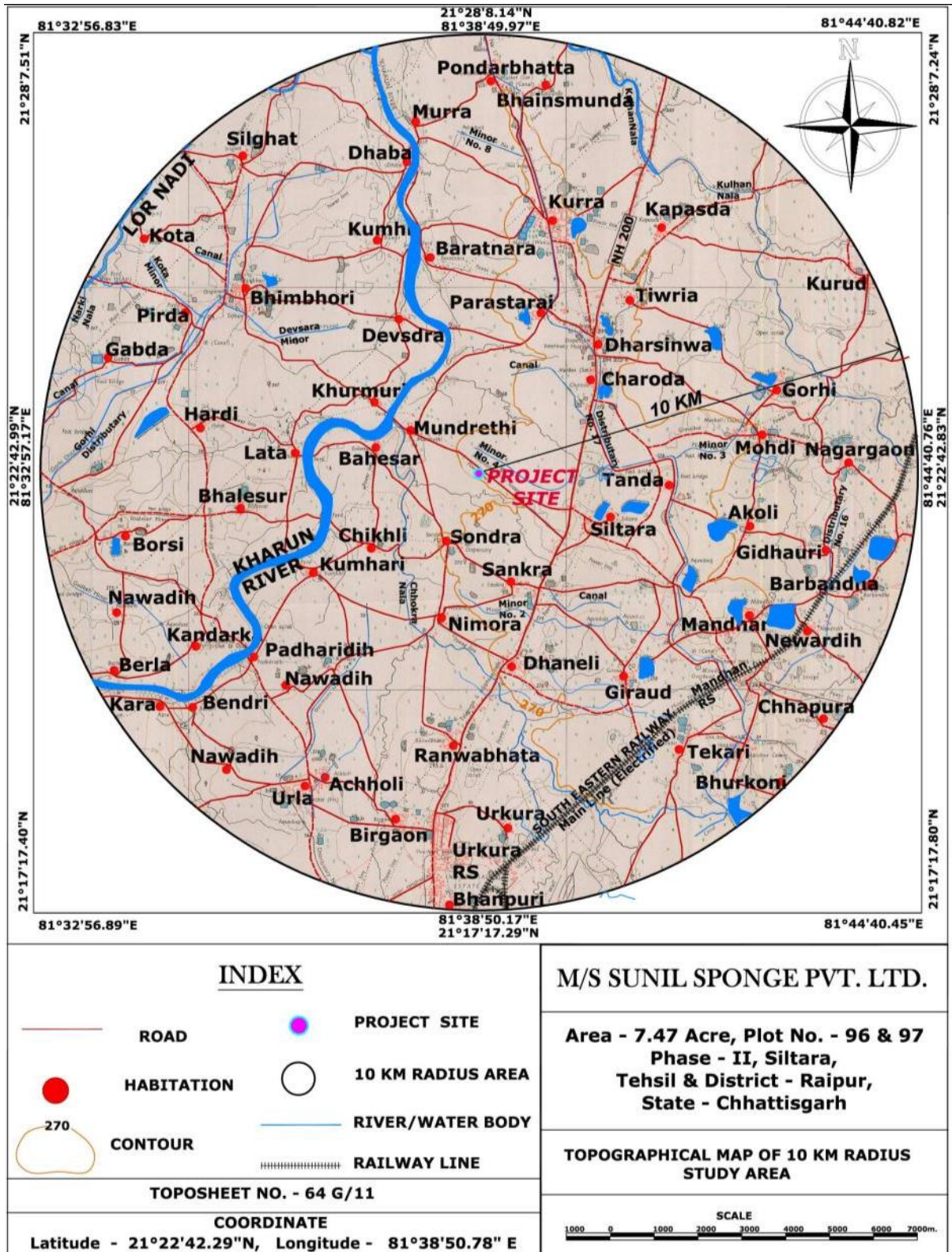


FIGURE 1: INDEX MAP OF THE PROJECT LOCATION



**FIGURE 2: STUDY AREA MAP
 (10 KM RADIAL DISTANCE FROM THE PROJECT SITE)**



2.0 PROJECT DESCRIPTION

2.1 NATURE OF THE PROJECT

The proposed expansion project is secondary metallurgical activities and classified as “**Category-A**” as per the EIA Notification dated on 14th September, 2006 and subsequent amendments thereof. The configuration of the plant and facilities implemented without seeking EC are given in **Table 3** and **3 (A)**.

**TABLE 3
EXISTING CONFIGURATION OF THE PLANT**

Sl.	Description	Production Capacity with Configuration	EC/CTE/CTO
1.	Sponge Iron Kiln to produce sponge iron from Coal based DRI kiln process from Iron Ore	30000 TPA (100 TPD X 1 No.)	CTE 10/09/2003 CTO 27/07/2005 CTO 5/9/2018
2.	<ul style="list-style-type: none"> ➤ Sponge Iron Kiln to produce sponge iron from Coal based DRI kiln process from Iron Ore ➤ 12 MT Induction Furnace to produce 36000 TPA MS Billets 	30000 TPA (100 TPD X 1 No.) 36000 TPA (12 MT x 1 No.)	CTE on 07/04/2006 CTO on 06/07/2006 CTO 5/9/2018
3.	WHRB	3 MW X 2 Nos.	CTE 04/02/2010 CTO 20/06/2012 CTO 5/9/2019
4.	Biomass based power plant	5 MW	CTE on 06/03/2014 CTO 07.09.2018

**TABLE 3 (A)
CAPACITY EXPANSION PROPOSED WHICH IS IMPLEMENTED WITHOUT SEEKING EC**

SN	Description	Production Capacity with Configuration	Yr. of Installation	EC/CTE/CTO
1.	Induction Furnace	36000 TPA (12 MT x 1 No.)	20.09.2007	Nil

2.2 SIZE OR MAGNITUDE OF THE PROJECT

The existing and proposed plant details of M/s. SSPL are given in **Table 4**. Whereas, detail about the process plant with capacity provided in **Table 4 (A)**.

**TABLE 4
EXISTING AND PROPOSED PLANT DETAILS**

SN	Description	Existing capacity	Total Capacity after expansion	Remarks
1.	Induction Furnace	36000 TPA (12 MT X 1 No. furnace)	72000 TPA (12 MT X 2 Nos. furnace)	One 12 MT Induction furnace is installed but not operated till date for want of EC
2.	Sponge Iron Kiln	60000 TPA (2 X 100 TPD)	-	No Change
3.	WHRB Based Power Plant	3 MW X 2 Nos. = 6 MW	-	No Change
4.	Biomass Based Power Plant	5 MW	-	No Change



**TABLE 4 (A)
SIZE AND MAGNITUDE OF PROJECT**

Process plant	Proposed capacity of plant	Proposed product name	Annual capacity
Induction Furnace	12 MT X 2 Nos.	MS Billets	72000 TPA

2.3 PROCESS DESCRIPTION

2.3.1 Manufacturing process for proposed Induction Furnace unit 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.
- Two numbers of Induction Furnaces 12 MT capacity each (Existing 12 MT + Proposed 12 MT) with higher power input capacity setup with completely automatic charging facility as well as power sharing panel also.
- The melting process involves taking sample of Sponge Iron, CI/MS Craps and Ferro Alloys. 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 through the coil. Enormous heat is 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 specific high temperature. If necessary, superheating is also 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 1050⁰ C. The cast the molten metal in required shapes.
- The continuous casting technology has gained worldwide acceptance because of high yield, economics of operation and better product quality. Hence, this technology is adopted for our steel plant casting the liquid steel into MS billets.

2.3.2 Manufacturing of Sponge Iron through Coal based DRI Kiln Technology

The direct reduction of iron ore, the main furnace used is Rotary kiln. The gas is taken to an after burner chamber and the combustibles are burnt is cooled to about 160 °C and taken to ESP for final dust separation, before going to stack via ID Fans.



2.3.3 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.

2.3.4 Biomass based power generation

Biomass like Rice Husk is used for facility heating, electric power generation, and combined heat and power. Emission controls can be takes place through an electrostatic precipitator.

2.7.5 Process of Brick Making From Waste

Fly ash, Lime sand and Gypsum are manually fed into a pan mixer, where water is added in the required proportion for intimate mixing. It is proposed to mix Fly Ash, Granulated Ferro Alloy Slag, Grounded Slag from Induction Furnace; Lime; Gypsum and Cement and if required river sand in small portion.

2.4 LAND REQUIREMENT

The Company is already having about 7.47 Acres land located under Phase-II Industrial Area Siltara Raipur (Chhattisgarh) by CSIDC Limited (Govt. of Chhattisgarh Undertaking). The project is located at Plot No 96-97 Phase-II Industrial Area Siltara Raipur (Chhattisgarh) admeasuring about 7.47 Acres. There will be no additional land required for proposed expansion. The existing green belt area covered 33% of total area (7.47 Acres) i.e. 2.46 acres which will be expanded to total 40% of total area i.e. 2.98 Acres in proposed expansion. The details of area statement are provided in **Table 5**.

**TABLE 5
AREA STATEMENT OF THE PROJECT SITE**

SN	Particulars	Area in Acres	Percentage
1.	Building Up Area	1.66	22%
2.	Road and Paved area	0.44	6%
3.	Green Belt Area	2.98	40%
4.	Open Area	2.39	32%
Total		7.47	100

2.5 RAW MATERIAL REQUIREMENT AND THEIR SOURCES

Availability of raw material is abundant within 100 km area of Raipur district. The raw material will be transported through covered trucks. Raw material requirements with their respective sources are given in the following tables:

**TABLE 6(A)
RAW MATERIAL REQUIREMENT FOR INDUCTION FURNACE (EXISTING AND PROPOSED)**

Raw Material	Quantity (TPA)	Source	Mode of transportation
Sponge Iron	72000	Own production	-
MS/CI Scrap	14400	From local market and open market	By road through covered trucks
Ferro Alloys	875	From local market and open market	By road through covered trucks
Total	87275		

**TABLE 6(B)
RAW MATERIAL REQUIREMENT FOR EXISTING SPONGE IRON PLANT**

Sl. No.	Item	Qty (TPA)	Source	Total qty (TPA)
1.	Iron ore	25140	Odisha iron ore mine	129938



Sl. No.	Item	Qty (TPA)	Source	Total qty (TPA)
			and NMDC	
2.	Pallet	39844	Local Steel Plants	
3.	Coal	58818	SECL coal mines/ Coal India	
4.	Limestone/ dolomite	3136	Open market	
5.	Refractory material	3000	Open market	

TABLE 6(C)

RAW MATERIAL REQUIREMENT FOR EXISTING BIOMASS BASED POWER PLANT

S. No.	Raw Material	Qty (in TPA)	Source	Mode of Transportation
1.	Husk	40752	Locally available Rice Husk	Truck / Road Transportation

TABLE 6(D)

RAW MATERIAL REQUIREMENT FOR FLY ASH BRICK PLANT

S. No.	Raw Material	Qty (in TPA)	Source
1.	Fly Ash/ Coal Ash etc	8145	Generated through Biomass based
2.	Gypsum and Cement	1629	Locally available
	Total		

Material Balance for Steel making

**TABLE 6(E)
MATERIAL BALANCE**

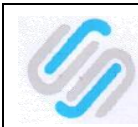
INPUTS		
SI. NO.	ITEMS	QUANTITY (TPA)
1	Sponge Iron /DRI	72000
2	Scrap	14400
3	Ferro Alloys	875
	Total	87275
OUTPUTS		
SI. NO.	ITEMS	QUANTITY (TPA)
1	Billet	72000
3	End cutting and mill scale	1200
3	Slag	7200
4	Refractory Waste	6000
5	Ignition Losses	875
	Total	87275

2.6 SOLID AND HAZARDOUS WASTE GENERATION AND ITS DISPOSAL

The major solid waste generation from the process is defective mill scales, end cuttings, slag and refractory wastes from expansion of Induction furnaces. The detail of solid waste generation is presented in **Table 7** and hazardous waste generation is in the form of waste oil/used oil and tar details are presented in **Table 8**.

**TABLE 7
SOLID WASTE GENERATION**

Item	Qty in TPA	Disposal
Char/ Dolochar	13520	Will be sent to other power plant.
Bottom and Flue Dust Ash	4500	Used in Brick making.



Item	Qty in TPA	Disposal
Kiln Accretion and Refractory waste	1500	Used in Brick making and low lying areas.
End cutting and mill scale	1200	End cutting will be used in own induction furnaces
Slag	8000	Slag will be sold to metal recovery units and thereby used in brick manufacturing unit
Refractory Waste	6000	Used in Brick making and low lying areas
Fly Ash	8145	Used in Brick making.

**TABLE 8
HAZARDOUS WASTE GENERATION**

Type of Hazardous Waste	H. W. Category	Quantity	Disposal
Waste Oil/Used Oil	5.1	3 KL/annum	Partly used for lubrication and will be stored in covered HDPE Drums & will be given to CECB approved vendors/authorized recycler

2.7 WATER REQUIREMENT AND WASTE WATER GENERATION

The total water requirement will be 756 KLD out of which permission of supply of water 250 KLD Per day obtained from Chhattisgarh Ispat Bhumi Limited Siltara Raipur (C.G). Additional water requirement i.e. 506 will also fulfill from Chhattisgarh Ispat Bhumi Limited Siltara Raipur (C.G). The domestic wastewater will be treated in STP and treated water will be used for green belt and dust suppression purposes. Zero Discharge condition will always be maintained.

**TABLE 9
WATER REQUIREMENT (in KLD)**

Sr. No.	Particulars	Water Requirement (In KLD)	
		Existing	Proposed
1.	Sponge Iron Division	58	0
2.	Induction Furnace Division	15	15
3.	WHRB	360	0
4.	Biomass	300	0
5.	Domestic	7	1
		740	16
		Total Water requirement	756

Abbreviations: SID – Sponge Iron Division; IFD – Induction Furnace Division; WHRB – Waste Heat Recovery Boiler

Note:-

There will be no industrial effluent discharged outside the plant premises due to existing as well as proposed units. Domestic wastewater will be generated, which will be treated in STP and treated water will be used for green belt and dust suppression purposes. Sunil Sponge Pvt. Ltd. is maintaining Zero Discharge condition from the plant all the time throughout the year.

**TABLE 10
WASTEWATER GENETATION THROUGH DIFFERENT PROCESS (m³/Day)**

Sl.	Unit	Source	Waste Water Generation	Remarks
1.	Sponge Iron Plant	Process/Eva. Loss	0.0	-
2.	Induction Furnace	Process/Eva. Loss	0.0	-
3.	WHRB	DM regeneration & Cooling Blowdown	18.0	Total 30 KLD treated water generated through neutralization out of this 15 KLD will be utilized in Dust
4.	Biomass Based Power Plant	DM regeneration & Cooling Blowdown	15.0	



Sl.	Unit	Source	Waste Water Generation	Remarks
				suppression and remaining 15 KLD will be used in Ash/Slag Quenching
5.	Domestic Consumption		6.0	About 5 KLD treated domestic water through STP will be used green belt development
		Total	39.0	

Note: Zero discharge norms will be followed.

2.8 POWER REQUIREMENT AND SUPPLY

Total Power requirement for existing facility is 4800 KVA. For proposed furnace additional power required will be 3000 KVA. Thus after expansion total power requirement will be 7800 KVA.

Source - Existing WHRB (6 WHRB Cap) and biomass power generation capacity is 5 MW. Sanction for Grid Power is for 2800 KVA already in place. Thus total power required will be met thru captive generation and grid power drawn from Chhattisgarh State Power Distribution Company Limited (CSPDCL) grid. Grid power capacity will not be enhanced after expansion. In order to meet emergency, DG set cap 2500 KVA is kept as backup.

2.9 MANPOWER REQUIREMENT

Existing manpower is 150 people and it is proposed to engage 20 more staffs, resulting in total manpower of 170 people. Since the plant is located in the Raipur district in which trained manpower are already available therefore the employment will be mostly given to local people therefore there will not be any substantial increase in the population of local villages. However, due to increase economic growth, the local youth will be benefited and employment.

2.10 INFRASTRUCTURAL FACILITIES

Major infrastructural facilities like road, water source, power, etc. required for the industrial set up are available at plant location.

Other infrastructural facilities like sanitation, drinking water, rest shed, etc have been developed for the existing plant and same will be expanded as per requirement of the proposed expansion.

No substantial additional infrastructure is required for expansion activities. The available road network and natural sources of water supply and drainage system are adequate. There is no other major infrastructural requirement for the project.

2.11 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.

3.0 EXISTING ENVIRONMENTAL SCENARIO

3.1 BASELINE ENVIRONMENTAL STUDIES

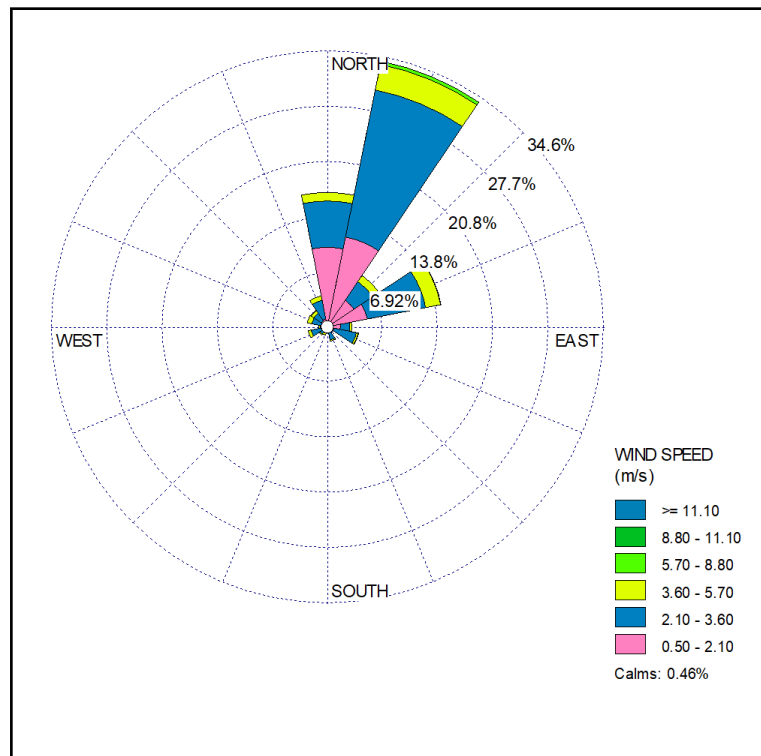
An environmental baseline monitoring was carried out as a part of EIA studies for the proposed project during **winter season (1st December 2019 – 29th February 2020)**.



3.2 METEOROLOGY & AMBIENT AIR QUALITY

Summary of Meteorological data generated at site (1st December 2019 – 29th February 2020)

Temperature (°C)	12°C to 31°C
Relative Humidity (%)	18% to 100%
Wind Direction	NNE (33.88%)
Calm wind %	0.46



Ambient Air Quality Status

The ambient air quality monitoring with respect to parameters of significance was carried out during **winter** season. The major sources of air pollution in the region are industrial activities, domestic activities, traffic density and rural conditions. The prime objective was to assess the existing air quality of the area. The locations (8 Nos.) were identified keeping in view predominant wind directions prevailing during study period, sensitive receptors and human settlements. The levels of PM₁₀, PM_{2.5}, Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x), Carbon monoxide (CO), Ozone (O₃) and Ammonia (NH₃), were monitored for establishing the baseline status. The minimum and maximum values of monitoring results are summarized in **Table 11**.

**TABLE 11
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	1. Min	81.5	25.1	14.3	17.5	0.352	12.0	12.9
		2. Max	106.5	40.1	24.9	31.2	0.428	16.8	18.3
		3. Avg.	96.6	33.3	22.2	25.3	0.394	14.0	15.4
		4. 98 th	106.2	40.1	24.3	31.0	0.421	16.1	17.9
2	Sondra	1. Min	74.2	25.2	16.4	18.2	0.312	14.1	14.3
		2. Max	99.2	39.6	26.1	29.2	0.425	17.7	19.3
		3. Avg.	93.2	30.8	18.9	21.7	0.363	15.2	16.2
		4. 98 th	99.2	39.3	24.4	26.5	0.421	16.9	18.4
3	Siltara	1. Min	88.1	25.6	17.5	15.9	0.333	11.8	12.0
		2. Max	110.7	43.1	27.1	30.4	0.409	16.6	17.4
		3. Avg.	97.5	37.6	21.9	23.7	0.375	13.8	14.4
		4. 98 th	109.4	41.6	25.6	30.0	0.402	15.9	16.7



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
4	Dharsinwa	1. Min	79.6	23.2	11.3	12.2	0.348	13.4	10.2
		2. Max	101.7	40.3	17.1	19.1	0.396	18.2	19.3
		3. Avg.	84.9	28.3	13.4	15.9	0.360	15.8	14.6
		4. 98 th	101.0	39.7	16.5	18.4	0.391	18.2	19.1
5	Giraud	1. Min	75.0	23.8	12.4	13.1	0.340	13.3	11.4
		2. Max	99.0	40.1	17.8	22.8	0.426	21.9	20.0
		3. Avg.	90.1	30.1	14.3	16.8	0.381	17.1	15.7
		4. 98 th	98.1	39.6	17.0	21.7	0.425	20.9	19.1
6	Mundrethi	1. Min	78.9	18.9	14.7	17.0	0.309	11.9	14.8
		2. Max	101.0	27.0	21.4	25.9	0.404	18.8	19.2
		3. Avg.	91.5	23.3	17.3	20.7	0.358	15.4	16.1
		4. 98 th	100.9	26.7	21.3	25.2	0.401	18.1	18.2
7	Bhalesur	1. Min	69.0	17.6	11.3	12.3	0.277	10.3	14.6
		2. Max	95.7	32.6	16.8	24.1	0.385	15.9	19.5
		3. Avg.	81.3	24.1	13.3	17.4	0.343	13.0	16.2
		4. 98 th	95.4	31.2	15.7	22.6	0.380	15.1	18.5
8	Kumhari	1. Min	72.0	16.1	13.6	15.1	0.362	13.3	14.0
		2. Max	96.3	23.9	17.1	20.4	0.419	19.9	20.4
		3. Avg.	79.1	19.5	15.2	18.2	0.389	16.2	16.1
		4. 98 th	94.9	23.9	16.8	20.3	0.418	19.3	19.3
CPCB Standards			100 (24hr)	60 (24hr)	80 (24hr)	80 (24hr)	2 (8hr)	100 (8hr)	400 (24hr)

It has been observed that average maximum concentration of PM₁₀ is 97.5 µg/m³ (Maximum Concentration 110.7 µg/m³) recorded at Siltara and average minimum is 79.1 µg/m³ (Minimum Concentration 72.0 µg/m³) recorded at Kumhari. The concentration of PM_{2.5} varies from 19.5-37.6 µg/m³. SO₂ concentration level ranged from 13.1-22.2 µg/m³ and NO₂ concentration ranged from 15.9-25.3 µg/m³ in the study area. Heavy metals were estimated from PM₁₀ to know the concentration levels in particulate matter and observed that all average concentrations were found to be within the standard limit.

3.3 AMBIENT NOISE LEVELS

Ambient noise level monitoring was carried out at the 8 monitoring locations. The monitoring results are summarized in **Table 12**.

TABLE 12
SUMMARY OF AMBIENT NOISE LEVEL MONITORING RESULTS

Sr. No.	Monitoring Locations	Equivalent Noise Level	
		Leq _{Day}	Leq _{Night}
Residential Area			
1.	Mohdi	51.7	44.3
2.	Charoda	54.5	41.4
CPCB Standards dB(A)		55.0	45.0
Commercial Area			
3.	Sondra	57.8	46.3
4.	Tanda	54.6	42.7
CPCB Standards dB(A)		65.0	55.0
Silence Zone			
5.	Dharsinwa	47.4	35.8
6.	Bahesar	49.6	38.9
CPCB Standards dB(A)		50.0	40.0



Sr. No.	Monitoring Locations	Equivalent Noise Level	
		Leq _{Day}	Leq _{Night}
Industrial Area			
7.	Project Site	68.3	59.7
8.	Siltara	62.1	50.3
CPCB Standards dB(A)		75.0	70.0

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

The overall ambient noise quality with respect to various zones was found to be within prescribed limits by CPCB. Equivalent noise levels (L_{eq}) were monitored at the project site and observed as 68.3 dB (A) and 59.7 dB (A) during day and night time, respectively.

3.4 SURFACE AND GROUND WATER RESOURCES & QUALITY

Site Specific Geology

The 10 km study area falls in two districts i.e. Durg & Raipur District. Kharun River marks the boundary of Raipur district in the West of project area.

The study area is monotonously plain with very scanty exposures & is covered by the rocks of Chandi Formation. Lithological boundaries are concealed under laterite or soil cover. On correlating subsurface exposures seen in well cuttings, it is observed that the Raipur limestone - shale belonging to Chandi Formation of Chhattisgarh Supergroup occupies the whole area of Samoda nala basin. The Chandi limestone showing stromatolitic form, at places, occurs along with dolomites. Apart from Chandi Formation rocks of Chopardih Formation belonging to the Chandrapur Group also present. The Chopardih Formation mainly consists of reddish-brown and olive-green sandstone.

Site Specific Hydrogeology

The study area comes under Mahandi river basin. Sedimentary rocks (cavernous Limestone, fractured, shales and weathered Sandstones) of Chandi & Gunderdehi Formation form the principal aquifer system within study area. As per CGWB, data, the study area falls in "Semi critical" category of Non-Notified area with groundwater development of 36.7%. However, no ground water would be utilized for project related activity. Dendritic type of drainage pattern is observed in study area which usually follows the regional slope towards North.

Pre-monsoon water levels range from: 5.5 -10.88 mbgl

Post-monsoon water level range from: 1.32- 3.59 mbgl

(Reference: WRIS portal data)

Water Quality

The existing status of groundwater and surface water quality was assessed by identifying 8 ground water samples and 8 surface water samples in different villages and rivers/ponds, respectively.

The physico-chemical characteristics of groundwater were analysed and compared with the IS-10500 standards. The analysis results indicate that the pH ranged between 7.23-7.80. The TDS was ranging from 503-977 mg/l. Total hardness was found to be in the range of 268.73-705.05 mg/l. The fluoride concentration was found in the range of 0.24-0.64 mg/l. The nitrate and sulphate were found in the range of 20.12-37.42 mg/l and 18.13-47.63 mg/l respectively.

For surface water samples, the analysis results indicate that the pH ranged between 7.12-7.82 which is 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 395-481 mg/l which is within the permissible limit of 2000 mg/l. The total hardness recorded was in the range of 170.26-197.19 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 58.75-133.45 mg/l and 18.19-37.44 mg/l respectively.

Dissolved oxygen (DO) refers to the amount of oxygen (O₂) 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 6.0-6.4 mg/l. Phosphorus (as PO₄) 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. PO₄ ranges from 0.02-0.38 mg/l.

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 27th August 2020 satellite image with reference to Google Earth data and the Cartosat-I data having 2.5 m spatial resolution and date of pass Jan 2020. In order to strengthen the baseline information on existing land use pattern, the following data covering approx. N 21°17'29.08" to N 21°27'58.93" latitude and E 81°33'08.99" to E 81°44'23.19" longitude and elevation 260-290 meter are used as per the project site confined within that area. The project site is located at latitude N 21°02'41.83" and longitude E 81°38'51.35" and its elevation is about 272 m from MSL.

Land use pattern of the study area as well as the catchment area was carried out by standard methods of analysis of remotely sensed data and followed by ground truth collection and interpretation of satellite data. The Land Cover classes and their coverage are summarized in **Table 13**.

TABLE 13
LU/LC CLASSES AND THEIR COVERAGE WITHIN 10 KM RADIUS

LU/LC classes and their coverage in Sq. Km			
Sr. No.	LU/LC Class	Area (Sq.Km ²)	Percentage (%)
1	Built up Land Rural/Urban)		
	Settlement	52.63	16.76
	Industrial Settlement	48.94	15.59
	Road Infrastructure	9.54	3.04
	Railway Infrastructure	6.85	2.18
2	Agriculture Land		
	Cropland	124.88	39.77
	Barren Land	10.86	3.46
	Play Ground	2.43	0.77
3	Water bodies		
	River/Nala/Stream	9.88	3.15
	Pond/Tank	2.92	0.93
4	Scrub/Waste Land		
	Land with scrub/Open Scrub	40.96	13.04
5	Mining/Stone Quarry	1.24	0.39
	Brick Kline area	2.87	0.91
	Total	314.00	100.00



3.6 SOIL QUALITY

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

The bulk density of the soil in the study area ranged between 1.45-1.70 g/cc which indicates favourable physical condition for plant growth. The water holding capacity is between 19.18-33.08%. Infiltration rate, in the soil is in the range of 16.44-23.12 mm/hr. Variation in the pH of the soil in the study area was found to be neutral (7.08-7.43) in reaction. Electrical conductivity, a measure of soluble salts in the soil is in the range of 136.7-330 μ S/cm.

The important soluble cations in the soil are calcium and magnesium whose concentration levels ranged from 205.07-342.73 mg/Kg and 53.32-408.69 mg/Kg respectively. Chloride is in the range of 64.11-872.5 mg/Kg.

Variation in the pH of the soil in the study area is found to be neutral to moderately alkaline (7.0 – 7.6) in reaction. Electrical conductivity, a measure of soluble salts in the soil is in the range of 200 – 320 μ S/cm. The important soluble cations in the soil are calcium and magnesium whose concentration levels ranged from 65.12 – 88.14 mg/Kg and 224.12 – 310.12 mg/Kg, respectively. Chloride is in the range of 30.10 – 48.76 mg/Kg.

Organic matter was found in the range of 1.22-3.15%. The nutrient status in terms of NPK value was found to be in the range of 152.6-242.61 kg/ha, 4.42-20.4 kg/ha and 74.46-150.6 kg/ha respectively.

3.7 BIOLOGICAL ENVIRONMENT

The proposed expansion of M/s. SSPL is lies within the notified industrial area. The entire industrial area is partly covered with vegetation. The plantations were observed along the main roadside, periphery of the various companies, private land and nursery.

Trees: The main tree species observed within the industrial area are *Azadirachta indica* (Neem), *Conocarpus sp.*, *Cassia fistula* (Cassia fistula), *Bauhinia racemosa* (Asta), *Mangifera indica* (Aam), *Emblia officinalis* (Aawla), *Tamarindus indica* (Emali), *Bauhinia variegata* (Katchnar), *Delbergiasissoo* (Sisam), *Syziziumcumini* (Jamun), *Acacia nilotica* (Babul), *Tacoma stans*, *Lucina leaucociphala* (Babul), *Peltophorum pterocapum*, *Pongamia pinnata* (Karanj), *Cassia siamea* (Kashid), *Acacia catechu* (Khair), *Phoenix sylvestris* (Khajur Sindi), *Zizyphus xylopyra* (Ghont), *Butea monosperma* (Palash), *Zizyphus mauritiana* (Ber), *Ailanthus excels* (Maharukh) and *Asoca longifolia* (Ashok).

Shrubs: *Calotropis gigantea* (Aak Madar), *Helicteres isora* (Anthi Marodfalli), *Lantana Camera* (Ghaneri), *Nerium indicum* (Kanher), *Boganvelia sp.* & *Thevetia peruviana* (Pilli Kaner).

Herbs: *Parthenium hysterophorus* (GajarGhas), *Xanthium strumarium* (Gokharu), *Cassia tora* (Travar), *Tridax procumbens* (Ghamra), *Alternanthera sessilis* (Garundi), *Aerva laneta* (Kapurijadi), *Croton sp.* and *Elephantopus scaber*.

Grasses and Bamboos: *Dendrocalamus strictus* (Bans), *Eragrostis tenella* (Bhurbhusi) & *Cynodondactylon* (Durva)

Climbers: *Cuscuta reflexa* (Amarbel) & *Momordica dioica* (Kakad Bel)



Floral Biodiversity of the Study Area

The tree species, herbs and shrubs and major crops, were documented during this baseline study. Total 110 species observed within the study area. The overall floral diversity of the area is as follows:

Floral Biodiversity of the Study Area

- a. **Trees:** Total 62 species were found in the study area
- b. **Shrubs (small trees):** Total 23 species were enumerated from the study area.
- c. **Herbs:** In the study area 13 species were observed.
- d. **Bamboo & Grasses:** 07 species were enlisted from the study area
- e. **Climbers and Twiners:** Total 04 species of climbers/ twiners were recorded in the study area.
- f. **Parasite :** Each 1 species enlisted in the area

Ret Status

According to IUCN Status report 2013 out of total 86 plant species identified with study area. Among the observed species most of the species belongs to the least concern (LC), Data Deficient (DD) and Not Assessed (NA), as per IUCN status. Thus, none of reported species in study area belongs to Rare, Endangered or Threatened category.

Endemic Plants of the Study Area

De Candolle (1855) first used the concept of “Endemic”, which is defined as an area of a taxonomic unit, especially species which has a restricted distribution or habitat, isolated from its surrounding region through geographical, ecological or temporal barriers. Among recorded plant species none were assigned the status of endemic plant of this region.

Fauna in the Study Area

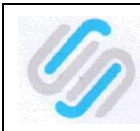
Study area was found to be a home to several species of mammals, reptiles, Aves and other lower invertebrates. However, faunal wealth including birds was not significantly observed in the immediate vicinity of the project area may be due to non-conducive atmosphere and industrial development. Moreover, the project site is not acting as barrier for the movement of any wildlife. There is no any wildlife sign was observed in the notified industrial area moreover due to good greenery in an around the area possibilities to attract birds and butterflies. Some reptiles like snakes are common in the in the area. Birds were observed throughout the study area mostly near the forest area and water bodies.

Avifauna:

Birds are the most diverse group amongst the terrestrial higher vertebrates. In the present study, birds were found at all the locations i.e. in the villages, in agricultural fields, at roadside, within plant site/industrial notified area and along the river side and paddy fields.

Reptiles:

Lizards and snakes are the most adaptive groups of reptiles as these are seen living in the very close vicinity of human populations. Lizards are common everywhere, in house, in fields, in wastelands and in wilderness. 9 species of mammals, 6 species of reptiles, 46 species of avifauna were reported in the study area.



Rare and Endangered fauna of the study area

• 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, all are categorized under least concern category as per IUCN list.

• 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 were given protection by the Indian Wild Life (Protection) Act, 1972 by including them in different schedule. Among the Avifauna in the study area, All birds observed in the study area are protected in schedule IV as per Wild life protection Act (1972) and subsequent amendments thereof.

Among mammals; Common Langur, *Herpestes edwardsi* (Common Mongoose), *Vulpes bengalensis* (Indian fox), are protected in schedule –II. whereas, *Lepus nigricollis* (Black-naped hare), *Funambulus pinnati* (Palm squirrel) protected in Schedule IV and Rats protected in Schedule V

Among the Herpetofauna, Indian Cobra (*Naja naja*), and Common Rat Snake (*Ptyas mucosa*) were provided protection as per Schedule-II of Wild life protection act, (1972) and Common Indian Krait (*Bungarus caeruleus*), Indian Toad (*Bufo parietalis*) were provided as per Schedule – IV of Wildlife protection act 1972 and as amended.

Among the Avifauna: All birds were observed in the study are included in schedule IV as per wildlife protection act.

• As per IUCN RED (2013) list

Among the reported animals all wild fauna including avifauna are categorized under least concern category.

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 from census 2011 & District Census hand book 2011. Summary of the socio-economic status of the study area is given in **Table 14**. Details regarding education and infrastructure facilities 2011 are presented in **Table 14 (A)** respectively.

TABLE 14
SUMMARY OF SOCIO-ECONOMIC ENVIRONMENT OF VILLAGES WITHIN 10 KM RADIUS AREA

No. of villages	49
Total households	42803
Total population	202111
Male Population	104755
Female population	97356
SC Population	24778
ST Population	7803



Total literates	131579
Total Illiterates	70532
Total workers	76162
Total main workers	65294
Total marginal workers	12903
Total non-workers	123914

Source: Primary census abstract 2011, District Raipur & Durg state Chhattisgarh.

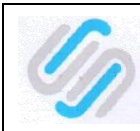
TABLE 14 (A)
INFRASTRUCTURE FACILITIES AVAILABLE IN THE STUDY AREA

Yr. 2011	In percentage (%)									
	Educ ation	Drink ing water	Road	Power	Comm unicati on	Transpo rtation	Medical	Social Security	Drainage	Recreation
Avail ability	100	100	100	100	93.62	85.11	23.91	14.89	59.57	93.48

Source: District census handbook, District Raipur & Durg, state Chhattisgarh.

3.9 SALIENT OBSERVATION OF THE SURVEY / STUDY AREA

- **Employment:** Main occupation in the study area was agriculture and Labor Work its allied activities eg. Cattle rearing, dairy farming 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 Raipur 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 Labour and wage rates:** The wages of agriculture labour are varied from Rs. 100 (2010) to Rs. 235 (2011). The prevailing labour charges of agriculture operations are varied with the operations of cultivations of crops i.e. ploughing, leveling, weeding, transplanting, harvesting and winnowing. The actual wage rates of agriculture labour varied from Rs. 252 to 270 per man day in different operations of the crops. The rates are higher in peak operation periods i.e. ploughing of seeds and harvesting of crops.
- **Fuel:** The primary sources of cooking fuel were LPG, cow dung and coal etc.
- **Major crops of study area, production & yield:** The various crops are grown by the cultivators in Study area. The paddy (70.8%) was found to be major crop of the state. The cultivators are also found to be tivra (pulse) (6.5%), gram (4.6%), and wheat (6.5%). The soybean, arhar, groundnut are grown in small proportion by the cultivators in the Study Area.
- **Migration from other states:** During survey it was found that local population were not migrating for employment purpose, they prefer only local employment.
- **Language:** Official language Hindi As well As Hindi is spoken and understood by most of the population. Chhattisgarhi is also widely spoken here by the locals.
- **Sanitation:** Toilet facility is one of the most basic facilities required in a house. There was no proper drainage line in the villages, open and kachha drainage which was not working properly seen in most of the villages. Various villages in study area now actively involved in open defecation free (ODF) in the community level under which toilet facilities developed within several villages. The overall position of cleanliness was near to satisfactory



- **Drinking water Facilities:** During study area it has been observed that, the water supply in this region is mostly through taps, wells and hand pumps. For drinking purpose people are using Tap water and water tanker is also provided by panchayat in summer, but supplied water quantity is not sufficient. For treating water, the Panchayat of village does not take any actions. Overhead Water Tanks are also installed in few villages.
- **Education facilities:** Educational facilities are available of the villages in the study area. Literacy rate of the study area is quite good that is about 80%. Primary, schools are available in the villages whereas College facility is available in nearby town i.e. Raipur. Female literacy is also good; In terms of female education, the villagers has positive attitude.
- **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.
- **Road connectivity:** It was observed that only 27 villages have Pucca Road facilities. It means nearly 75 % of the villages have road facility.
- **Communication facilities:** For communication purpose mainly mobile phones, newspapers & post offices were present in the villages.
- **Medical facilities:** There were healthcare facilities available in the study area. The Primary & secondary data reveals that there are only 13 nos. of Maternity And Child Welfare Centre, 12 nos. of Sub Health Centers & 01 nos. of PHC's in the Study area. Hospitals and other better health centers were available in the range of 5-10 km at town/city place. No major diseases were reported by local people in the study area except routine cough, cold and fever etc. Local people mentioned about the lack of equipment's, infrastructure and poor coverage of the existing health services. The PHCs in the study area are lack of basic equipment's and trained staffs and hence people are expecting health infrastructure with adequate staff.
- **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 was predominantly rural. In villages, small shops were available for daily need things. Weekly market facility was available in some villages. Wholesale market was available Raipur city.
- **Banking facility:** The study area has almost all the schedule commercial banks with ATM facility at urban areas and the district HQ.
- **Recreation facilities:** Television and radio were the main recreation facilities in the study area. Newspaper/magazine facilities were also used by villagers. Internet based Mobile usage has gained the highest popularity. Most of the youth are found to be using the Mobile based applications. At some places video parlors are also seen. Cinema houses are not found in the rural area. It is only found in Raipur City which is also one of the main sources of recreation. It is observed that there is no encouragement for sports as there are less Schools & Colleges in the Study area. Raipur is the only place where Sports training facilities are available in entire District.



4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 AMBIENT AIR QUALITY

Impacts on Air Quality

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.

Primary Fugitive Emission

The major sources of fugitive emissions are as detailed below:

- Loading/unloading of raw materials at project site.
- Transportation from storage yard to processing unit
- Stacking of raw materials like Ferro alloys, sponge iron, etc.

Fugitive emission in the material unloading area can be avoided by providing dust suppression system.

All internal conveyors will be covered with Galvanized iron (GI) sheets to prevent the fugitive dust emission.

Fugitive emissions are being/ and will be regularly monitored in the plant area and CPCB stipulations regarding fugitive emission control and monitoring are being/ and will be strictly followed.

Secondary Fugitive Emission

The secondary emissions from the Induction furnace is being controlled at present 1 No. wet scrubber in operation, movable suction hood. During proposed expansion bag filters will be installed at Induction furnace (instead of wet scrubber along with stack). Stack emission level will be kept below 50mg/NM³

After expansion secondary emissions from the Induction furnaces area will be extracted and treated in a fume extraction system. Fumes will be evacuated directly from induction furnaces through hoods with swiveling mechanism and ducting. The duct carrying fumes from Induction furnaces will join in a mixing chamber from where the gases will be led to the bag house by means of ID fan. Clean gases having less than 50 mg/Nm³ of dust content will be exhausted through a stack of suitable height.

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 emission factors, air handling capacity of the proposed installation and emission norms has been used to estimate the amount of emission that will be generated from the proposed modification/enhancement in induction furnace. The emission inventory is prepared on the basis of CPCB norms, air pollution equipment efficiency standards and actual field tests carried out for similar processes elsewhere.

The maximum ground level concentrations (MGLCs) for particulate matter and gaseous concentration SO₂, NO₂ due to existing as well after expansion activities were carried out. The predicted 24 hourly maximum contribution in AAQ concentrations from existing and after expansion DG sets for particulate matter, SO₂ and NO₂ are found to be 0.24 µg/m³, 0.0095 µg/m³ and 4.8 µg/m³ occurring at a distance of about 1.0 km each respectively in SSW and S directions. Existing main process facilities (SID, Biomass power plant) for particulate matter, SO₂ and NO₂ are found to be 0.4 µg/m³, 1.3 µg/m³ and 1.15 µg/m³ occurring at a distance of about 5.3 km each respectively in SSW and S direction already reported in current baseline scenario. After expansion scenario (SID, IF, Biomass power plant) for particulate matter, SO₂ and NO₂ are found to be 0.54 µg/m³, 1.3 µg/m³ and 1.15 µg/m³



occurring at a distance of about 5.3 km in SSW and S direction. There is slightly increase in short term modeling results as no significant incremental concentration was found due to proposed expansion activities with respect to existing scenario.

Details of Air Pollution Control System

- Existing Furnace: 1 No. wet scrubber in operation, movable suction hood along with 45 m height stack. During proposed expansion bag filters will be installed at Induction furnace (instead of wet scrubber). Stack emission level will be kept below 50mg/NM³ and
- Sponge Iron kiln 100 x 2 Nos, WHRB + Biomass based Power Plant, ESP is in operation to control emission level within 50 mg/Nm³.
- Water spraying will be carried out in order to control fugitive emissions in the internal open storage yards. The details of air pollution equipment provided in **Table 15**.

**TABLE 15
EXISTING AND PROPOSED AIR POLLUTION CONTROL DEVICES**

S. No.	Facilities	Air Pollution Control equipment	Emission Level
1.	DRI Kiln with WHRB (Existing)	a. Dust extraction system , ESP with 45 m Chimney	PM - 50 mg/Nm ³
2	Induction Furnace (Existing + Proposed)	1 No. wet scrubber in operation, movable suction hood. During proposed expansion bag filters will be installed at Induction furnace (instead of wet scrubber) with stack height 30 m. Stack emission level will be kept below 50mg/NM ³	PM - 50 mg/Nm ³
4	Biomass based power plant (Existing)	ESP with Chimney with 48 m Chimney	PM - 30 mg/Nm ³ SO ₂ - 100 mg/Nm ³ NO _x - 100 mg/Nm ³ Mercury(Hg) – 0.03

Impact due to transportation of raw materials and finished products

The raw material required for the project is sponge iron, MS/CI scrap and Ferro Alloys are readily available within 100 KM radius and will be transported by road through covered trucks. Mundrethi to Siltara Road which is adjacent to site NE, NH-200 is 2.2 km in SE & NH – 6 Km in S.

Thus, overall 360614 TPA materials will be transported through road (considering 300 working days) for the plant. Thus, around 57 trucks per day will be required to transport the materials by road with the capacity of each truck being 21 Tons. The emission of CO, HC, NO_x and PM from the trucks has been calculated for the proposed project will be 256.5 gm/km, 62.7 gm/km, 456 gm/km and 20.52 gm/km respectively, based on the emission factor in gm/km of Trucks / Trailer / Bus.

Mitigation Measures

- All trucks moving between road to the plant site for transporting raw materials, solid waste & product shall be fully covered to avoid dust pollution.
- With stringent traffic management system within the project site, scope for air pollution due to movement of goods transports will be minimized. The layout of the project has generous area earmarked for greenery development. This will act as effective media for arresting the emissions within the project site.
- The vehicular traffic plying in and out of the project site is being/ will be one of the significant



sources of air pollution. If the site is not properly regulated, it can create disruption in free traffic movement leading to air pollution problems. This difficulty can be tackled to a great extent by properly regulating the traffic and by following strict and disciplined vehicular movement and operation at the project site. By imposing vehicular emission standards, this problem can be further curbed to a large extent. Adequate and planned road network will be set up at the project site for smooth movement of the goods vehicles.

- It would be ensured that all the vehicles plying in the working zone are properly tuned and maintained to keep emissions within the permissible limits. At loading and unloading points, arrangement for Water sprinkling will be made so that dust generation during transportation of materials will be minimized further.
- All the internal roads within the plant shall be metalled; hence dust arising from the internal roads shall be insignificant. The greenbelt development shall further help in reduction in fugitive emissions.

4.2 AMBIENT NOISE LEVELS & GROUND VIBRATIONS

Impact on Traffic

The noise generation in the manufacturing process will be due to vehicular movements at steel melting shop, sponge iron kiln, power plant. DG sets are likely to be used during power failure. Predictions have been made taking into account even DG set in operation and thus reflecting the worst case scenario. The maximum predicted noise level within the plant boundary (0.2 km radius) is 54.9 dB (A). Noise level at a distance of 0.5 km radius of the plant is predicted to be less than 50 dB (A) which is well within the standards.

Impact on Community

Day and night sound pressure levels are often used to describe the community exposure. The nearest human settlement (Sondra) is 1.7 km away from project site and resultant noise level at this village is 57.8 dB(A) and 46.7 dB(A) at day night respectively. 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.

Prediction on Impacts Occupational Health

The damage risk criteria as enforced by OSHA (Occupational Safety and Health Administration) to reduce hearing loss, stipulates that noise level up to 90 dB (A) are acceptable for 8 hrs working shift per day. In the proposed project there will be no too high noise generating source. Hence, the noise level may not be of much concern from an occupational health point of view.

Impact due to Ground Vibration

No ground vibration impacts are expected on property and human beings due to proposed project due to absence of any major vibration source during construction and operation phases. Only impact on fauna during construction phase is anticipated; however, the vibration impact will be temporary in nature similar to noise impacts.

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 work place vibration impacts.

Mitigation Measures

1. Labor camp should be located away from the construction site.



2. Construction camp should be located at least 500 m distance from nearest habitation, silence zone, forests etc. If near habitation, silence zone, forests, construction activities should be halted in night time.
3. 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.
4. 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.
5. Proper shifting arrangement shall be made to prevent over exposure to noise and vibration.
6. Tall trees with heavy foliage shall be planted along the boundary of camp / project site / plantation area, which will act as a natural barrier to propagating noise.
7. Silent DG sets shall be used at construction camp / project site.
8. Speed limits shall be enforced on vehicle.
9. Use of horns / sirens shall be prohibited.
10. Use of loud speakers shall comply with the regulations set forth by CPCB.
11. Regular noise monitoring shall be carried at construction camp / project site to check compliance with prevailing rules.

4.3 IMPACT ON WATER ENVIRONMENT

In general, the proposed expansion project may have some impact on the water environment. The impact may be on the source of water in the form of depletion water resources of the area and in the form of deterioration of quality of natural water resources due to discharge of plant effluent. In case of proposed expansion of Induction furnace the total make-up water requirement will be 756 KLD. The details of water requirement and wastewater generation are provided in **Table 16**.

TABLE 16
WASTEWATER GENETATION THROUGH DIFFERENT PROCESS (m³/Day)

Sl.	Unit	Source	Water Requirement		Waste Water Generation	Remarks
			Existing	Proposed		
1.	Sponge Iron Plant	Process/Eva. Loss	58	0	0.0	-
2.	Induction Furnace	Process/Eva. Loss	15	15	0.0	-
4.	WHRB	DM regeneration & Cooling Blowdown	360	0	18.0	Total 30 KLD treated water generated through neutralization out of this 15 KLD will be utilized in Dust supression and remaining 15 KLD will be used in Ash/Slag Quenching and brick manufacturing
5.	Biomass Based Power Plant	DM regeneration & Cooling Blowdown	300	0	15.0	
7.	Domestic Consumption		7	1	6.0	About 5 KLD treated domestic water through STP will be used green belt development



Sl.	Unit	Source	Water Requirement		Waste Water Generation	Remarks
		Total (756 KLD) Source: Chhattisgarh Ispat Bhumi Limited Siltara Raipur	740	16	39.0	

Mitigating Measures for Water Environment

- Closed circuit circulation system will be followed
- Rain water charged to ground water.
- All stock piles will be on pucca flooring to prevent for any ground water contamination.

4.4 IMPACTS OF SOLID AND HAZARDOUS WASTE GENERATION

Solid Waste Generation

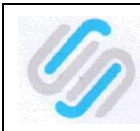
- End Cutting and Mill Scale generated during CCM will be used in own induction furnace
- Slag will be sold to metal recovery units and thereby used in brick manufacturing unit
- Refractory Waste will be used in brick making and low lying areas
- Fly ash used in brick making plant
- Char/ Dolochar will be sent to other power plant
- Bottom and Flue Dust Ash used in brick making
- Kiln Accretion and Refractory waste used in brick making and low lying areas.
- Slag and refractory wastes will be given to nearby slag crushing units and recyclers / given to brick manufacturing units.

Hazardous Waste Generation

Waste oil/used oil will be stored in covered HDPE Drums & will be given to CECB approved vendors/authorized recyclers.

Possible Impacts due to mishandling of waste

- DG set only the source of generation of used oil/waste oil being the project is based on hot charging. No conventional rolling mill used in the process to produce rerolled product.
- Waste oil/Used oil if spilled tends to accumulate in the environment, causing soil and water pollution.
- Toxic gases and harmful metallic dust particles are produced by the ordinary combustion of used oil. The high concentration of metal ions, lead, zinc, chromium and copper in used oil can be toxic to ecological systems and to human health if they are emitted from the exhaust stack of uncontrolled burners and furnaces.
- Lubricating oil is transformed by the high temperatures and stress of an engine's operation. This results in oxidation, nitration, cracking of polymers and decomposition of organo - metallic compounds



4.5 IMPACTS ON BIOLOGICAL ENVIRONMENT

There is no ecological sensitive area like national park, sanctuary, biosphere reserve, wetland, forest, etc. within 10 km radial distance from the project site. No rare or endangered flora/fauna were recorded in the study area. Proposed expansion of M/s. SSPL will be within the existing plant premises, no tree cutting involved in the project. There will not be any increase in pollution load to the greater extent since it is clean technology. Moreover, incremental emission of air pollutants is not likely to induce any significant changes in the ecology as the ambient air quality standards will remain within the limits. Thus, the impact on local ecology in surrounding area would be minimum.

The existing green belt area covered 33% of total area (7.47 Acres) i.e. 2.46 acres which will be expanded to total 40% of total area i.e. 2.98 Acres in proposed expansion. Further, additional plantation will also be developed outside the plant on the approach road as well as available community land, available in the nearby community area.

4.6 SOCIO-ECONOMIC IMPACTS

The land use is not going to be significantly change 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 in the project under the control of Project Manager. The EMC will be headed by an Environmental scientist having adequate qualification and experience in the field of environmental management. Environmental monitoring of Ambient Air Quality, Water table depth, Water quality, Ambient Noise Levels, Soil Quality, etc. will be carried out through MOEF accredited agencies regularly and reports will be submitted to MPCB/MoEF&CC.

6.0 RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

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.

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. is considered in detail in the Disaster Management Plan.

7.0 PROJECT BENEFITS

M/s. SSPL envisage the social development programs that includes Water Resource Management, health care, solar power systems, women empowerment, education and infrastructure development and skill development programs. In addition to the activities budgetary provision of Rs. 1.809 Lakhs provided under CER, M/s. SSPL also proposed social welfare activities under Corporate Environment Responsibility.

The employment opportunities, both direct and indirect, that will be created from the proposed expansion project are described below:

Around 20 nos. of person will be required as direct employment whereas 150 people are already working in the existing plant thus; total 170 employments will be generated after expansion project.

Apart from this, the project will be helpful to improve market demand to some extent and increase in the economy of the state and thereby the nation.

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 SSPL will carry community welfare activities in the following areas:

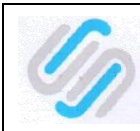
- Community development
- Education
- Health & medical care
- Drainage and sanitation
- Roads
- Drinking water supply occasionally in the event of water scarcity through tankers, etc.

8.0 ENVIRONMENTAL MANAGEMENT PLAN

An Environmental Management Plan comprise of 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.
- Safety, welfare and good health of the work force and populace.
- Ensure effective operation of all control measures.
- Vigilance against probable disasters and accidents.
- 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 plan addresses the components of environment, which are likely to be affected by the different operations in the project. The total capital is Rs. 180.90 Lakhs. Provision for EMP for proposed expansion is Capital cost Rs.40.00 Lakhs and Recurring Cost of Rs.15.00 Lakhs. The project is estimated to take 4-6 months for production after getting Environmental Clearance.



9.0 CONCLUSION

The proposed project of M/s. SSPL will be continually beneficial for the development of the nearby villages. Some environmental aspects like dust emission, noise, etc. will have to be controlled within the permissible norms to avoid impacts on the surrounding environment. Necessary pollution control equipment like water sprinkling, plantation, personal protective equipment's, etc., will form regular practice in the project. 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 thick green belt and plantation within project area and along transport road, adoption of rainwater harvesting in the project site and in nearby villages, etc. will be implemented. The CSR/CER interventions to be adopted by the project management will improve the social, economic status of the resident population of the nearby villages.

The overall impacts of the proposed expansion will be positive and will result in overall socio-economic growth of nearby villages.

10.0 DISCLOSURE OF CONSULTANTS

The Environmental studies for proposed expansion project of M/s SSPL 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.