REPORT SUBMITTED FOR PUBLIC HEARING

EXECUTIVE SUMMARY OF DRAFT EIA-EMP REPORT

For

Brownfield project in which addition of SAF (3.5 MVA x 2 nos.) to produce Ferro Alloys (SiMn) 11,000 TPA and/or FeMn 17,000 TPA and/or FeSi 7,000 TPA and/or Pig Iron 27,000 TPA in place of existing Cast Iron 29,700 TPA and change in fuel of existing Captive Power Plant 7.5 MW (Coal and Dolochar fuel proposed instead of existing Biomass)

LOCATED AT

Village - Thakurtola, Tehsil & District – Rajnandgaon (C.G.)

Terms of Reference File No IA-J-11011/26/2025-IA-II(Ind-I) dated 19th January 2025
Category A, Schedule 3 (a) Metallurgical Industries (Ferrous & Non-Ferrous) and 1(d) Thermal Power Plant
Baseline Monitoring Period: Winter Season (1st December 2024 – 28th February 2025)

PROJECT PROPONENT

ASMPL
AGARWAL STRUCTURES MILLS PVT LTD

M/s. Agrawal Structure Mills Pvt. Ltd.

ENVIRONMENTAL CONSULTANT

ANACON

M/s. ANACON LABORATORIES PVT. LTD., NAGPUR
QCI - NABET Accredited EIA Consultant for
3 (a) Metallurgical Industries (Ferrous & Non-Ferrous) and 1(d) Thermal Power Plant
MoEF&CC (GOI) Recognized Laboratory
ISO 9001:2015, ISO 14001:2015, ISO 45001:2018
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Report No. ANqr/PD/20A/2024/252

MARCH - 2025

EXECUTIVE SUMMARY

1.0 INTRODUCTION

Agrawal Structure Mills Pvt. Ltd. is a Private incorporated on 10 November 1995. It is classified as Non-government Company and is registered at Registrar of Companies, ROC Chhattisgarh. The company is also ISO 9001:2008 & IS 1786 Certified company. The Group is engaged in the business of steel products such as Ferro Alloy and Power.

The company is led by its directors, Mr. Anil Kumar Madanlal Agrawal and Ms. Renu Agrawal, both esteemed industrialists in the secondary steel manufacturing sector in Chhattisgarh. Its registered office is located at Govind Kunj, Near Krishna Talkies, Samta Colony, Raipur, Chhattisgarh, India – 492001.

Previously, the company operated under the name M/s. SKA Power & Cast Alloys Pvt. Ltd., with Mr. Saurabh Agrawal as the director. This entity had obtained consent for establishment and operation at Village Thakurtola, Tehsil Rajnandgaon, as per Letter No. 137/RO/TS/CECB/2023 dated 25/04/2023. Subsequently, M/s. Agrawal Structure Mills Private Limited acquired this existing plant.

According to a letter from the Regional Office, Chhattisgarh Environment Conservation Board (CECB), Bhilai (Letter No. 5520/Kshetra Karya/CGPSM/Bhilai/2024 dated 03/01/2025), the company's name has been officially changed from M/s. SKA Power & Cast Alloys Private Limited to M/s. Agrawal Structure Mills Private Limited.

M/s. Agrawal Structure Mills Private Limited (Formerly - Rayapati Power Generation Private Limited) (Power Division) have renewal of consent, letter No. 4740 /TS/CECB/ 2023 Nava Raipur Atal Nagar, dated: 13/09/2023 valid upto 30/04/2024 for Biomass Based Power Plant (7.5 MW).

Now, M/s Agrawal Structure Mills Pvt. Ltd. intended to obtain Environmental Clearance for the production of Ferro alloys (SiMn and/or FeMn and/or FeSi and/or Pig Iron) along with Coal+Dolochar based Power Plant (7.5 MW) at Village Thakurtola, District – Rajnandgaon. Total land area 12.53 Acre (5.28 ha.).

In accordance with the Environmental Impact Assessment (EIA) Notification dated September 14, 2006, and its subsequent amendments, the proposed project falls under Category "**A**". It is classified under Project Activity '**3(a)**' for Metallurgical Industries and '**1(d)**' for Thermal Power Plants under Activity '1(d).' As a result, the project requires Environmental Clearance (EC) from the Expert Appraisal Committee (EAC) of the Ministry of Environment, Forest and Climate Change (MoEF&CC), New Delhi.

The company applied for the Terms of Reference (ToR) on December 11, 2024, vide proposal number IA/CG/IND1/503967/2024, seeking approval for the ToR. The Expert Appraisal Committee (EAC) (Industry – I) of the Ministry of Environment, Forest and Climate Change (MoEFCC), New Delhi, granted the Standard ToR for the proposed expansion on January 19, 2025, under file number IA-J-11011/26/2025-IA-II (IND-I) to facilitate the preparation of the EIA-EMP report. ToR compliance, along with cross-referencing, is detailed at the start of the chapter scheme.

Anacon Laboratories Pvt. Ltd., located in Nagpur, is a QCI-NABET accredited environmental consultant organization in 'Category A.' The company has been entrusted with conducting an Environmental Impact Assessment (EIA) study and preparing an Environment Management Plan (EMP) to assess the potential environmental impacts of the proposed expansion project.

The EIA and EMP report is being prepared to secure Environmental Clearance (EC) from the Ministry of Environment, Forest and Climate Change (MoEF&CC), New Delhi, as well as the Consent for Establishment from the Chhattisgarh Environment Conservation Board (CECB) for the proposed expansion.

1.1 IDENTIFICATION OF PROJECT

M/s. The proposal is brownfield project for changing production facilities Ferro Alloys SiMn and/or FeMn and/or FeSi and/or Pig Iron instead of Cast iron, and Change of the Fuel from Biomass to Coal + Dolochar in Captive Power Plant. The proposal is to seek Environment Clearance based on energy efficient as well as well proven technology process.

TABLE 1: EXISTING AND PROPOSED CAPACITY DETAILS (IN TPA)

S. No.	Process plant	Existing Capacity	Proposed Capacity	Product	Total Capacity after expansion
1	Submerged Electric Arc Furnace	(Cast Iron) 29,700 TPA	Electrically operated Sub-Merged Arc Furnace 3.5 MVA x 2 Nos.	Ferro Alloy (SiMn)	11,000 TPA
				And/or	
				Ferro Alloy (FeMn)	17,000 TPA
				And/or	
				Ferro Alloy (FeSi)	7,000 TPA
				And/or	
				Pig Iron	27,000 TPA
2	Captive Power Plant (Boiler and TG based)	Biomass Based Power Plant (7.5 MW)	Captive power 7.5 MW (32 TPH Boiler)	Coal + Dolochar Based Power Plant	Coal + Dolochar Based Power Plant (7.5 MW)

1.2 LOCATION OF THE PROJECT

The expansion project will be carried out within 5.28 hectares in Thakurtola Village, Tehsil and District Rajnandgaon, Chhattisgarh, covering Khasra Nos. 376, 377/1, 377/2, 383/1, 384, 385/2, and 385/3. It involves modifying the existing captive power plant to produce Ferro Alloys instead of cast iron. The land is already in possession, designated for industrial use, and no additional land is required.

The project site is 5.40 km west of Rajnandgaon and 65.40 km east-northeast of Swami Vivekanand Airport, Raipur. The nearest habitations, Thakurtola and Torankata, are 0.62 km north-northeast and 0.84 km south-southwest, respectively. It is accessible via district roads connecting to Thakurtola-Torankata Road in the east, which links to NH 53 (1 km north) and SH 5 (6.63 km west-northwest). The nearest railway stations are Parmalkasa (3.92 km north-northwest) and Rajnandgaon (7.50 km west-southwest).

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

1.3 EIA/ EMP REPORT

As per approved ToR obtained from EAC (Industry –I), MoEFCC, New Delhi, baseline environmental monitoring was already conducted during during **winter season (1st December 2024 – 28th February 2025)** has been considered for determining the status of ambient air quality, ambient noise levels, surface and groundwater quality, soil quality, status of flora, fauna and eco-sensitive areas and socio-economic status of the villages within 10 km radius study area from the project site **(Figure 1).** The observations of the studies are incorporated in the EIA/EMP report. Impacts

of the proposed expansion project activities during construction and operation stages were identified and duly addressed in the EIA- EMP report.

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

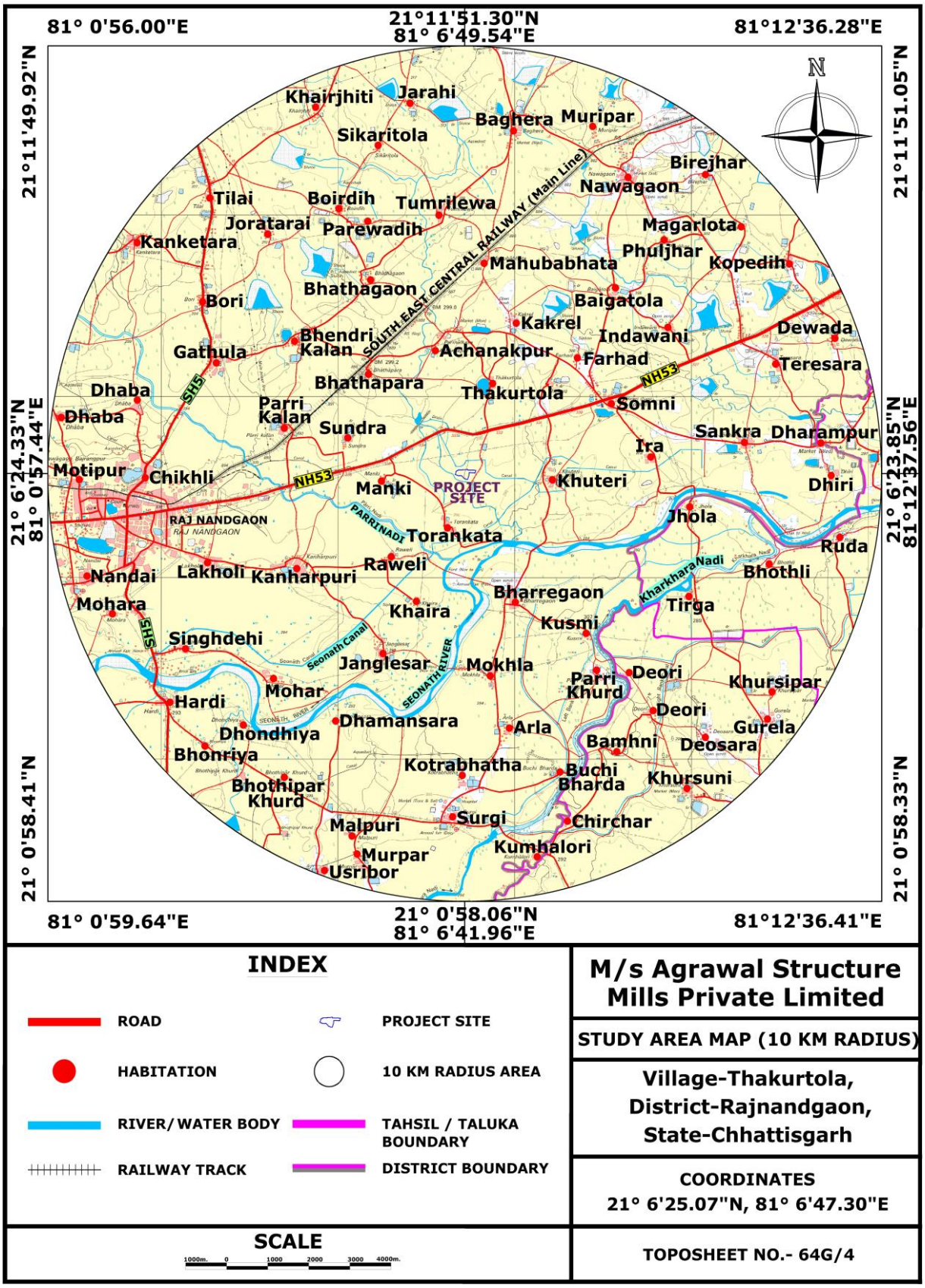

FIGURE 1 : STUDY AREA (10 KM RADIAL DISTANCE)

TABLE 2: DETAILS OF ENVIRONMENTAL SETTINGS

<table>
<tr><th>Sl.</th><th>Particulars</th><th>Details</th></tr>
<tr><td>1.</td><td>Project Location</td><td>Village- Thakurtola, District- Rajnandgaon,
State - Chhattisgarh</td></tr>
<tr><td>2.</td><td>Latitude/Longitude</td><td>
<table>
<tr><th>S. No.</th><th>Latitude</th><th>Longitude</th></tr>
<tr><td>BP1</td><td>21° 6'26.93"N</td><td>81° 6'41.48"E</td></tr>
<tr><td>BP2</td><td>21° 6'26.59"N</td><td>81° 6'55.99"E</td></tr>
<tr><td>BP3</td><td>21° 6'25.04"N</td><td>81° 6'55.44"E</td></tr>
<tr><td>BP4</td><td>21° 6'25.42"N</td><td>81° 6'50.48"E</td></tr>
<tr><td>BP5</td><td>21° 6'20.19"N</td><td>81° 6'49.27"E</td></tr>
<tr><td>BP6</td><td>21° 6'23.06"N</td><td>81° 6'43.84"E</td></tr>
<tr><td>BP7</td><td>21° 6'23.95"N</td><td>81° 6'39.27"E</td></tr>
</table>
</td></tr>
<tr><td>3.</td><td>Location covered in Toposheet No</td><td>64G/4</td></tr>
<tr><td>4.</td><td>Nearest representative IMD Station</td><td>IMD Rajnandgaon - 8.47 km/WSW</td></tr>
<tr><td>5.</td><td>Site elevation above Mean Sea Level</td><td>315 m to 323 m</td></tr>
<tr><td>6.</td><td>Nearest roadway</td><td>1. Road connecting village Thakurtola and Torankata - Adjoining/E
2. NH53-1km/N 3. SH5-6.63km/WNW</td></tr>
<tr><td>7.</td><td>Nearest Railway Station</td><td>Parmalkasa Railway Station - 3.92 km/NNW
Murhipar Railway Station - 9.10 km/NNE
Rajnandgaon Railway Station - 7.50 km/WSW</td></tr>
<tr><td>8.</td><td>Nearest Air Port</td><td>Swami Vivekananda Airport, Raipur-65.40km/ENE</td></tr>
<tr><td>9.</td><td>Nearest village</td><td>Thakurtola - 0.62 km/NNE & Torankata - 0.84 km/SSW</td></tr>
<tr><td>10.</td><td>Nearest Port</td><td>Gopalpur Port - 448.40 km/ESE</td></tr>
<tr><td>11.</td><td>Distance from Sea Coast</td><td>Bay of Bengal - 428.54 km/SE</td></tr>
<tr><td>12.</td><td>Nearest major city with 2,00,000 population</td><td>Rajnandgaon - 5.40 km/W</td></tr>
<tr><td>13.</td><td>Nearest State/National Boundaries</td><td>Maharashtra - 49.60 km/WNW
Madhya Pradesh - 52.37 km/WNW</td></tr>
<tr><td>14.</td><td>Hills/Valleys</td><td rowspan="4">None within study area</td></tr>
<tr><td>15.</td><td>Ecologically sensitive zone</td></tr>
<tr><td>16.</td><td>National Parks, Wildlife Sanctuaries, etc.</td></tr>
<tr><td>17.</td><td>Nearest Reserved / Protected forests</td></tr>
<tr><td>18.</td><td>Historical/Tourist places</td><td>
<table>
<tr><th>Sr. No.</th><th>Name</th><th>Distance (Km)</th><th>Direction</th></tr>
<tr><td>1</td><td>Mahadev Mandir</td><td>2.75</td><td>SW</td></tr>
<tr><td>2</td><td>Mohad/Dhamansara Dam</td><td>6.13</td><td>SSW</td></tr>
<tr><td>3</td><td>Mata Mandir Khursipar</td><td>9.33</td><td>SE</td></tr>
</table>
</td></tr>
<tr><td>19.</td><td>Nearest Industries</td><td>
<table>
<tr><th>Sr. No.</th><th>Name</th><th>Distance (Km)</th><th>Direction</th></tr>
<tr><td>1</td><td>Hitec Panels Pvt. Ltd.</td><td>2.02</td><td>ENE</td></tr>
<tr><td>2</td><td>Kamal Solvent Extractions Private Limited</td><td>2.9</td><td>NE</td></tr>
<tr><td>3</td><td>Shraddha Rice Mill</td><td>4.4</td><td>ENE</td></tr>
<tr><td>4</td><td>Godawari Power & Ispat Limited (50 MW Solar Power Plant)</td><td>5.91</td><td>NNE</td></tr>
<tr><td>5</td><td>Sai Chemicals Private Limited</td><td>7.95</td><td>NE</td></tr>
</table>
</td></tr>
</table>

Sl.	Particulars	Details

		6	Rajaram Maize Products Pvt. Ltd. (13.5 MW Solar Power Plant)	8.01	NE

20. **Nearest Water Bodies**

Sr. No.	Name	Distance (Km)	Direction
1	Seasonal Nala	0.01	S
2	Parri Nadi	1.67	SW
3	Kharkhara Nadi	4.82	SE
4	Shivnath River	1.87	SE
5	Shivnath Canal	1.33	SSE
6	Right Bank Canal	6.75	SE
7	Left Bank Canal	4.46	SE
8	Joratarai Lake	5.95	NW
9	Moti Talab	8.27	WSW
10	Rani Sagar Lake	8.58	WSW
11	Budha Sagar	8.48	WSW
12	Bada Talab	7.68	W

21. **Archaeological Sites** — None

22. **Religious Places**

Sr. No.	Name	Distance (Km)	Direction
1	Hanuman Mandir, Toran Katta	0.90	SW
2	Panchdham Mandir	3.82	ENE
3	Siddhivinayak Mandir	6.87	WSW

23. **Hospitals and Education Institutions (Sensitive Manmade Land use)**

HOSPITALS

Sr. No.	Name	Distance (Km)	Direction
1	CAMC Hospital	1.33	WNW
2	Up-Swastha Kendra Baghera	8.35	NNE
3	Government District Hospital, Basantpur	8.66	WSW
4	Shukla Multispeciality Hospital	8.75	WSW
5	Samda Superspeciality Hospital	9.63	WSW

EDUCATIONAL INSTITUTIONS

Sr. No.	Name	Distance (Km)	Direction
1	Ashoka Institute of Technology & Management	0.73	WNW
2	Shri Ram College of Agriculture	1.2	NW
3	Chhattisgarh Ayurvedic Medical College	1.26	WNW
4	Sanskar City International School	1.54	NW
5	Sanskarcity College of Education	1.65	NW
6	Yugantar Institute of Technology and Management (YITM)	1.83	NE
7	Chhattisgarh Dental College & Research Institute (CDCRI)	2.65	WNW

<table>
<tr><th>Sl.</th><th>Particulars</th><th>Details</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>8</td><td>Yugantar Public School</td><td>3.48</td><td>W</td></tr>
<tr><td>9</td><td>Govt.H.S. School Bedikala</td><td>5.05</td><td>NW</td></tr>
<tr><td>10</td><td>Livelihood College Rajnandgaon</td><td>5.63</td><td>ENE</td></tr>
<tr><td>11</td><td>Govt. Primary School Parewadih</td><td>6.57</td><td>NW</td></tr>
<tr><td>12</td><td>Govt Middle & Primary School Mohad</td><td>6.81</td><td>SW</td></tr>
<tr><td>13</td><td>Govt. Digvijay Autonomous College</td><td>8.54</td><td>WSW</td></tr>
<tr><td>14</td><td>ANM College Rajnandgaon</td><td>8.55</td><td>WSW</td></tr>
<tr><td>15</td><td>Primary School Birejhar Bhata</td><td>8.58</td><td>ENE</td></tr>
<tr><td>16</td><td>SKS College of Agriculture & Research Station</td><td>8.7</td><td>SSW</td></tr>
<tr><td>17</td><td>Atmanand English Medium School</td><td>8.8</td><td>WSW</td></tr>
<tr><td>18</td><td>Govt. Shivnath Science Mahavidyalaya</td><td>9.2</td><td>WSW</td></tr>
</table>
</td></tr>
<tr><td>24.</td><td>Community Places</td><td>
<table>
<tr><th>Sl.</th><th>Name</th><th>Distance (Km)</th><th>Direction</th></tr>
<tr><td>1</td><td>Anant Palace</td><td>4.57</td><td>WSW</td></tr>
<tr><td>2</td><td>Udyachal Bhavan</td><td>7.7</td><td>WSW</td></tr>
<tr><td>3</td><td>Maheshwari Bhawan</td><td>7.75</td><td>WSW</td></tr>
</table>
</td></tr>
<tr><td>25.</td><td>Seismic zone</td><td>Zone II (Least Active)</td></tr>
</table>

2.0 PROJECT DESCRIPTION

2.1 PROCESS DESCRIPTION

2.1.1 FERRO ALLOYS PLANT:

High Carbon Ferro/Silico Manganese: Standard High Carbon Ferro/Silico Manganese is smelted at about 1600-1700^{0}C. A conventional Submerged Arc Electric Furnace (SAEF) achieves this. The three carbon electrodes, partially submerged in the charge, are supported on hydraulic cylinders for upward and downward movements to maintain the desired electrical conditions in the furnace.

The body of the furnace is cylindrical in shape, and is lined with firebricks, silicon carbide bricks and carbon tamping paste. Two tap-holes are provided at 120^{0}C. Apart for draining out both the molten alloy and the slag. During the repair works of one of the tap holes the other will function as standby.

The raw materials are thoroughly mixed in the proper proportion before being charged into the furnace. Manual poking rods or stroker car are used for stoking the charge on the furnace top. As the charge enters the smelting zone, the metal alloy formed by chemical reactions of the oxides and the reductant, being heavy gradually settles at the bottom. The slag produced by the unreduced metal oxides and the flux, being relatively lighter, floats on the metal alloys surface.

At regular intervals the furnace is tapped. The tap hole is opened by oxygen lancing pipe and after tapping is completed, it is closed by clay plug. The liquid Silicon manganese and the slag flow the C.I. Pan. The slag being lighter overflows from the C.I. pan and is taken into the sand mould. The alloy cake from C.I. pan is removed and broken manually with hammer to required lump size. The slag produced in the process is generally free from metal thus after cooling the slag is shifted to slag dump.

2.1.2 PIG IRON:

It is also proposed to produce Pig Iron from Submerged Arc Furnace by using lower grades Iron ore and Magnetite Iron ores. The fundamental process and equipment's are same. The basic difference is only in Raw material in place of Alloys metal Oxide minerals the Iron Ore will be used. The Power consumption in case of Pig Iron smelting will be less than half than that of Ferro Alloys production. So the proportionate production of Pig Iron Possible has been considered.

2.1.3 Fluidized Bed Combustion (FBC) (Power Generation)

The FBC boiler will have a capacity of 30 TPH, operating at 64 ata and a temperature range of 450-480°C. It will include all necessary auxiliary equipment, such as Forced Draft (FD), Induced Draft (ID), and Primary Air (PA) fans, along with an air heater, economizer, and electrostatic precipitator. The steam turbo generator will be designed to produce **7.5 MW** of power at 11 kV, 50 Hz, and a power factor of 0.8 at the generator terminals.

In the Fluidized Bed Combustion boiler envisaged, combustion of fuel particles is achieved in suspension with an inert aggregate i.e. sand. Combustion air will be fed through air nozzles from underneath into the sand fuel bed. Oil burner will be provided for startup and low load flame stabilization. The fuels proposed in FBC Boiler are Dolochar & Coal (Indian / Imported). The condensate after condenser of STG will be pumped to a common de-aerator by condensate extraction pumps. Feed water from the de-aerator will be pumped to the waste heat recovery boiler as well as FBC boiler by boiler feed pumps. 7.5 MW power will be generated through FBC Boiler.

The steam generated from the FBC boilers will drive the steam turbine through a common steam header. The flue gases will pass over various heat transfer surfaces to ESP and then finally discharged into chimney by ID fan. The flue gases will be treated in a high efficiency ESP to bring down the particulate matter in the gases to less than 30 mg/Nm^3 and discharged through a stack of adequate height.

2.2 LAND REQUIREMENT

The total project area for expansion project will be 5.280 Ha. The land use of entire area is industrial. No additional land proposed to be acquired. Greenbelt area 33 % (i.e., 1.740 Ha.) will be kept unchanged. Khasra details of project site is are as follows: 376, 377/1, 377/2, 383/1, 384, 385/2, 385/3. The land already sufficient flat land, free from major undulations and sparse vegetation is available within the plant premises. The entire land is already diverted.

The detail of land use planning in the project area is provided as follows:

TABLE 3: AREA STATEMENT

S. No.	Land Use for	Area (in Ha.)	In (%)
1.	Built-up area	1.560	29.55%
2.	Road and Paved area	0.260	4.92%
3.	Raw Material /Finish Product Storage	0.520	9.85%
4.	Water Reservoir	0.200	3.79%
5.	Greenbelt Development	1.740	33%
6.	Truck Parking	0.500	9.47%
7.	Miscellaneous & Others	0.500	9.47%
	Total	**5.28**	**100%**

2.3 RAW MATERIALS REQUIREMENT, SOURCE & MODE OF TRANSPORT

The raw materials required for the project include Manganese Ore, Iron Ore, Coal, Limestone/Dolomite, Quartz, LAM Coke, Iron, Carbon Paste, Electrode Paste, Mill Scale, and Dolochar. Many of these materials are readily available within a 100 km radius and will be transported through covered trucks. Bulk materials such as Mn Ore and Coal will be transported by rail to the nearest railway siding (Parmalkasa) and then moved to the plant site via covered trucks. Availability of raw material is abundant in a range of distance within 50 km to 500 km area from project site. Fuel consumption will be mainly source from local sources.

2.3.1 Solid and Hazardous waste generation

The total estimated solid waste generation (including existing and proposed expansion) will be 92,070.00 TPA and 1.3 KLA Hazardous Waste in the form of Waste oil/ used oil.

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

TABLE 4: SOLID WASTE GENERATION AND ITS DISPOSAL

S. No.	Waste / By product	Quantity (TPA)	Proposed method of disposal
1.	Slag from SiMn	11000	Will be utilized in road construction
2.	Slag from FeMn	14380	Will be used in manufacture of Silico manganese as it contains high MnO_2.
3.	Slag from FeSi	750	will be given to cast iron foundries
4.	Slag from Pig Iron	24700	Used for filling of low-lying area/land filling/ construction purpose/ sell to Cement plant.
5.	Bag Filter dust	360	Used in SiMn production (SAF) / Sent to Cement plants
6.	Fly Ash/Bottom ash	40080	Sold out to bricks manufactures
7.	Bed Material	800	Used for filling of low-lying area/land filling/ construction purpose/ sell to Cement plant

TABLE 5: HAZARDOUS WASTE GENERATION AND DISPOSAL ESTIMATES

Item	H.W Category /Rule	Quantity	Proposed method of disposal
Used/Spent Oil	5.1(as per HWM Schedule I)	1.3 KLA	Will be given to authorized recycler
Empty Barrels/ Containers/ liners contaminated with hazardous chemicals/ wastes	Covered under The Batteries (Management and Handling) Rules, 2001	7 Nos. (0.1 TPA)	Total 0.1 TPA the lead acid battery or dry battery will be given to authorized recycler having authorization from competent Authority.
E-waste generation	E-waste Management rule 2022	0.3 TPA Computers, laptops, Monitors, printers, and other electronic appliances	Total 0.3 TPA Shall be disposed through authorized recyclers as per e-waste Management rule 2022

2.4 WATER REQUIREMENT & SOURCE

Total water requirement (existing 90 KLD + proposed expansion of 181 KLD) will be 271 KLD (81,300 KLA) out of which 10 KLD required for domestic purpose. The source of water is CSIDCL supply water. However, the company will recharge rain water within plant premises.

To support sustainable water management, the company will implement rainwater recharge systems within the plant premises. These systems are designed to recharge 100% of the runoff potential back into the groundwater.

2.5 POWER REQUIREMENT & SUPPLY

Power requirement will be around 7.5 MW. Power will be met through CPP (80% Coal + 20% Dolochar Based).

2.6 MANPOWER REQUIREMENT

The industry will create employment opportunities for approximately 200 individuals, consisting of 34 Administrative Staff and 166 production staff.

2.7 FIRE FIGHTING FACILITIES

Firefighting facilities are installed across various plant units. Furthermore, all plant units, office buildings, laboratories, and other facilities will be equipped with a sufficient number of portable fire extinguishers for initial fire response. A detailed description of the firefighting system is provided in **Chapter 7**.

2.8 PROJECT COST

The Total cost of the project is **Rs. 959 Lakhs** (Existing cost – Rs 323 Lakhs + Additional cost – Rs 636 Lakhs).

3.0 EXISTING ENVIRONMENTAL SCENARIO

3.1 BASELINE ENVIRONMENTAL STUDIES

Baseline environmental studies were conducted at project site along with 10 km radial distance from the project site. The baseline environmental quality data for various components of environment, viz. Air, Noise, Water, Land were monitored during **winter season (1st December 2024 – 28th February 2025).**

3.2 METEOROLOGY & AMBIENT AIR QUALITY

Summary of the Meteorological Data Generated at Site (1st December 2024 – 28th February 2025)

Predominant Wind Direction	Dec, 2024 to Feb, 2025
First Predominant Wind Direction	E (18.52%)
Second Predominant Wind Direction	ENE (17.78%)
Calm conditions (%)	1.48
Avg. Wind Speed (m/s)	2.37

The status of ambient air quality within the study area was monitored for **Winter season (1st December 2024 – 28th February 2025)** at 8 locations. All these 8 sampling locations were selected based on the meteorological conditions considering upwind and downwind, cross wind directions and reference point. The levels of Respirable Particulate Matter (PM_{10}), Fine Particulates ($PM_{2.5}$),

Sulphur Dioxide (SO_2,), Oxides of Nitrogen (NO_X) and carbon monoxide (CO), Ammonia, Ozone, Benzene and BAP were monitored. The details of Ambient Air Quality Monitoring Results are summarized and given in **Table 6.**

TABLE 6: SUMMARY OF AMBIENT AIR QUALITY RESULTS (PERIOD – 1ST DECEMBER 2024 – 28TH FEBRUARY 2025)

Sr. No.	Location			$PM_{2.5}$	SO_2	NO_2	CO	Ozone	NH_3
			µg/m³	µg/m³	µg/m³	µg/m³	mg/m³	µg/m³	µg/m³
1	Project Site	Min	58.6	20.5	8.4	15.4	0.285	6.2	5.3
		Max	77.5	29.7	11.5	22.5	0.364	9.3	9.5
		Avg	67.9	25.2	9.8	18.6	0.321	7.5	6.8
		98th	75.6	29.6	11.4	22.1	0.359	9.2	9
2	Khuteri	Min	58.7	22.4	8.8	16.6	0.317	6.9	5.7
		Max	77.4	31.2	13.2	22.7	0.417	9.7	8.6
		Avg	70.2	26.7	10.5	19.4	0.365	8.3	7.2
		98th	77.3	30.9	12.7	22.6	0.411	9.7	8.6
3	Somni	Min	65.8	23.4	11.6	18.5	0.463	8.5	7.5
		Max	88.8	36.5	17.4	26.8	0.623	12.7	12.1
		Avg	76.2	30.6	14.2	22.7	0.544	10.6	9.5
		98th	87.7	36.2	17.4	26.3	0.618	12.6	11.7
4	Manki	Min	57.4	22.5	10.3	17.7	0.402	8.1	6.2
		Max	83.1	35.8	14.5	25.8	0.541	12.2	12.2
		Avg	72.5	29.1	12.8	21.4	0.476	10.1	9.2
		98th	81.9	35.2	14.5	25.2	0.532	12.1	11.8
5	Sundra	Min	66.1	21.6	10.7	16.7	0.363	7.6	6.4
		Max	82.7	37.2	15.6	25.1	0.491	11.4	10.1
		Avg	74.6	28.2	13.1	20.5	0.418	9.5	8.6
		98th	81.7	35.6	15.1	24.7	0.485	11.2	10.1
6	Torankata	Min	59.7	21.8	9.6	14.2	0.327	6.8	6.1
		Max	80.6	32.4	13.8	20.7	0.441	10.2	9.7
		Avg	69.3	27.5	11.3	17.4	0.385	8.6	7.6
		98th	79.8	32	13.8	20.3	0.438	10	9.4
7	Tharkurtola	Min	67.5	26.7	13.5	20.5	0.539	9.4	8.3
		Max	85.5	37.6	20.1	28.5	0.693	14.2	13.4
		Avg	77.1	32.2	16.2	24.5	0.611	11.7	10.6
		98th	84.8	37.2	19.4	27.9	0.687	13.9	13
8	Tirga	Min	58.2	18.3	7.7	13.7	0.257	5.5	5.7
		Max	73.6	32.6	10.8	20.4	0.346	8.3	8.6
		Avg	65.8	24.7	9.1	16.7	0.295	6.8	7.3
		98th	72.4	31.2	10.6	20	0.342	8.2	8.6
CPCB Standards			**100 (24hr)**	**60 (24hr)**	**80 (24hr)**	**80 (24hr)**	**2 (8hrs)**	**100 (8hr)**	**400 (24hr)**

3.3 AMBIENT NOISE LEVELS

Ambient noise level monitoring was carried out at the 08 monitoring locations; those were selected for ambient air quality monitoring. The monitoring results are summarized in **Table 7.**

TABLE 7: AVERAGE NOISE LEVELS IN THE STUDY AREA

Sr. No.	Monitoring Locations	Equivalent Noise Level	
		Leq_{Day}	Leq_{Night}
Residential Area			
1	Kuteri	51.6	42.3

Sr. No.	Monitoring Locations	Equivalent Noise Level	
		Leq_{Day}	Leq_{Night}
2	Somni	53.1	43.7
3	Bharregaon	52.7	41.8
CPCB Standards dB(A)		**55.0**	**45.0**
Commercial Area			
4	Manki	56.1	45.6
5	Sundra	54.9	44.5
CPCB Standards dB(A)		**65.0**	**55.0**
Silence Zone			
6	Tharkurtola (Govt. Govt. Higher secondary school)	43.7	35.4
7	Torankata (Govt. Primary School)	45.2	36.8
CPCB Standards dB(A)		**50.0**	**40.0**
Industrial Area			
8	Project Site	58.7	49.2
CPCB Standards dB(A)		**75.0**	**70.0**

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

3.4 SURFACE AND GROUND WATER RESOURCES & QUALITY

3.4.1 Regional Geology

The study area is predominantly underlain by hard rock formations of Precambrian Age. These hard rocks include sandstone, shale, and limestone/dolomite, all of which are part of the Proterozoic Purana rocks of the Chhattisgarh Supergroup. The majority of the study area is dominated by Proterozoic Purana rocks of the Chhattisgarh Supergroup, which include a variety of sedimentary and metamorphic rock types that provide insight into the area's tectonic history.

Geomorphology

All these Geomorphologic structures come under the physiographic unit belonging to Chhattisgarh Basin area. Proterozoic rocks cover majority of the study area. This unit is developed over rocks of Purana sedimentary basin of Chhattisgarh. This unit has extensive cris-crossed fractures and joints. They are having gently sloping erosional surfaces and thin to moderate cover of soil. Along with the above-mentioned geomorphic unit, pediplain covers most prominent part of study area.

3.4.2 Hydrogeology and Aquifer Systems

The Groundwater occurs under the water table in laterite, alluvium, and weathered mantle, and in semi-confined to confined conditions in fractured crystalline and sedimentary rocks. In weathered crystalline rocks, the depth and intensity of weathering control groundwater movement, while fractures, joints, and lineaments influence deeper levels in hard crystalline rocks. Wells in low areas generally have better yields. The Charmuria Formation is the most prolific aquifer, while the Gunderdehi Formation acts as an aquiclude in parts of the area.

The major aquifers present in the study area are

(1) Chandi Limestone

(2) Gunderdehi shale

(3) Charmuria limestone

(4) Chandrapur sandstone with shale interbedded

The pre-monsoon depth to the water level in the phreatic aquifer ranges from 5 to 10 mbgl, while in the semi-confined aquifer, it ranges from 10 to 20 mbgl, as observed in the study area. The post-monsoon depth to the water level in the phreatic aquifer ranges from 3 to 5 mbgl, and in the semi-confined aquifer, it ranges from 5 to 10 mbgl. The yield varies between 0 and 3 liters per second. As per CGWA Categorization of Assessment Units as per Dynamic Ground Water Resources of India the area comes under Semi-Critical category.

Source: *Aquifer Mapping and Management of Ground Water Resources Rajnandgaon District, Chhattisgarh 2018.*

3.4.2 Water Quality

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

A. Groundwater Quality

The analysis results indicate that the pH ranged from 7.04 to 8.2. The Total Dissolved Solids (TDS) ranged from 285 to 351 mg/l. Total hardness was found to be in the range of 118.35 to 174 mg/l. The fluoride concentration was found to be in the range of 0.3 to 0.75 mg/l. The nitrate and sulphate concentrations were found in the range of 5.09 to 8.62 mg/l and 19.4 to 51.86 mg/l, respectively.

The chloride concentration was found in the range of 63.46 to 112.16 mg/l. The Total Suspended Solids (TSS) concentration was found to be below the detection limit (DL = 10 mg/l) at all sampling locations. Heavy metals such as Arsenic (As), Lead (Pb), and Nickel (Ni) were below detection limits (BDL). Iron was found in the range of 0.13 to 0.66 mg/l.

B. Surface Water Quality

The analysis results indicate that the pH ranged between 7.56 – 8.12. The pH of water indicates whether the water is acidic or alkaline. The TDS was observed to be 301 – 368 mg/l, which is within the permissible limit of 2000 mg/l.

The total hardness recorded was in the range of 147.67 – 188.86 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 71.28 – 104.25 mg/l and 27.44 – 39.32 mg/l, respectively.

Dissolved oxygen (DO) refers to the amount of oxygen (O_2) dissolved in water. Because fish and other aquatic organisms cannot survive without oxygen, DO is one of the most important water quality parameters. The reported value of range of 5.8 – 6.2 mg/l. Phosphorus (as PO_4) is an important nutrient for plants and algae. Because phosphorus is in short supply in most fresh waters, even a modest increase in phosphorus can cause excessive growth of plants and algae that deplete dissolved oxygen (DO) as they decompose. PO_4 concentration was found to be in the range of 0.21 – 0.31 mg/l. COD ranges from 11.72 – 17.95 mg/l and BOD ranges from 2.31 – 3.12 mg/l.

C. Bacteriological Characteristics

Coliform group of organisms are indicators of faecal contamination in water. All surface water samples were found to be bacteriologically contaminated. Presence of total coliforms in surface water indicates 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.

LOCATION WISE WATER QUALITY ASSESSMENT

S. N.	Locations	WQI	Quality	Remark
1.	Project Site	60.64	Good	**Assessment of water quality based on the above physico-chemical parameters revealed that the quality of groundwater samples was good.**
2.	Kuteri	52.99	Good	
3.	Somni	52.29	Good	
4.	Jhola	58.76	Good	
5.	Manki	59.83	Good	
6.	Sundra	51.25	Good	
7.	Tharkurtola	49.94	Good	
8.	Torankata	61.48	Good	

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 28th March 2024 satellite image with reference to Google Earth data. In order to strengthen the baseline information on existing land use pattern, the following data covering 10 km radius is approximate about 21° 0'47.40"N to 21°11'58.19"N latitude and 81° 0'46.31"E to 81°12'45.62"E longitude and elevation 268 to 377 meters are used as per the project site confined within that area.

The Land Cover classes and their coverage are summarized in **Table 8.**

TABLE 8: LU/LC AND ITS COVERAGE WITHIN 10 KM RADIUS

LU/LC Classification System				
S. No.	**Level-I**	**Level-II**	**Area (Sq. Km²)**	**Percentage (%)**
1	Built-up land	Settlement	16.88	4.92
		Industrial Settlement	3.56	1.04
		Road Infrastructure	4.15	1.21
		Railway Line	1.48	0.43
2	Agricultural Land/ Crop Land	Single Crop	201.45	58.75
		Double Crop	81.43	23.75
3	Forest Area	Reserved Forest	0.51	0.15
4	Scrubs/Wastelands	Open Scrub	7.84	2.29
		Wasteland	4.18	1.22
5	Waterbodies	River/Nala/Stream/Canal	7.51	2.19
		Dam/Pond/Lake	13.46	3.93
6	Mine Area	Stone Quarry	0.47	0.14
		Total	**342.92**	**100**

3.6 SOIL QUALITY

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

Parameters	Unit	Results	Fertility Status
pH	-	6.42 – 7.56	Neutral
Organic Carbon	%	0.68 – 1.12	More than sufficient
Nitrogen	Kg/hec	230.50 – 789.12	Better to sufficient
Phosphorus	Kg/hec	21.69 – 39.63	Medium to average sufficient
Potassium	Kg/hec	184.38 – 456.28	Less to medium
Sodium Absorption Ratio	-	0.80 – 2.69	Excellent (Little or No Hazard)

3.7 BIOLOGICAL ENVIRONMENT

Floral composition in Study Area:

Total 109 plant species were enlisted within the study site out of which habitat wise details are given as follows: Trees: 61, Shrubs: 23, Herbs: 12, Climbers: 05, Grasses & Bamboos: 7, and Parasite: 1 species observed in the study area.

Endemic Plants of the Study Area

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

RET (Rare, Endangered and Threatened species) Status

Flora Details:

According to IUCN Status report 2024-2 out of total 109 plant species identified within study area among the observed species Tectona grandis Linn. is endangered (EN) while *Aegle marmelos* (L.) Corrêa is near threatened (NT) as per IUCN RED list. The other identified plant species in the study area belongs to least concern (LC), data deficient (DD) and not evaluated (NE), as per IUCN status report 2024-2.

Fauna Details:

- **As per IUCN RED (2024-2) list**

Among the reported animals, the categorization of species as per IUCN is as follows:
Mammals: 9 species are observed in the study area which are Least Concern as per IUCN.
Reptiles: *Python molurus* – Indian Python (Near Threatened), *Varanus bengalensis* - Bengal Monitor Lizard (Near Threatened)
Avifauna: All species are Least Concern as per IUCN.

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

Among mammals: Jackal (*Canis aureus*), Indian fox (*Vulpes bengalensis*), Indian Wild boar (*Sus scrofa cristatus*), Common Mongoose (*Herpestes edwardsi*), are protected in Schedule–I. whereas, Common Langur (*Semnopithecus entellus*), protected in Schedule-II, While Palm squirrel (*Funambulus pinnati*), and Black-naped hare (*Lepus nigricollis*) does not given protection under Schedules of Wild Life Protection Amendment Act 2022.

Among the Herpetofauna: Bengal Monitor Lizard (*Varanus bengalensis*), Indian Cobra (*Naja naja*), Indian Python (*Python molurus*) and Common Rat Snake (*Ptyas mucosa*) were provided protection as per Schedule-I; While Common Indian Krait (*Bungarus caeruleus*), Indian Toad (*Bufo parietalis*) were provided as per Schedule – II of Wildlife protection (Amendment) Act 2022 and as amended**.**

Among the Avifauna: All of the Avifauna were observed in the study area included in Schedule-II as per wildlife protection (Amendment) Act 2022

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

3.8 SOCIO-ECONOMIC ENVIRONMENT

Information on socio-demographic status and the trends of the communities in the 10 km radius was collected through primary social survey and secondary data collection from census 2011, District Census hand book 2011 & GeoIQ 2021. Summary of the socio-economic status of the study area is given in **Table 9.** Details regarding education and infrastructure facilities 2011 are presented in **Table 10**.

TABLE 9 (A): SUMMARY OF SOCIO-ECONOMIC ENVIRONMENT OF VILLAGES WITHIN STUDY AREA

Total households	23214
Total population	112455
Male Population	56514
Female population	55941
SC Population	12986
ST Population	7961
Total literates	76285
Total Illiterates	36170
Total workers	56999
Total main workers	43414
Total marginal workers	13585
Total non-workers	55456

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

TABLE 9 (B): PREDICTED POPULATION DETAILS IN STUDY AREA (2021)

Zones	Total Population	Total Male	Total Female
0-2 km	5871	2980	2891
2-5km	28165	14100	14038
5-10km	88982	45236	43745
10 km	123018	62316	60674
In %		50.66	49.34

***Source**: GeoIQ website (https://geoiq.io/places/Chhattisgarh/zibvgpcXAF)*

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

Infrastructure facilities	**Availability (In percentage/%) As per year 2011, Census Dist Rajnadgaon & Durg Chhattisgrh**
Educational Facilities	100
Drinking water	100
Road	98.64
Power	100
Communication	90.54
Transportation	94.59
Govt. PHC & SC	45.95
Bank & Society	14.86
Drainage	50
Recreation	14.86

***Source**: Primary census abstract 2011, District Rajnandgaon and Durg, State Chhattisgarh.*

SALIENT OBSERVATION OF THE SOCIO-ECONOMIC SURVEY

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

1. **Agriculture (Cultivation, Farming)**:

- Agriculture remains the primary source of livelihood in the study area, highlighting the community's dependence on traditional farming practices and seasonal cycles.
- Urban areas shift toward non-agricultural work in services, including hotels and tourism.
- Daily wages for male agricultural workers range from ₹300 to ₹500, while female workers earn between ₹250 and ₹350.

2. **Agricultural Production**:

- Dominant crops include rice, wheat, pulses, and oilseeds; horticulture and cash crops contribute to income diversity.
- Improved infrastructure and modern techniques are required to boost productivity.

3. **Animal Herding Including Livestock Farming**:

- Agricultural production in the study area primarily supports subsistence needs, with a portion of the yield entering local markets. Survey findings highlight the continued reliance on traditional farming methods, though a gradual adoption of modern techniques is evident among progressive farmers aiming to enhance productivity.
- Local mandis and cooperatives facilitate the sale of agricultural produce, but inadequate storage infrastructure often leads to post-harvest losses.

4. **Economic Benefits**:

5. The project will generate direct employment opportunities in construction, operations, and maintenance, benefiting the local workforce. Additionally, the increase in demand for local goods and services will create indirect employment, further enhancing local livelihoods.

6. **Social and Public Amenities**:

- Population Density: The area within a 10 km radius of the the proposed Brownfield project site has a moderate population density. Villages are typically small to medium-sized, with populations ranging from a few hundred to a few thousand residents.
- **Healthcare**: The study area is served by one primary health center and approximately 21 primary health sub-centers within a 10 km radius. Additionally, several hospitals are located in the vicinity, including CAMC Hospital, Up-Swastha Kendra Baghera, Government District Hospital in Basantpur, Shukla Multispeciality Hospital, and Samda Superspeciality Hospital, which provide essential healthcare services to the local population.
- **Education**: A detailed survey of the project area and its surroundings revealed that every village has access to pre-primary schools, ensuring foundational education. For higher education, students rely on institutions located within a 10 km radius, such as Ashoka Institute of Technology & Management and Sanskar City International School, offering diverse academic opportunities.
- **Water Supply**: The study area has multiple water bodies, including rivers, canals, lakes, and ponds, with Shivnath River, Parri Nadi, and various canals playing a crucial role in meeting the

water needs of the community. Additionally, borewells, hand pumps, and covered wells serve as key sources of drinking and domestic water supply.

- **Transportation**: The area is connected by NH-53 (1 km North) and SH-5 (6.63 km WNW), along with local roads such as the Thakurtola-Torankatta village road, which serves as a primary route for daily commuters. However, road conditions in several sections are poor, leading to inconvenience for residents, particularly during monsoon seasons..

7. **Cultural and Social Issues**:

- The cultural fabric of the study area is rich and diverse, with a blend of tribal and non-tribal communities.
- Traditional festivals, fairs, and rituals are integral to the social life of the inhabitants. Cultural practices are deeply rooted in the agrarian lifestyle, with celebrations often linked to agricultural cycles.
- The project is likely to attract a workforce from other states, leading to migration into the area.

8. **Development Needs**:

- Strengthening infrastructure (roads, electricity, sanitation), enhancing education and healthcare access, and supporting vocational training programs are crucial for sustainable development.
- Addressing sanitation and public health issues, particularly in rural areas, remains a priority.

9. **Potential for Growth**:

- The project will generate direct employment opportunities in construction, operations, and maintenance, benefiting the local workforce. Additionally, the increase in demand for local goods and services will create indirect employment, further enhancing local livelihoods.
- The infusion of capital, alongside improvements in infrastructure, is expected to stimulate economic activities across the study area, fostering growth and elevating the standard of living for the local population.
- The proximity of several industrial units, including Hitec Panels Pvt. Ltd., Kamal Solvent Extractions Pvt. Ltd., and Godawari Power & Ispat Ltd., within a 10 km radius will also enhance synergies and create a conducive environment for industrial development.

3.8.1 Awareness and opinion of the respondents about the project

Existing Awareness:

The primary survey indicated that most residents in the core zone villages, including Thakurtola, have limited awareness of the proposed expansion. A considerable portion of the population is not fully informed about the project's scope, objectives, and potential benefits. This highlights the need for enhanced outreach initiatives to ensure effective information dissemination across all sections of the community.

Curiosity and Interest:

Despite limited awareness, local stakeholders, including community leaders and residents, exhibited a genuine interest in understanding the project's broader implications. Many expressed curiosity about potential benefits such as job creation, infrastructure development, and enhanced economic opportunities. This indicates a positive attitude and a willingness to engage constructively with the project once they receive detailed and transparent information.

Concerns and Misconceptions:

The survey found that many people were worried about the project's impact on the environment, especially the possibility of more air and water pollution. Some also doubted whether the project would truly bring benefits like jobs and better infrastructure for the local community. There were also concerns about whether these benefits would be shared fairly among everyone.

Suggestions and Expectations:

During discussions with the local community, residents raised important concerns about education, healthcare, jobs, water supply, and recreational spaces. These issues have been carefully analyzed to create practical recommendations, ensuring the project meets both immediate needs and long-term social and economic goals.

3.8.2 Interpretation

The socio-economic analysis highlights both challenges and opportunities in the project area. Population growth requires robust planning in infrastructure, healthcare, education, and water management to meet future demands. Community awareness about the project is limited, though there is curiosity about its potential benefits, especially regarding employment and development. Educational and healthcare facilities are inadequate, with limited access to quality education and healthcare services. Water resources, though abundant, face issues of accessibility and quality, necessitating conservation and treatment measures. Residents also seek improvements in roads, sanitation, and recreational facilities. Addressing these challenges can drive sustainable development and significantly improve the local population's quality of life.

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 AIR ENVIRONMENT

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

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

Presentation of Results

The model simulations are done for the air pollutants due to existing and proposed project. The maximum ground level concentrations (GLCs) for particulate matter and gaseous emission of SO_2, NO_x due to existing project has been carried out using hourly meteorological data. The existing short-term modeling results are presented in **Table 11** and for the short-term simulations for point emission sources, the concentrations were estimated around 441 receptors to obtain an optimum description of variations in concentrations over the site in 10 km radius covering 16 directions. The predicted incremental concentrations of above parameters are as follows:

TABLE 11: PREDICTED INCREMENTAL GROUND LEVEL CONCENTRATIONS

Pollutant	Incremental Concentration (µg/m3)	Distance (m)	Direction
PM_{10}	2.75	1000	W

Pollutant	Incremental Concentration (µg/m3)	Distance (m)	Direction
$PM_{2.5}$	1.12		
SO_2	7.18		
NO_x	7.18		

TABLE 12: DETAILS OF AIR POLLUTION CONTROL SYSTEM/ MITIGATION MEASURES

S. No.	Facilities	Air Pollution Control equipment	Emission Level
1.	Submerged Electric Arc Furnace	Fume Extraction system with bag filters (Stack Height 30 m)	PM < 30 mg/Nm^3 SOx < 100 mg/Nm^3 NOx < 100 mg/Nm^3
2	FBC Boiler	Electro Static Precipitator (ESP) (Stack Height 60 m)	PM < 30 mg/Nm^3
		Lime dosing	SOx < 100 mg/Nm^3
		Low NOx burners with 3-stage combustion, flue gas recirculation and auto combustion control system will be provided	NOx < 100 mg/Nm^3

Additional Measures to reduce/control pollution control

- Roads will be frequently sprinkled with water.
- Most of the materials like Coal, Dolochar, Mn ore, and Iron ore will be stored under covered shed.
- In case of storage of Coal, Dolochar, Mn ore, and Iron ore in open, it will be covered by tarpaulins to prevent spread of dust from it during transportation.
- Regular sweeping of road by using vacuum cleaner will be carried out
- Regular maintenance of vehicles and machineries will be carried out in order to control emissions.
- Green belt development will be taken up all along the roads, plant premises etc.
- Protective appliances will be provided to all the workers exposed in dusty atmosphere.
- Avoiding overloading of the trucks.
- Workers will be equipped with all personal protective devices like Gum Boot; hand gloves; Safety helmet; Safety goggles, earplugs at work place.
- By controlling the speed of the truck.
- Proper gradient of roads to reduce cumulative noise.
- Transportation of materials will be limited to day hours only.
- Periodical maintenance of process machinery.

4.2 NOISE ENVIRONMENT

➢ Day and night sound pressure levels are often used to describe the community exposure. The nearest habitation is Thakurtola Village which is at 0.62 Km in North North East direction from project site and resultant noise level at this village are 43.7 to 45.2 dBA for daytime and 35.4 to 36.8 dBA for nighttime..

- Full body vibration and hand-arm vibration impacts will be felt by operators sitting in heavy machineries and operating vibrating devices, respectively. Necessary precautions in workplace environment shall be exercised to reduce workplace vibration impacts.

Mitigation Measures

- Dense plantation will help to reduce noise pollution in the following ways –
- The sounds that are produced by the leaves helps muffle the noise.
- Hedging makes a thick front of the wall and blocks the noise.
- Thick tree trunks create a sound-absorbing buffer zone.
- They help in filtering the noise.
- The research also concluded that a 20 m dense plantation can give a noise reduction of 6 dB (A).
- Equipment will be standard and equipped with silencer. The equipment will be in good working conditions, properly lubricated and maintained to keep noise within permissible limits.
- Most of the equipment's will be placed in closed room
- Equipment's will be placed on acoustic floor to reduce vibration and noise
- High noise zone will be marked, and earplugs will be provided to the workmen near high noise producing equipment.
- Use of PPES awareness program will be provided to all workers.
- Regular noise & vibration monitoring will be carried for all equipment's to check compliance with prevailing rules.
- Proper shifting arrangement will be made to prevent over exposure to noise and vibration. Speed limits will be enforced on vehicle.

4.3 IMPACT ON WATER ENVIRONMENT

The proposed expansion 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. Total water requirement will be 271 KLD (89,430 KLA). Total water required for domestic purposes will be 10 KLD. There will be no industrial effluent discharged outside the plant premises due to existing as well as proposed units. Domestic wastewater will be generated treated in STP and treated water will be used for green belt and dust suppression purposes. M/s. Agrawal Structure Mills Pvt. Ltd. will maintain zero discharge condition from the plant all the time throughout the year.

The various control measures that will be adopted are:

Mitigation Measures

- The project will have **17 KLD ETP** including for treat Industrial waste water and **8.5 KLD** STP for treatment of domestic waste water. Treated Industrial water from ETP will be used in process as recycle and dust suppression. Whereas, treated domestic wastewater from STP will be used in green belt. The project site is located in an area classified as '**Semi-critical zone** as per the guidelines of CGWA, moreover the source of water will be surface water.
- Total 17 KLD treated water will be reused/recycled in process.
- 7 KLD treated domestic water through STP will be used green belt development.
- Garland drain will be provided to all stockyards area to prevent run-off containing suspended solids by routing the storm water drains through catch pits/sediment traps.
- Any spillage of hazardous waste (used oil/spent oil, ETP Slag, etc.) or contamination will be immediately removed.

- Periodic ground water monitoring at project site as well as nearby villages will be carried out.
- All stock piles will be on pucca flooring to prevent for any ground water contamination.
- It is proposed to build 5 nos. of recharge well and 2 Nos of Recharge Pit inside the project premise.
- **Proposed:** Recharge well – Total 5 Nos. RWH Structure: 1 m (dia) × 3 m (depth) will be implemented.
- **Proposed:** Recharge Pit – Total 2 Nos. RWH structure: 3 m × 2 m × 2 m will be implemented.

4.4 IMPACT ON BIOLOGICAL ENVIRONMENT

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

S. No.	Project Aspects / Activities	Residual Impacts	Mitigation Measures Suggested
1.	Transportation, unloading & storage of Material and Movement of vehicle inside plant, Dust and sound generation due to proposed expansion activities	Impact on nearby vegetation and avifauna in a scale of 3 out of 5 due to proposed expansion activity.	Thick greenbelt will be developed along periphery of the project site in order to provide buffer between plant fugitive emission and nearest vegetation.
2.	Gaseous emission from Stack, Movement of vehicle inside plant and Raw material & finished product transportation, Product manufacturing	Decline in photosynthetic activities, Stomatal index may be minimized, Crop yield may be reduced.	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. In expansion project is proposed at total 5.280-hectare land out of which it is proposed to develop 33% (1.740 ha.) area as greenbelt. In the above 1.740 Hectare land it is proposed to develop a greenbelt by total plantation of 4350 Trees. This will be developed within one-year time from completion of the expansion. At present 100 Nos no. of trees are alive within plant premises. Indigenous species for plantation is recommended along the approach road and plantation under CER. Thus, the impact due to proposed expansion project would be minimal as project activity will be carried out within the plant boundary limit with proper control measures.

4.5 IMPACT ON SOCIO-ECONOMIC ENVIRONMENT

Positive Impacts:

Employment and Economic Growth

The project will generate 34 administrative jobs, providing stable employment in management, finance, and operations. Additionally, 166 production roles will create opportunities for skilled and semi-skilled workers, improving local livelihoods.

Beyond direct employment, the project will support indirect job creation in transportation, retail, supply chains, and local services, fostering economic growth and enhancing community well-being.

Enhanced Local Economy

The increase in employment and business opportunities will stimulate the local economy through higher disposable incomes and increased demand for goods and services.

Skill Development Training programs for local residents, especially youth, will enhance their employability in specialized roles in the explosives and chemical manufacturing sectors

Infrastructure Development: Improved road connectivity will facilitate smoother access to regional markets and services, enhancing the mobility of local residents. Upgraded water supply, sanitation systems, and housing projects will significantly improve the standard of living for the local population.

Education and Healthcare:

- The project will generate demand for additional educational facilities, likely leading to the establishment of new schools and colleges.
- Healthcare infrastructure will also see improvements to meet the rising needs of a growing population.

Cultural Integration: The arrival of workers from other regions may lead to cultural exchange, which could positively influence the local community's cultural dynamics.

Women's Empowerment Engaging women in auxiliary services (e.g., catering, housekeeping, and packaging) and skill-based training initiatives will provide them with income-generation opportunities. And Collaboration with SHGs for micro-business ventures can improve financial independence among women.

Negative impacts.

- The steel plant operations will generate emissions, effluents, and solid waste, which can lead to air, water, and soil pollution. This pollution can harm local biodiversity, agriculture, and human health.
- The influx of workers and rapid industrialization may disrupt local social structures and lead to conflicts over resource use and cultural differences. It may also lead to an increase in the cost of living, affecting the local population.
- Industrial activities pose health and safety risks to both workers and local communities. Exposure to pollutants and industrial accidents can lead to serious health issues and fatalities.
- Construction and operational activities of the plant can generate significant noise, which can disturb local communities and wildlife.
- Increased transportation of raw materials and finished products can lead to traffic congestion and a higher risk of road accidents.

Mitigation Measures

- Advanced equipment like Electrostatic Precipitators (ESP), bag filters, and Low NOx burners should be used to control air pollution. Effluents should be treated with Effluent Treatment Plants (ETPs) and regularly monitored for compliance. Solid waste management should focus on reducing, reusing, and recycling materials, with proper disposal of hazardous waste.

- Ensure that benefits from the project, such as employment and social programs, are distributed equitably among local residents to prevent social tensions.
- Conduct regular consultations with local communities to understand their concerns and include them in decision-making processes.
- Strict health and safety protocols will be implemented, including the use of personal protective equipment (PPE), regular safety drills, and safety training for all workers. Regular health check-ups and health awareness programs will be provided for workers and local communities to detect and address health issues early.
- Use noise barriers, maintain equipment to reduce noise, and schedule high-noise activities during daytime hours to minimize disruption.
- Develop a traffic management plan that includes designated routes for heavy vehicles, staggered timings to avoid peak hours, and coordination with local traffic authorities.

5.0 ANALYSIS OF ALTERNATIVES (SITE AND TECHNOLOGY)

5.1 SITE SELECTION

The proposed expansion project activities will be carried out at total 5.28 Ha land at Village - Thakurtola, Tehsil and District - Rajnandgaon, Chhattisgarh. The total land area is 5.28 hectares. The total land is acquired by company. The entire land is already diverted for industrial purpose. No additional land proposed to be acquired. The Khasra Number of the project area are 376, 377/1, 377/2, 383/1, 384, 385/2, 385/3. Greenbelt area 33% (i.e., 1.740 Ha.) will be kept unchanged. The land already sufficient flat land, free from major undulations and sparse vegetation is available within the plant premises.

The project is an expansion on a previously acquired site, hence, no alternative locations is applicable. The existing land was strategically chosen and already possesses the necessary foundational infrastructure, making it the optimal and only suitable site for expansion. Therefore, the current location remains the sole viable option for this expansion project, ensuring continuity, efficiency, and alignment with the original planning and development goals.

5.2 SELECTION OF ALTERNATIVE TECHNOLOGY

The entire project related activities are already discussed in **Chapter 2**. The following aspects of the project are dealing with the study of alternative technology in brief involved in each of the proposed products and choice of the technology based on environmental applicability, technical and financial viability. Selection of suitable production process and the capacity of the production units form the nucleus around which the basic concept of a plant is developed. While the selection of a process takes into account factors like type of product, availability of local raw materials, process status, specific energy consumption, level of energy required, environment, and pollution etc., the capacity selection of major units would depend on the volume of production, available unit sizes, economies of scale, etc.

5.3 CONCLUSION

The proposal involves a Submerged Electric Arc Furnace (SAF) and a captive power plant utilizing FBC coal and dolochar. India has several operational units employing SAF technology. The captive power plant ensures localized electricity generation, minimizing transmission losses that occur with centralized power systems. Both the production process and pollution control measures have been thoroughly tested and successfully implemented in India.

6.0 ENVIRONMENTAL MONITORING PROGRAM

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

Additionally, as the proposed project becomes operational, an NABL/MoEFCC accredited third-party laboratory will be engaged to monitor all environmental components in accordance with CPCB/CECB norms. The company has allocated a capital cost of Rs. 29 Lakhs and a recurring cost of Rs. 8.78 Lakhs for the Environmental Monitoring Program.

7.0 ADDITIONAL STUDIES

7.1 PUBLIC CONSULTATION

The Draft EIA-EMP report for the proposed brownfield project has been prepared in accordance with the Standard Terms of Reference (ToR) issued by the Expert Appraisal Committee (EAC) (Industry-I), MoEF&CC, New Delhi.

The report has been submitted for the public consultation process as per the provisions of the EIA Notification, 2006, and its subsequent amendments. Following the completion of the public consultation, the concerns expressed and the commitments made by the project proponent during the public hearing will be integrated into the final EIA-EMP report for submission to secure Environmental Clearance.

7.2 RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

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

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

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

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

8.0 PROJECT BENEFITS

- M/s. ASMPL will also support social welfare activities under CSR obligation under companies act.
- A provision of Rs.10 Lakhs is made under CER.
- It is estimated that **200** additional people will get direct employment and indirect employment will be approx. **150 persons**.

Proposed Social Welfare Arrangement

M/s. Agrawal Structure Mills Pvt. Ltd. is also committed to supporting social welfare activities. These activities will focus on strengthening the relationship between the project authorities and the local community in the vicinity of the project area. In alignment with the CSR policy, M/s ASMPL is currently involved in and will continue to carry out community welfare initiatives in the following areas:

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

The project proponent will comply with its obligation for CSR as per Company's Act too. Corporate Environment Responsibility (CER) value of **Rs. 10** Lakhs will be spent for the social infrastructure development.

9.0 ENVIRONMENTAL MANAGEMENT PLAN

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

- Overall conservation of environment.
- Minimization of natural resources and water.
- Ensure effective operation of all control measures.
- Monitoring of cumulative and longtime impacts.
- Ensure effective operation of all control measures.
- Control of waste generation and pollution.

The company will invest about **Rs. 170 Lakhs,** capital cost for the Environmental Management Plan and spent about **Rs. 12 lakhs**. recurring cost per year for operation and maintenance.

10.0 CONCLUSION

The proposed expansion project of M/s. Agrawal Structure Mills Pvt. Ltd. will be beneficial for the overall development of the nearby villages. In line with the economic policies of the Government of India and the National Steel Policy, India aims to achieve a steel production capacity of 300 million tonnes per annum, significantly increasing from the current capacity of approximately 125 million tonnes per annum. To support this vision, the Government of Chhattisgarh has introduced its Industrial Policy (2019–2024), which encourages the establishment of steel projects utilizing locally available resources.

The proposed expansion project aligns with these strategic policies, relying on domestic iron ore supplies from NMDC and other mines, Manganese Ore from MOIL, coal from SECL, and a captive power source. The required technology is well-established, with all necessary machinery and skilled manpower readily available in the region. Additionally, critical infrastructure, including land, water, transport, and labor, is sufficiently accessible to support the project's smooth execution.

The project is committed to environmentally sustainable practices, ensuring particulate matter emissions remain below 30 mg/Nm^3, adopting a zero liquid discharge system, and achieving 100% utilization of solid waste for beneficial applications. The project site is located in an environmentally safe area, with no critically or severely polluted zones within a 15 km radius.

A greenbelt will be developed on 33% of the project land, while 100% of the rainwater within the premises will be harvested for plant operations and groundwater recharge. Employment opportunities will prioritize local communities, and Corporate Environmental Responsibility (CER) activities will be carried out based on public input. Furthermore, Corporate Social Responsibility (CSR) initiatives will align with the priorities set by the district administration and local panchayats.

In conclusion, with the effective implementation of pollution control and mitigation measures, the project is not expected to cause any significant adverse environmental impact. Instead, it will help bridge the steel demand-supply gap, stimulate regional economic growth, and generate societal benefits.

11.0 DISCLOSURE OF CONSULTANTS

The environmental studies for the proposed expansion project of Agrawal Structure Mills Pvt. Ltd. were conducted by M/s. Anacon Laboratories Pvt. Ltd. (ALPL), Nagpur. Established in 1993 as an analytical testing laboratory, ALPL has grown into a leading environmental consultancy firm in Central India, supported by a state-of-the-art testing lab for environmental and food analysis. The team comprises experienced former government scientists and highly skilled young scientists with expertise in various fields. Recognized by the Ministry of Environment & Forests, New Delhi, ALPL is accredited by the Quality Council of India (QCI) for conducting environmental studies, holding Accreditation Certificate No. **NABET/EIA/2326/RA 0304_Rev.01**, **dated March 13, 2024**, valid until **September 29, 2026.**