

EXECUTIVE SUMMARY

1.0 INTRODUCTION

M/s. Nandan Smelters Pvt. Ltd. (formerly known as “Nandan Poly Fibers Pvt. Ltd.”) has proposed to implement greenfield project to produce Sponge Iron - 62700 TPA through DRI Kiln, MS Ingot/Billets 99000 TPA through Induction Furnace and Captive Power Plant - 4.5 MW through WHRB & TG Set. The proposed Greenfield project will be established in 4.123 Hectare total land area.

The DRI Kilns along will be implemented with WHRB boilers. The Sponge Iron production capacity of 62700 TPA will be achieved through 1 no. of 190 TPD DRI kiln along with 4.5 MW WHRB power is proposed to be implemented. WHRB power plant will generate captive power without combustion of fossil fuel. The MS Billets production of 99000 TPA through 03 Nos. of Induction Furnaces with CCMs having 10 MT capacities each will be implemented.

As per Environmental Impact Assessment Notification dated 14th September, 2006 and subsequent amendments thereof, the Sponge Iron and Steel Melting Shop (Induction Furnace) falls under **Sector 3 (a)** and the WHRB based power plant falls under **Sector 1 (d)**. The overall project activity is categorized as **Category “B1”**; therefore, it will require Environmental Clearance (EC) to be obtained from SEAC Chhattisgarh.

The application for prior Environmental Clearance (Form-1) for proposed metallurgical project was submitted to SEIAA, MoEF & CC (Online Proposal No. SIA/CG/IND/61668/2021 on 11th March, 2021. The proposal was considered by the SEAC Committee (SEAC) and ToR (vide. TOR No. : 600/Industries/Raipur/1594) was granted on 26th June, 2021.

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

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

The public hearing will be conducted as per the EIA Notification (dated 14th September 2006) and subsequent amendments thereof. The final report will be upgraded and submitted to SEAC, CG after public hearing, incorporating with issues by public with respective compliances by project proponent at the time of public hearing.

1.1 IDENTIFICATION OF PROJECT

M/s. Nandan Smelters Pvt. Ltd. (M/s. NSPL) is a private limited company under companies Act-1956 and registered company in DTIC, Raipur. It is Greenfield project involving Sponge Iron Kilns, Induction Furnaces, and Captive Power Plant (WHRB). The Greenfield project will be established at Village – Parsada, Tehsil – Tilda, District – Raipur (CG – 493 114). The proposal is to seek Environment Clearance based on energy efficient as well as well proven technology process.

1.2 LOCATION OF THE PROJECT

The proposed Greenfield project located at Village – Parsada, Tehsil – Tilda, District – Raipur (CG – 493 114). The nearest city is Tilda which is around 3.9 km in east direction. Nearest airport is Swami Vivekananda International Airport, Raipur which is around 40.7 km in south direction. The project site can be reached from nearest City Raipur through NH 200, connected with Sankara - Sarora- Tilda Road. Alternatively can be reached form via Tilda Sarora Road. The roads are all weather roads. Nearest railway station is Tilda Railway Station which is about 3.8 km in east direction from the project site.

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

1.3 EIA/EMP REPORT

In line with the approved ToR obtained from SEAC, Chhattisgarh, baseline environmental monitoring was conducted during winter season (1st December, 2020 to 28th February, 2021) 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 draft EIA/EMP report. Impacts of the proposed project activities during construction and operation stages were identified and duly addressed in the draft.

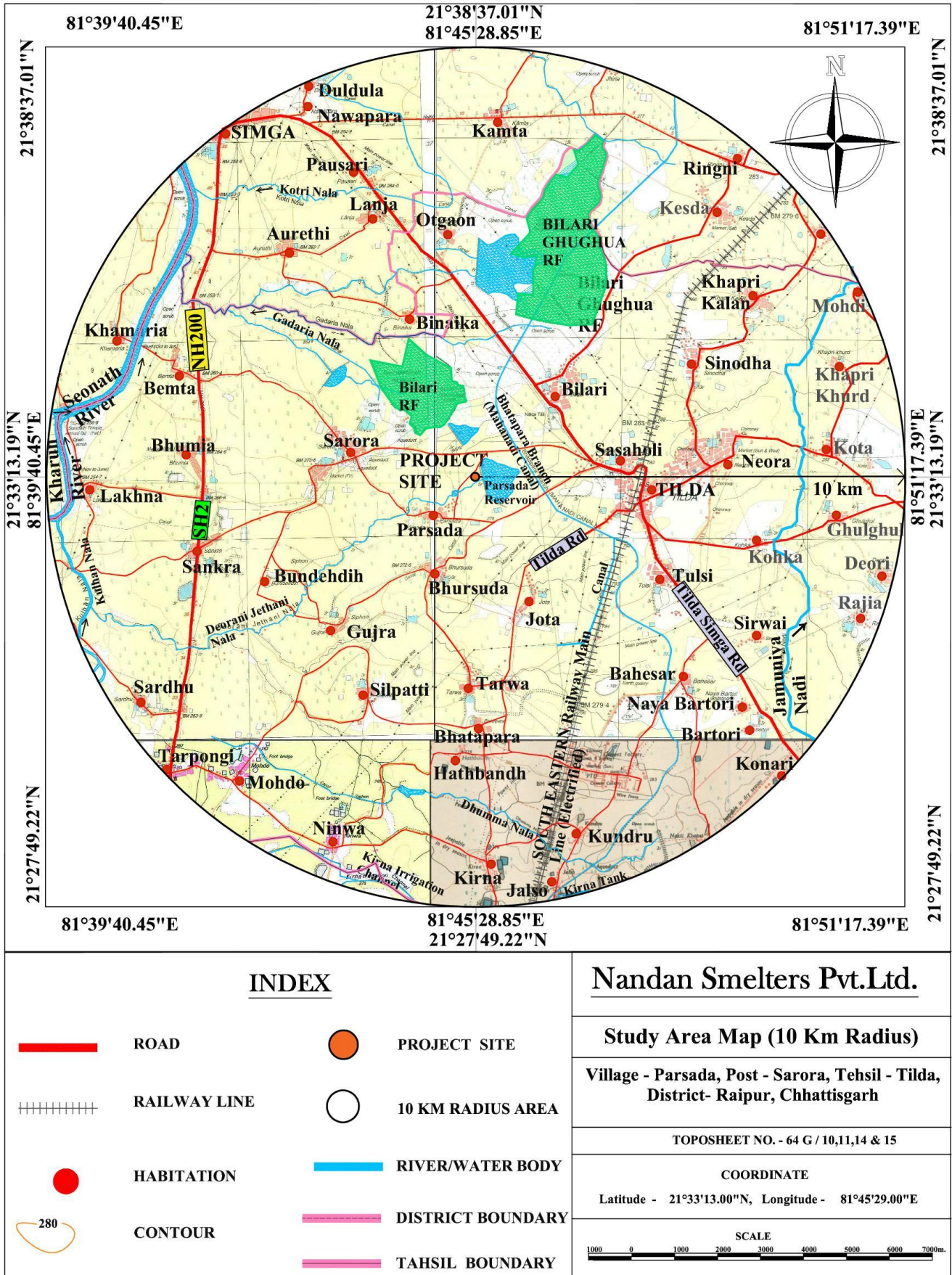


FIGURE 1: STUDY AREA (10 KM RADIAL DISTANCE)

Sr. No.	Particulars	Details
		<ul style="list-style-type: none"> • Bharti Rice Industries – 4.6 km, E • Amit Chawal Udyog – 5.3 km, ENE • Suresh Industries – 6.4 km, NE • Ananya Paper Industries Pvt. Ltd. – 6.6 km, SW • Sambhav Sponge Power Pvt. Ltd.– 2.7 km, NW • Hi Tech Power and Steel Ltd – 0.4 km, N • Mahendra Sponge & Power Ltd. (Unit II) – 0.8 KM, WNW • Agrasen Rice Industries 1.6 KM, E • Sagar Industries 5.0 KM, ENE • Century Cement Mines 5.4 KM, SE • Century Cement 6.4 KM, SSE • Shri. Bajrang Power 6.3 KM, S • K.K. Industries 4.90 KM, ENE • Agroha Industries 4.94 KM, ENE • Chaitanya Solvex Pvt. 7.0 KM, ESE • Agrawal Oil Extractions 5.9 KM, SE • Industry at Biladi (no 2.8 KM, NE • Uday Sponge Iron & Power Pvt. Ltd. 7.7 KM, WSW • Shree Mahamaya mill- 4.6 km/ESE • Kailash Rice Mill- 4.9km/ ESE • Ranulal Gandhi Rice Mil- 5.3km/ E • Agrawal Parboiling - Rice mill- 5.1km/E • Gindlani Rice Mill- 4.4km/SE • Bajaj Brokers Tilda - Rice mill -3.9km/ESE • Rahul Rice mill- 5.7km/SE
20.	Seismic zone	The proposed 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 Sponge Iron (DRI)

- Iron ore, coal, dolomite/limestone is fed in the weighed quantity and the kiln is rotated at a speed of about 0.5 RPM. A temperature between 1000°C to 1050 °C is maintained in about 70% of the kiln length towards discharge end side for required reaction.
- After the reaction, the product is taken into an indirect cooling drum cooler. The product is cooled to 100°C and taken for product separation. The product is separated from the coal ash and coal char and then taken for final use.
- The waste 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.
- The kiln has three functions; heat exchange, chemical reaction in vessel and conveying solids.
- In order to achieve high efficiency, DRI kiln of 190 TPD X 1, total 62700 TPA capacities will be installed in the final phase.

2.1.2 Manufacturing process of Steel Melting Shop with CCM and Hot Charging Rolling Mill

- The manufacturing process installed in the unit is one which is well established and proven technology presently being followed by majority of similar manufacturing units mostly in small or medium scale sector.
- In order to achieve high energy efficiency 3 numbers of Induction Furnaces (each 10 MT capacity) with medium power input capacity of 3.5 to 4.5 MVA each will be setup with automatic charging facility. Electronic software will be installed to monitor the input power and maintaining power factor to almost unity level and operate at full load in any given time.

- The melting process involves taking sample of Sponge Iron & Pig Iron; Iron Powder and mild steel scrap, end cutting from rolling mills or scrap from user units is taken from raw material storage.
- Homogeneous molten mass is poured hydraulically into the ladle.

CCM:

The ladle containing liquid steel is placed on the Continuous Casting Machine platform and continuous casting of hot billet is carried out in the same.

2.1.3 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.

2.2 LAND REQUIREMENT

Total 4.123 Hectare land has been acquired by company for implementation of project. The land is located at Kh. No. 505/1, 505/2, 506, 507, 508/2, 508/1, 510/1, 510/3 at Village - Parsada, Tahsil and District - Raipur (CG). Green belt will be developed in 1.44 Ha. (i.e. 34.9%). The proposed site is having clear land without vegetation and not used for cultivation. Sufficient flat land, free from major undulations is available for construction. The land details are provided as follows:

**TABLE 2
AREA STATEMENT**

Landuse	Area (In Hectare)	Area In %
Built Up	0.851	20.64
Road and Paved	0.211	5.12
Green Belt	1.44	34.9
Open area	1.621	39.32
Total	4.123	100

2.3 RAW MATERIALS REQUIREMENT, SOURCE & MODE OF TRANSPORT

The raw material will be transported through rail and truck. Coal from SECL as well as MCL or imported as well as Iron Ore from NMDC will be transported through rail upto nearest railway siding at Tilda; thereby it will be transported by Road to the proposed plant through covered truck. It is estimated that approx. 56 trips per day i.e. 112 trucks per day movement required for transportation of raw materials and finished products of the plant.

2.3.1 Solid and Hazardous waste generation

The details of solid and hazardous waste generations are given in **Table 3** and **4**, respectively.

**TABLE 3
SOLID WASTE GENERATION AND ITS DISPOSAL**

Item	Qty in TPA	Disposal
Char Dolochar	18810	Sold to power plant and Cement Plants
Bottom Dust Ash	18810	To be given for Brick making
Kiln Accretion and Refractory waste	564	Used in Brick making and low lying areas
Defective Billets	2080	Used as melting in own plant/Sold outside Rerolling mills
Mill Scale	990	Used in Ferro Alloys as raw material/ sold to Ferro Alloys / Pellet Plants.
Slag from Induction Furnace	12127	Given/ Sold to metal recovery units. And also used in own plant to make Bricks
Refractory and Ramming Mass waste	248	Given to refractory recycling units / used in Fly ash brick making unit / landfill.
STP Sludge	08	Used for Composting and then applied for Green Belt

**TABLE 4
HAZARDOUS WASTE GENERATION**

Type of Hazardous Waste	H. W. Category (as per HWM Schedule I)	Qty.	Disposal
Waste Oil/Used Oil	5.1	2 KLA	Will be given to authorized recycler having authorization from competent authority.
ETP Sludge	35.3	25 TPA	Given to Cement Plants or used in Brick making. The sludge will not have any Toxic Chemicals. Mostly will be Calcium; Magnesium; Silica Hardness Salts and Iron Oxide.

2.4 WATER REQUIREMENT & SOURCE

Estimated water requirement will be 310 KLD, out of which 9 KLD will be used for domestic purposes. It is proposed to meet this water requirement through ground water. M/s. NSPL will obtain NOC from CGWA to withdrawal of ground water. As per CGWA the area comes under safe zone. The company has already submitted its application for seeking sanction of required qty of ground water vide application no 21-4/5080/CT/IND/2021 dtd. 04/10/2021.

2.5 POWER REQUIREMENT & SUPPLY

Total power requirement will be 11 MW out of which 4.5 MW will be met through captive power plant and 6.5 MW will be sourced through State Grid (CSPDCL). In addition to this two Nos. of 550 kVA DG sets are proposed for emergency backup.

2.6 MANPOWER REQUIREMENT

M/s. NSPL will provide employment to 200 peoples as direct employment which includes 16 people as administrative staff and 184 people will be production staff. 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. All plant units, office buildings, laboratories, etc. will be provided with adequate number of portable fire extinguishers to be used as first aid fire appliances.

2.8 PROJECT COST

The project cost of the project is estimated as Rs. 7000 Lakhs. A CER budget of 2% will be added on project cost, i.e. 140 lakhs will be spent for the Improvement of Environment.

3.0 EXISTING ENVIRONMENTAL SCENARIO

3.1 BASELINE ENVIRONMENTAL STUDIES

Baseline environmental studies were conducted at project site along with 10 km radial distance from the project site. The baseline environmental quality data for various components of environment, viz. Air, Noise, Water, and Land were monitored during winter season (1st December 2020 – 28th February 2021).

3.2 METEOROLOGY & AMBIENT AIR QUALITY

Summary of the Meteorological Data Generated At Site (1st December 2020 – 28th February 2021)

Predominant Wind Direction	Winter Season
First Predominant Wind Direction	NE (13.8)
Second Predominant Wind Direction	ENE (12.8%)
Calm conditions (%)	4.17
Avg. Wind Speed (m/s)	1.79

The status of ambient air quality within the study area was monitored for Winter season at 9 locations. All these 9 sampling locations were selected based on the meteorological conditions considering upwind and downwind, cross wind directions and reference point. The levels of Respirable Particulate Matter (PM₁₀), Fine Particulates (PM_{2.5}), Sulphur Dioxide (SO₂), Oxides of Nitrogen (NO_x) and carbon monoxide (CO), Ammonia, Ozone, Benzene and BAP were monitored. The details of Ambient Air Quality Monitoring Results are summarized and given in **Table 5**.

TABLE 5(A)
SUMMARY OF AMBIENT AIR QUALITY MONITORING RESULTS
(Period From 1st December, 2020 to 28th February, 2021)

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	54.5	19.9	5.6	13.8	0.269	4.9	4.5
		2.	Max	69.4	26.1	7.9	19.3	0.319	7.1	8.5
		3.	Avg	60.6	23.2	6.7	16.2	0.296	6.0	6.6
		4.	98 th	68.0	25.8	7.9	19.0	0.316	7.0	8.3
2	Parsada	1.	Min	55.9	22.2	7.2	13.1	0.324	5.7	6.4
		2.	Max	67.7	29.7	10.0	17.2	0.388	7.9	10.3
		3.	Avg	62.4	25.5	8.6	15.3	0.364	6.8	8.1
		4.	98 th	67.7	29.7	9.9	17.2	0.387	7.9	10.3
3	Gujra	1.	Min	58.5	26.1	7.1	15.9	0.297	5.4	6.7
		2.	Max	68.3	32.8	11.8	19.7	0.368	8.9	10.3
		3.	Avg	64.8	29.6	9.2	18.2	0.338	7.1	8.3
		4.	98 th	68.3	32.6	11.5	19.7	0.364	8.7	10.2
4	Sarora	1.	Min	66.9	24.8	9.0	18.4	0.248	5.3	6.2
		2.	Max	80.5	32.4	11.7	23.1	0.316	7.8	8.7
		3.	Avg	73.4	28.1	10.3	20.8	0.292	6.7	7.6
		4.	98 th	80.0	32.1	11.7	22.9	0.315	7.6	8.7
5	Tilda	1.	Min	66.8	26.4	7.7	15.0	0.286	5.4	6.3
		2.	Max	78.7	32.4	11.1	19.8	0.321	7.7	10.6
		3.	Avg	72.7	29.2	9.6	17.6	0.305	6.8	8.7
		4.	98 th	78.6	32.0	11.1	19.8	0.320	7.7	10.3
6	Benaika	1.	Min	54.8	17.5	7.7	14.5	0.199	4.0	6.6
		2.	Max	66.3	28.1	10.8	19.3	0.429	9.5	11.6
		3.	Avg	61.8	21.5	8.9	17.1	0.284	6.7	8.2
		4.	98 th	66.3	27.6	10.5	19.2	0.424	9.4	11.0
7	Tulsi	1.	Min	58.7	22.5	6.5	13.3	0.266	4.1	5.5
		2.	Max	80.2	30.6	10.7	19.2	0.414	8.7	9.2
		3.	Avg	67.7	26.5	8.6	16.7	0.345	6.5	7.4
		4.	98 th	80.2	30.4	10.5	19.2	0.408	8.6	9.0
8	Bilari	1.	Min	49.9	18.9	6.0	11.6	0.230	4.2	4.8
		2.	Max	59.4	25.8	8.9	19.2	0.288	7.5	9.5
		3.	Avg	55.6	22.4	7.2	15.6	0.254	5.9	7.7
		4.	98 th	59.3	25.8	8.4	18.7	0.287	7.4	9.4
9	Bhumia	1.	Min	53.9	21.4	7.3	17.4	0.316	6.2	6.5
		2.	Max	72.6	35.6	12.2	26.6	0.456	9.8	9.7
		3.	Avg	65.3	26.4	9.7	21.6	0.372	7.6	8.4
		4.	98 th	72.1	32.8	11.9	26.5	0.451	9.7	9.7
CPCB Standards				100 (24hr)	60 (24hr)	80 (24hr)	80 (24hr)	2 (8hr) (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.

Note: As per specific ToR condition - 11 (On page no. - 5 & 6 of approved ToR) Additional one month data collected from **15th Oct - 2021 to 14th Nov - 2021** are provided in Annexure of EIA report.

3.3 AMBIENT NOISE LEVELS

Ambient noise level monitoring was carried out at the 8 monitoring locations. The monitoring results are summarized in **Table 6**.

**TABLE 6
SUMMARY OF AMBIENT NOISE LEVEL MONITORING RESULTS**

Sr. No.	Monitoring Locations	1 st Dec-20 to 28 th Feb-21	
		Equivalent Noise Level	
		Leq _{Day}	Leq _{Night}
Residential Area			
1.	Parsada	51.9	40.7
2.	Binaika	50.5	39.2
3.	Sankra	53.6	41.4
CPCB Standards dB(A)		55.0	45.0
Commercial Area			
4.	Sarora	52.1	42.4
5.	Sasaholi	54.7	41.8
CPCB Standards dB(A)		65.0	55.0
Silence Zone			
6.	Bhursuda	46.1	37.2
7.	Bilari	47.6	38.1
CPCB Standards dB(A)		50.0	40.0
8.	Project Site	60.8	52.5
CPCB Standards dB(A)		75.0	70.0

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

Note: As per specific ToR condition - 11 (On page no. - 5 & 6 of approved ToR) Additional one month data collected from **15th Oct - 2021 to 14th Nov - 2021** are provided in Annexure of EIA report.

3.4 SURFACE AND GROUND WATER RESOURCES & QUALITY

3.4.1 Regional geology

10 km radius study area is mainly comprised of sedimentary rock formations, like stromatolitic limestone, argillaceous dolomites, shale. All these formations are of Proterozoic 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 0.8-1.2m. Outcrops are very rare in project site.

3.4.2 Hydrogeology

Entire study area is comprises of calcareous sedimentary rock formations of Proterozoic age and belongs to Chhattisgarh super group. The primary porosity and permeability of these formations is very poor. The ground water in these formations occurs under water table, semi confined and confined conditions. The weathered and the cavernous part of the formation and also the fractured zones constitute the aquifers in the area. The maximum thickness of the weathered formation in the area is around 25m. The cavernous zones are occurring mostly in the depth range of 10 to 70 m.

Depth to water level scenario in the study area:

Pre-monsoon Water levels- 4.5 to 13 m bgl

Post-monsoon water levels: 1 to 3.5 m bgl

(Reference: *WRIS portal data*)

3.4.3 Geomorphology

Study area is comprises of gently sloping plains on Proterozoic age. 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 8 surface water samples.

A. Groundwater Quality

The analysis results indicate that the pH ranged between 6.82 to 7.57. The TDS value of the ground water samples in the study area varies from 259 to 802 mg/l, indicating that most of the ground water lies within the maximum permissible limit. Total hardness was found to be in the range of 176.91 – 266.57 mg/l. The fluoride concentration was found in the range of 0.16 - 0.41 mg/l. The nitrate and sulphate were found in the range of 11.27 – 18.27 mg/l and 16.43 - 37.24 mg/l respectively. Heavy metals content (i.e. As, Al, Cd, Cr, Cu, Pb, Mn, Zn and Hg) were found to be below detection limit and within specified standards.

Sr. No.	Locations	WQI	Quality	Remark
1	Project site	60.25	Good	Water quality assessed based upon above physico-chemical parameters and samples were found to be physico-chemically good and excellent.
2	Sarora	46.48	Excellent	
3	Benaika	50.54	Good	
4	Bilari	52.48	Good	
5	Bhursuda	43.47	Excellent	
6	Sasaholi	50.83	Good	
7	Tilda	66.61	Good	
8	Sankra	50.19	Good	

B. Surface Water Quality

The analysis results indicate that the pH ranged between 6.67 – 8.26 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 592 - 720 mg/l which is within the permissible limit of 2000 mg/l. The total hardness recorded was in the range of 199.65 - 298.50 mg/l as CaCO₃ 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 32.81 - 73.57 mg/l and 41.62 – 82.76 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 6.4-6.8 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 0.27-0.53 mg/l.

Heavy metals content (i.e. As, Al, Cd, Cr, Cu, Pb, Fe, Mn, Zn and Hg) were found to be very low and within specified standards.

C. Bacteriological Characteristics

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

3.5 LAND USE LAND COVER CLASSIFICATION

The land-use & land cover map of the 10 km radial study area from the periphery of project site has been prepared using Resource SAT-1 (IRS-P6), sensor-LISS-3 having 23.5m spatial resolution and date of pass 15th May 2021 satellite image with reference to Google Earth data. In order to strengthen the baseline information on existing land use pattern, the following data covering 10 km radius approximate about 21°27'50.55"N to 21°38'35.41"N latitude and 81°39'42.14"E to 81°52'07.77"E longitude and elevation 250 – 305 meters are used as per the project site confined within that area.

The Land Cover classes and their coverage are summarized in **Table 7**.

TABLE 7
LU/LC CLASSIFICATION SYSTEM

LU/LC Classification System				
S. No.	Level-I	Level-II	Area (Sq.Km ²)	Percentage (%)
1	Built-up land	Settlement	52.65	16.77
		Road Infrastructure	12.88	4.10
		Industrial infrastructure	15.86	5.05
		Rail Infrastructure	2.15	0.68
2	Agricultural Land	Single Cropland	138.6	44.14
		Double Crop Land	35.86	11.42
		Barren Land	9.88	3.15
		Plantation	6.18	1.97
3	Forest Land	Reserve forest	10.48	3.34
4	Scrubs	Open Scrub	20.24	6.45
5	Water bodies	River	3.54	1.13
		Pond/Tank, Canal	3.86	1.23
6	Others	Mining Area	1.82	0.58
	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 1.473 - 1.790 g/cc which indicates favourable physical condition for plant growth. The water holding capacity is between 21.52 - 25.99%. Infiltration rate, in the soil is in the range of 18.96 - 24.32 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. Variation in the pH of the soil is found to be neutral (6.92 – 7.82) in reaction. Electrical conductivity, a measure of soluble salts in the soil is in the range of 294.6 - 335.51 μ S/cm. The important soluble cations in the soil are calcium and magnesium whose concentration levels ranged from 237.16 – 271.59 mg/Kg and 101.63 - 141.68 mg/Kg respectively. Chloride is in the range of 246.91 – 364.29 mg/Kg.

Fertility status of Soil

The nutrient status in terms of NPK value is found to be in the range of 238.52 – 425.73 kg/ha, 16.54 – 28.24 kg/ha and 736.21 – 1152.82 kg/ha respectively.

3.7 BIOLOGICAL ENVIRONMENT

Floral composition in Study Area

Floral characteristics within project site and surrounding areas including various villages were studied during winter season. Total 171 floral species were observed in the study area. The details about the floral composition are as follows.

- a. **Trees:** Total 80 species were found in the study area
- b. **Shrubs (small trees):** Total 33 species were enumerated from the study area.
- c. **Herbs:** In the study area 14 species were observed.
- d. **Bamboo & Grasses:** 23 species were enlisted from the study area
- e. **Climbers and Twiners:** Total 19 species of climbers/ twiners were recorded in the study area.
- f. **Parasite :** Each 2 species enlisted in the area

RET (Rare, Endangered and Threatened species) STATUS

According to IUCN Status report 2013 out of total 171 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.

Fauna Details:

Total 83 faunal species was recorded through primary and secondary sources. Out of which 9 species belongs to class mammalian, 10 species belongs to class Reptelians and Amphibians, 45 species belongs to class Aves, 8 species belongs to class Insecta (Butterflies) and 11 species belongs to class Pisces.

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 Avifuna 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; *Canis aureus* (Jackal), 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.

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 8. Details regarding education and infrastructure facilities 2011 are presented in Table 9.

TABLE 8
SUMMARY OF SOCIO-ECONOMIC ENVIRONMENT OF VILLAGES WITHIN 10 KM RADIUS AREA

No. of villages	44
Total households	10501
Total population	54723
Male Population	27441
Female population	27282
SC Population	10792
ST Population	4448
Total literates	33562
Total Illiterates	21161
Total workers	14978
Total main workers	18946
Total marginal workers	7607
Total non-workers	28170

Source: Primary census abstract 2011, Chhattisgarh.

TABLE 9
INFRASTRUCTURE FACILITIES AVAILABLE IN THE STUDY AREA

Yr. 2011	In percentage (%)									
	Educational	Drinking water	Road	Power	Communication	Transportation	Govt. PHC & SC	Bank	Drainage	Recreation
Availability (in %)	100	100	96.77	100	100	100	45.16	12.90	41.94	100

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

SALIENT OBSERVATION OF THE SOCIO-ECONOMIC SURVEY

- **House pattern:** Types of housing varied from thatched to pucca (pakka) houses 75% houses were in pucca (pakka) form 15% in semi pakka and 10% houses were observed in kaccha form
- **Employment:** Main occupation in the study area was Labour Work and Agricultural. Other income generation sources of the area, small business; private jobs etc. The labours were getting daily wages in the range of 250-300 Rs, depending on type of work they set
- **Fuel:** The primary sources of cooking fuel were LPG, cow dung etc.
- **Main crops:** The principal crops grown in agricultural Commodities (first) were Paddy sugarcane, Tiwas and Vegetables etc. Manufacture commodities (first) plastic Products and Handicrafts commodities (first) Mat, fishing Net and Second Bamboo During discussion with villagers/farmers it was revealed that crop productivity of the study area is good and two to three times multi crop production was performing 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:** Chhattisgarh the mother tongue of most of the Chhattisgadi population, Along with Chhattisgarh Hindi and English are all official languages. Hindi and English are official languages because they are official languages of India's central government. .
- **Sanitation:** Toilet facility is one of the most basic facilities required in a house. It was observed that more than 85 % of the households were having toilet facilities in their houses. There was no proper drainage line in the villages.
- **Drinking water Facilities:** During the survey it was observed diverse sources of drinking water supply in villages. Major source of drinking water in the study area were hand pumps, tap water and dug wells and canal. During survey people from some villages reported Water Quality are good.
- **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 Tilda for their studies which are approximate 10 Kms. from the plant.
 - ❖ The schools are also not having proper infrastructure facilities.
 - ❖ College facility is available in Tilda & Raipur 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.
- **Communication facilities:** For communication purpose mainly mobile phones, news papers & post offices were present in the villages
- **Medical facilities:** The Primary & secondary data reveals that there are only 11 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 as 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 (Malaria & Dengue cases) 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.
- **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 Tilda villages The basic amenities exist at all villages
- **Recreation facilities:** Television and radio are the main recreation facilities in the study area. News paper/magazine facilities are also used by villagers.

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 their 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.

Almost all respondents were aware about the M/s NSPL Project area but Some respondents were unaware about the project activity. During the Side visit, the affected villages residents demanded to know the details.

- The respondents were happy to know about the project and they opined positively because the activity would definitely contribute development in the study area.
- Main demands of villagers in study area were for Pucca Roads.
- Village leaders asked to give employment opportunities to local people
- They also demanded for Water Spray by panchayat to curb down the effects of air pollution in the area due to the project.
- According to Respondents air Pollution was increase day by Day due to upcoming Projects and Directly affected health of surrounding villages.
- Respondents added that due to non availability of technical education most of the local educated youth are not offered job in company so would promote professional educational training facilities in the study area.
- They Demanded plantation on the both Side of the road to prevent Pollution due to the Proposed Project.

While giving information about project of M/s NSPL respondents gave positive opinion and they strongly believe that it will help to develop quality of life in the study area with employment opportunities.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Air Environment

Dust will be the main pollutant affecting the ambient air quality of the area during the construction phase. Dust will be generated during excavation, back filling and hauling operations and vehicular movement of trucks, dumpers and construction machinery. Further, concentration of NO_x and CO may also slightly increase due to increased vehicular traffic. However, change in ambient concentrations of air quality will be insignificant and temporary. As most of the construction equipment will be mobile, the emissions are likely to be fugitive. The impacts will be localized in nature and the areas outside the project boundary are not likely to have any significant adverse impact.

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 emission of SO₂, NO₂ due to proposed plant with new installations were carried out. The predicted 24 hourly maximum contribution in AAQ concentrations from main process unit facilities for particulate matter, SO₂ and NO₂ are found to be 0.46 µg/m³, 8.5 µg/m³ and 0.58 µg/m³ occurring at a distance of about 2.8 km respectively in SW & WSW direction and emissions from standby DG sets for particulate matter, SO₂ and NO₂ are found to be 0.46 µg/m³, 0.023 µg/m³ and 9.7 µg/m³ occurring at a distance of about 1.4 km each respectively in SW & WSW direction. No significant incremental concentration was found due to proposed installation activities.

- The main pollutants discharged from the Induction Furnace, Sponge Iron Plant, will be particulate matter, SO₂. In case of power failure DG set will be used and emissions generated from DG set operation will be PM, SO₂ and NO_x. Other gaseous emissions due to sponge iron plant which is

considered maximum consumption of raw material i.e. worst condition considered but all the predicted values well within the standard.

- In Sponge Iron Plant and Power Plant ESP with Dust Collectors will be installed.
- In Induction Furnace and Sponge Iron Material handling area, Dust Collector along with it; the Bag Filter will be installed.
- Steel Melting Shop with hot charging rolling mill will be provided with Bag filters, 33 meter stack and ID/FD fan capacity to cater the future requirement to control emission less than 50 mg/Nm³.
- DRI Kiln with WHRB will be provided with Dust extraction system, ESP with Chimney; to keep particulate matter emission below 50mg/Nm³. Bag Filters for Product house; Kiln discharge end and transfer points;
- Air Pollution control equipment such as ESP in sponge iron and Bag Filters at various locations will be provided
- Water spraying will be carried out in order to control fugitive emissions in the internal open storage yards.
- Adequate dust suppression system in the form of water sprinklers shall be provided at raw material yard, temporary solid waste dump site and along the vehicular roads.
- There will be dedicated roads for vehicles carrying raw materials and products.
- Stacks will be provided with porthole and working platform so that stack monitoring can be done as per norms of statutory authority.

Noise Environment:

Impact on Ambient Noise

There will be noise generation from earth moving equipment and material handling traffic. The major sources of noise during the construction phase are vehicular traffic, construction equipment like dozers, scrapers, concrete mixers, cranes, pumps, compressors, pneumatic tools, saws, vibrators etc. The operation of these equipment will generate noise ranging between 85-90 dB (A) near the source. These noise levels will be generated within the plant boundary and will be temporary in nature.

Noise Control Measures

The construction activity will be carried out mostly during daytime. The construction equipment will undergo preventive maintenance test at routine intervals. Any machinery or equipment generating excessive noise levels (above 90 dBA) will be taken out of service and replaced by new ones. The noise generation will be confined within the surrounding areas of construction site. Greenbelt will be developed during construction phase hence its impact will be lower.

Mitigation Measures

1. 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.
2. 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.
3. Proper shifting arrangement shall be made to prevent over exposure to noise and vibration.
4. 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.
5. Silent DG sets shall be used at project site.

6. Speed limits shall be enforced on vehicle.
7. Use of horns / sirens shall be prohibited.
8. Use of loud speakers shall comply with the regulations set forth by CPCB.
9. Regular noise monitoring shall be carried at construction camp / project site to check compliance with prevailing rules.

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:

- Closed circuit water system implemented in DRI Division, SMS division. Hence there will not be any waste water generation from process and cooling in the steel plant.
- Moreover, Total wastewater generation from the Captive power plant is 16 KLD. The boiler blow down & DM Plant regeneration water treated in a neutralization tank. As the proposed plant will be Zero effluent discharge plant, there will not be any provision of water getting mixed with solid particulates. Total 16 KLD treated water generated through neutralization out of this 10 KLD will be utilized in Dust suppression and remaining 06 KLD will be used in Ash/Slag Quenching.
- Domestic waste water generated through sanitary/toilet activities. This will be treated in STP and treated water will be used for plantation purposes.
- About 7 KLD treated domestic water through STP will be used green belt development
- Rain water harvesting is being carried out.
- All stock piles will be on pucca flooring to prevent for any ground water contamination.

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 involved in the project activities. Thus, no significant impact envisaged on biological environment.

The increase concentration levels of particulate matter, SO₂, NO_x, in the atmosphere could lead to decline the rate of photosynthesis, thus retarding the growth of plant. However, air quality modelling outputs study revealed that, the resultant concentrations of particulate matter, sulphur di-oxide and oxides of nitrogen are well within the prescribed limits. The impact due to proposed project would be minimal due to implementation of site specific mitigation measures.

The total plant area is 4.123 Ha. The total plantation is about 3600 nos. will be carried out on 1.44 Ha. (34.9%) @ 2500 trees/ha, some trees shall be planted along approach road side in proposed project area.

Socio-economic environment

The project would create certain impacts which could be beneficial as well as adverse. It is necessary to identify the extent of these impacts for further planning of control measures leading to mitigation of the adverse impact. The impacts due to project on parameters of human interest are assessed and given below.

Positive impacts

- A multiplier effect will be felt on the creation of indirect employment through the local community establishing small shops like tea stalls, supply of intermediate raw materials, repair outlets, hardware stores garages etc.
- Improvement in green cover due to the plantation of trees in the Study area, also will be leading to a decrease in environmental pollution.
- Sixty five percent of the Study area population is dependent on agriculture-related traditional occupations for their livelihood. However, due to the inadequacy of irrigation facilities, most villagers are able to get employment only for about four months in the year. Hence, the proposed will create additional employment.
- Approx. 200 people will be benefited in terms of direct employment due to the proposed project during regular operation phase. During regular operations indirect un skilled employment will also be generated as helpers for maintenance

Negative impacts

- During operation phase heavy vehicular movements will lead to dispersed dust particles which will affects the health of the workers and Local Peoples.
- If influx of workers from outside areas then there will be an increased pressure on residential accommodation the neighborhood during construction phase.
- The vehicular traffic of trucks will increase during the construction phase. Trucks, tankers and other vehicles may cause additional air pollution to the surrounding areas. The effects may be more prominent in nearby villages.

Mitigation Measures

In order to mitigate the adverse impact likely to arise in social, cultural and economic aspects in the surrounding region and the proposed project is expected to contribute towards enlistment of local people and improvement in quality of life.

- Preference for direct/contractual employment should be given to the locals based on their skills and aptitude. Social development program should be conducted as the part of CSR/ CER.
- Project proponent should take appropriate steps to keep environment clean and Green belts development/ Plantation along with the internal Road.
- Ensure that roads are properly signed, vehicles are well maintained and drivers are well trained and safety conscious.
- Priority will be given to local people in employment as part of proposed activity.
- Transportation of hazardous waste should be done as per CPCB Guidelines. The heavy trucks will be covered to prevent spillage or dusting. The drivers should be imparted training.

5.0 ENVIRONMENTAL MONITORING PROGRAM

An Environmental Management Cell (EMC) will be established for the proposed project under the control of Executive Director followed by General Manager. The EMC will be headed by an Environmental Officer 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 ADDITIONAL STUDIES

6.1 RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

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

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

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

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

6.2 PUBLIC CONSULTATION

The Draft EIA-EMP report for greenfield project is being submitted for public consultation process as per the provisions of EIA Notification 2006 and amendments thereof.

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

7.0 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. NSPL will carry community welfare activities in the following areas:

- Community development
- Education
- Health & medical care
- Drainage and sanitation
- Roads

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

As per MoEFCC vide its OM dated 30th Septmber 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. Thus, CER budget along with proposed physical work and time line are made in the proposal as per TOR which required considering O.M. dated 01/05/2018 and 30.09.2020 issued by MoEF&CC, New Delhi proposals regarding Corporate Environment Responsibility (C.E.R.). A CER budget of Rs. 140 Lakhs will be spent.

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 project. The Estimated capital cost required to implement the EMP for proposed project is estimated to be **Rs. 690.00** Lakhs. Some of these equipment are accounted for as Plant and Machinery and some of the civil works are accounted for as Building and Civil works. The annual recurring expenses mainly on repair; maintenance; consumable etc will be about **Rs. 62.00** Lakhs has been allocated for implementation of the Environmental Management Plan for proposed project.

9.0 CONCLUSION

The proposed project of M/s. NSPL 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. form integral part of the plant infrastructure. Additional pollution control measures and environmental conservation measures will be adopted to control/minimize impacts on the environment and socio-economic environment of the area. Measures like development of green belt and plantation in nearby village and along transport road, adoption of rainwater harvesting/recharging in the plant and in nearby villages will be carried out. The proposed CSR/CER activities to be initiated by the industry will be helpful to improve the social, economic and infrastructure availability status of the nearby villages.

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

10.0 DISCLOSURE OF CONSULTANTS

The Environmental studies for proposed project of M/s. NSPL 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.