SUMMARY
OF
ENVIRONMENTAL IMPACT ASSESSMENT
AND
ENVIRONMENTAL MANAGEMENT PLAN
OF

EXPANSION OF INTEGRATED STEEL PLANT

from 0.4785 to 0.9285 MTPA Finished steel products & 1.0 MTPA DI pipes (0.466 MTPA to 2.012 MTPA crude steel), (Project area expansion from 38.680 Ha to 84.021 Ha)

AT

VILLAGE – KOPEDIH AND ANJORA
TAHSIL & DISTRICT – RAJNANDGAON, CHHATTISGARH

(Existing Area: 38.68 ha, Proposed Area: 45.341 ha, Total Area: 84.021 ha)

Project Proponent:

M/s KALYANI ISPAT LIMITED

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CIN: U27100CT2021PLC012353

ToR granted: Letter no. IA-J-11011/1172/2007-IA-II(IND-I) dated 13-01-2025
Project as per Schedule of EIA Notification 2006: 3(a), 2(a), 2(b), 3(b), 4(b), 1(d)

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SUMMARY

The generic structure of environmental impact assessment document given in Appendix III of the EIA Notification 2006 requires Chapter 11 to cover overall justification for implementation of the project and explanation of how, adverse effects have been mitigated. Furthermore, the Appendix IIIA of the EIA Notification 2006 specifies the necessary contents of the summary, which have been included in this chapter.

1.0 INTRODUCTION

1.1 General background

The company "Kalyani Ispat Limited" is a public company. It was incorporated on 03 November 2021 under The Companies Act 2013 having Corporate Identification Number [CIN] U27100CT2021PLC012353. It was established with an objective to set up an integrated steel plant along with power plant.

Kalyani Ispat Limited [KIL] obtained Environmental Clearance vide letter no. IA-J-11011/1172/2007-IA-II(IND-I) dated 08/05/2024 from Ministry of Environment, Forest & Climate Change. Environmental clearance was obtained for a greenfield Steel Complex to produce sponge iron (660,000 Tonnes per annum [TPA]); mild steel billets (465,696 TPA); rerolled steel products through hot charging and through reheating furnace (478,500 TPA); iron ore pellets (1,200,000 TPA); submerged arc furnace to produce silico manganese (36,000 TPA) and/ or ferro manganese (46,000 TPA) and/ or ferro silicon (22,500 TPA) and/or pig iron (63,000 TPA); captive power of 75 MW (50 MW through waste heat recovery boiler [WHRB] and 25 MW through Circulating Fluidised Bed Combustion [CFBC]); pipe mill 155,100 TPA; galvanized mill (155,100 TPA) and fly ash bricks (41,500 TPA) located at village Kopedih, Tehsil & District Rajnandgaon, Chhattisgarh. The area of the plant is 38.680 hectares [ha]. Consent to Establish was obtained from Chhattishgarh Environment Conservation Board [CECB] dated 29.04.2024.

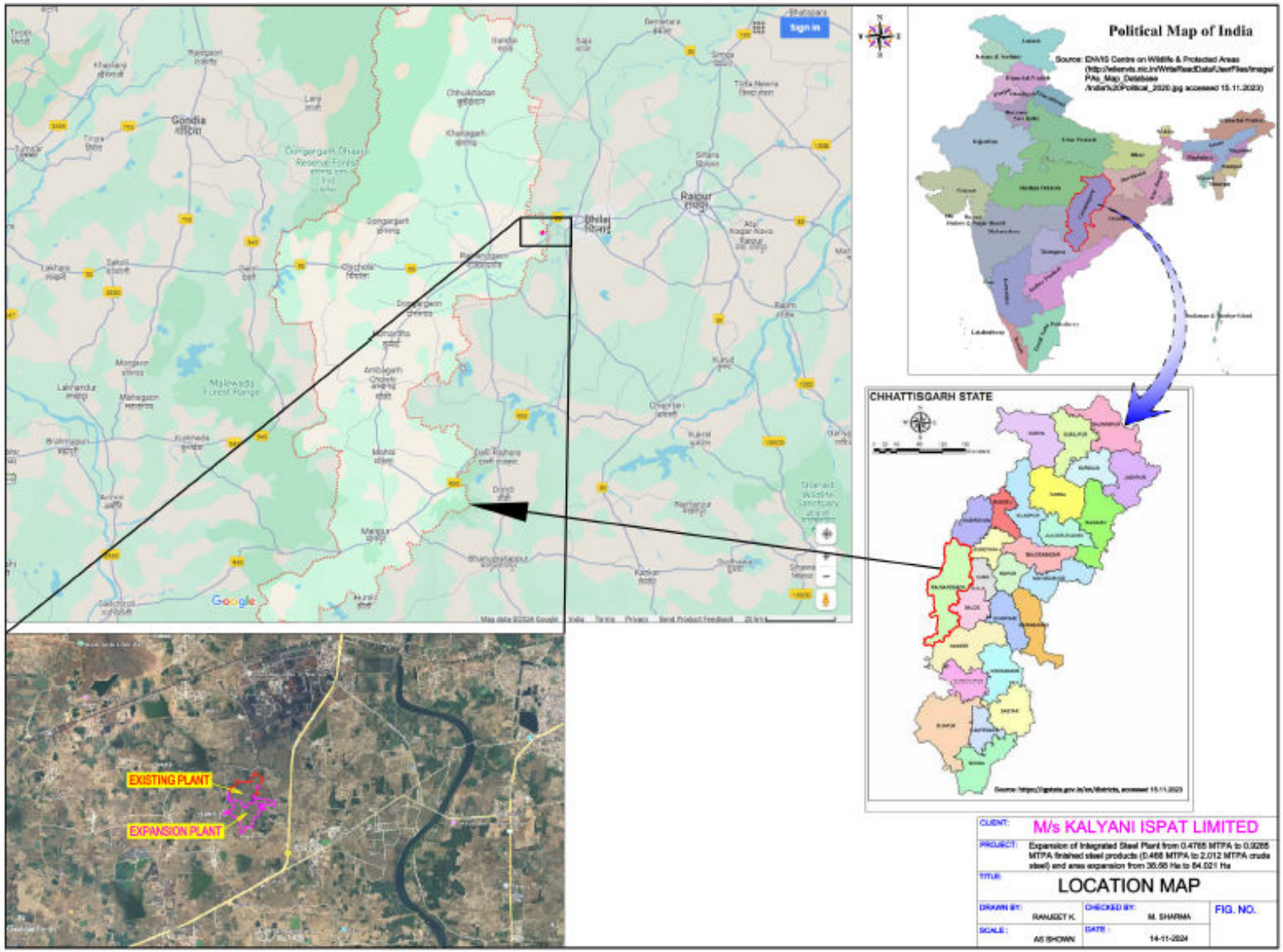
Now, M/s Kalyani Ispat Limited is proposing to expand its existing steel plant. It plans to enhance and revise the existing facilities as well as add pelletisation plant with iron ore beneficiation, steel melting shop, blast furnace, rolling mill, sinter plant, coke oven, ferro chrome, power plant, fly ash brick plant, oxygen plant, DI pipe plant, Cement plan (grinding unit), lime calcination plant, coal washery & producer gas plant and various other facilities. The area will expand from 38.680 to 84.021 hectares at Villages Kopedih and Anjora, adjoining to the existing plant.

The expected cost of the expansion project will be Rs. 5810 crores.

1.2 Location and communication

The proposed project is located in Village Kopedih and Anjora, Tehsil & District Rajnandgaon, Chhattisgarh. The location map is shown in **Fig 1.**

FIG 1: LOCATION MAP



The coordinates of the plant area based on Google Earth as on 07.11.2024 fall between latitude 21°9'36.97"N to 21°10'15.87"N and longitude 81°11'31.84"E to 81°12'18.01"E.

Road: The project is well connected to all weather road. The project site can be reached through NH-53 which is 0.3 Kms in east direction from the site. Nearest town is Durg located at a distance of 4.1 km in east direction.

Nearest Railway: Rasmara Railway Station at 3.7 kms in north north-east direction.

Nearest Airport: Raipur at 54.7 kms in east direction, aerially.

2.0 PROJECT DESCRIPTION

2.1 Plant layout

Total project area of existing plant is 38.680 ha (95.58 acre) and expansion area shall be 45.341 ha (112.04 acre). The total plant area after expansion shall be 84.021 ha (207.62 acre). Out of this total land, 35.3 hectares shall be under plant & facilities; 2.73 hectares under stock yards, 0.38 hectares for administration & other buildings, 2.66 hectares for water reservoir, 6.041 hectare for open space, 1.29 hectares for truck parking and 7.89 hectares for roads and railway siding. Green belt will comprise 27.73 hectares, which is 33% of the project area.

2.2 Process Description

(1) Direct reduced iron [D.R.I.] kilns, Existing 0.66 MTPA, Proposed 1.7895 MTPA, Total 2.4495 MTPA: There will be total 8 nos. X 500 TPD + 6 nos. X 100 TPD kilns. Main raw materials will be iron ore/ pellets, coal and dolomite. They will be fed to the ground hoppers with the help of pay loaders and tippers. They will be carried away by belt conveyors to the crusher house and thereafter fed to kiln. Iron ore will be reduced by heating with coal in the rotary kiln at a temperature of about 1000°C. After reduction, products will be cooled in a drum type rotary cooler. Product will then be separated into D.R.I. or sponge iron and char by magnetic separation. In rotary cooler, product will be cooled by indirect water spray.

(2) Steel melting shops, Existing 0.466 MTPA, Proposed 0.466 MTPA, Total 0.932 MTPA : Steel melting shop will have 8 nos. X 20 tonne, 8 nos. X 20 tonne and/ or E.A.F. 1 no. X 100 tonne or B.O.F. 2 nos. X 45 tonne, L.R.F. 1 nos. X 25 tonne and AOD 1 nos. X 25 tonne, LRF 7 nos. X 25T and/ or AOD 7 nos. X 25 T and/or CLU 5 nos. X 20 T and/or VD 4 nos. X 30 T. Induction furnace [I.F.] works on the principle of induction melting of scrap/ sponge iron with the help of electric power. In the electric arc furnace, electric arc is generated between electrodes, which heats the metallic charge. Other furnaces also use electric energy under different condition for melting the charge. In all furnaces, the melted content will separate into liquid metal and slag. The slag will be removed and sent to

slag crusher for recovery of metal. Reject will be considered as waste and used for land filling. The liquid metal will be sent to the continuous casting machine (C.C.M.) where semi-finished product will be made. There will be several casters for Billets/ Bloom/ Slab/ Ingot of mild steel/ stainless steel/ alloy grade steel. Slag Crusher for I.F. slag of 1 no. X 75 tonnes per hour is also proposed.

(3) Finished product facilities (Rolling mills), Existing 0.4785 MTPA, Proposed 0.45 MTPA, Total 0.9285 MTPA: Hot charge or semi-finished product from the various continuous casting machine of steel melting shop can be directly charged or reheated and converted into various types of finished products. There will be two rolling mills- one existing and one proposed. These are Rolling Mill including reheating furnace (Long and/or TMT and/or wire rod and/or TMT & Wire rod and/or flat and/or Round and/or structural mill and/or Strip mill and/or Bright Bar and/or rolled products of stainless steel or others and/or Hot Rolled/HRC Mill/Plate/ Pipe & Tube Products/ ERW and/or HFIW and/or HFW Pipe &Tubes and/or Seamless Steel Tube & Pipes manufacturing and Rolling with complete finishing facilities of line and OCTG finishing/ wire drawing/ HB wire/ Binding wire/ Nail/ Barbed wire & GI Wire or mesh wire or Gabion wire mesh with coating or Rolled products of stainless Steel or alloy steel or LRPC wire, etc.) followed by one or more in series of pickling, cold rolling, annealing, galvanizing. A Pipe mill/ Tube mill of 0.1551 MTPA along with galvanising unit of 0.1551 MTPA is also proposed.

(4) Pelletization plants, existing 1.2 MTPA and proposed 3.75 MTPA: There will be total 1 nos. X 1.2 MTPA + 1 no. X 3.75 MTPA pelletiszation units with iron ore beneficiation facility. The pellet plant will produce oxide pellets suitable for use in D.R.I. and blast furnace. Pellets are heat hardened balls produced from concentrates and natural iron ores of different mineralogical and chemical composition. The pellets have improved properties for iron making. Pelletization process will involve feed preparation, green ball formation, pellet induration and product dispatch or inhouse consumption. Beneficiation of iron ore shall be carried out prior to pelletization. Beneficiation process will mainly involve wet grinding of iron-ore fines and separation of gangue to improve the quality of iron ore. The product from the beneficiation unit shall be fed into the pellet plant. The rejects will be sent to temporary tailing storage area till further utilisation/ disposal.

(5) Ferro Alloy Plant with pig iron, Existing 0.063 MTPA: Ferro-silicon (0.0225 MTPA) or ferro-manganese (0.046 MTPA) or silico-manganese (0.036 MTPA) or pig iron (0.063 MTPA) or ferro-chrome (0.036 MTPA-proposed) shall be manufactured using submerged arc furnaces. These will also have additional units such as briquetting/ sintering plans of 0.0828 MTPA and metal recovery plant of 1 no. X 5 TPH.

(6) Captive Power Plant (C.P.P.), Existing 75 MW, Proposed 430 MW, Total 505 MW: (1) Waste Heat Recovery Boiler: 170 MW waste heat recovery boilers based power plant is proposed to utilize the heat from

gases exiting DRI kilns (50 existing + 65 proposed = 115 MW), mini blast furnace (10 MW proposed), coke oven (40 MW proposed) (2) **Top pressure recovery turbine** on Blast furnace (TRT) of 5 MW (proposed) and (3) **AFBC/ CFBC: 25 existing + 310 proposed =** 335 MW power plant based on coal, coal fines, washery middlings and char from DRI kilns has been proposed. The power generated from the CPP will meet the requirement of the steel plant. The fly ash shall be used for making fly ash bricks, cement, land filling, etc.

(7) Fly ash brick plant, Existing 1 no. X 41,500 TPA, Proposed 2 nos. X 41,500 TPA : The fly ash brick plant is being established for the utilisation of fly ash generated in house from the captive power plant.

(8) Mini blast furnaces, Proposed 1.0845 MTPA: There will be total 1 nos. X 686 cum blast furnaces. The purpose of a blast furnace is to chemically reduce and physically convert iron oxides into liquid iron called "hot metal" and solidified form “pig iron”. Iron ore/ pellet, coke and limestone will be fed into the top of the blast furnace. Preheated air will be blown into the bottom. The raw materials will descend to the bottom of the furnace where they will become liquid iron (final product) and liquid slag (waste). These will be drained from the furnace at regular intervals. The blast furnace flue gas will be passed through Waste Heat Recovery Boilers (W.H.R.B.) for power generation. Thereafter, the gas will be used as fuel in blast furnace stove and elsewhere after cleaning in Gas Cleaning Plant (G.C.P.). Unutilised gas will be flared. Power will also be generated by top pressure recovery turbine.

(9) Sinter Plants, Proposed 1.5015 MTPA: There will be total 1 nos. X 130 sq.m. sintering unit. Sintering is an agglomeration process of iron ore fines/ blue dust, coke breeze and fluxes. The iron ore dusts collected from other units and pollution control equipment will also be utilised as raw material for sinter. Thus, solid waste from within the integrated steel plant shall be utilised to maximum extent by sintering. The sinter generated will be 100% utilised in mini blast furnace.

(10) Coke oven plants, Proposed 0.49 MTPA: There will be total 7 nos. X 70,000 TPA coke oven plant. Coke oven will be non-recovery type with modified wet quenching. Raw coal will be crushed in a crusher into powdered form and charged in the oven for carbonisation. The volatile matter in raw coal will get released in the form of gas and burnt in the oven as well as in the flues. After the completion of the carbonization process, raw coal will get converted to coke within 36 to 38 hours. The coke will then be pushed out from the oven and quenched by water. Coke will be utilised in mini blast furnace and sinter plant.

(11) Oxygen Plants, Proposed 450 TPD: It will have 1 no. X 300 TPD and 1 no. X 150 TPD unit. The Oxygen Plant is required to meet the oxygen & argon requirement for mini blast furnace, electric arc furnace, new oxygen furnace, basic oxygen furnace, etc. to improve lancet, which reduces the electricity consumption and also reduces considerable tap to tap time

increasing productivity. Occasional purging need of the steel plant will be met by nitrogen, which will also be generated from the oxygen plant.

(12) DI pipe plant and DI fitting plant (Proposed total 1.0 MTPA) : A 1.0 MTPA Ductile Iron (D.I.) plant with configuration 2 nos. X 0.5 MTPA and a 0.5 MTPA DI fitting plant with configuration 2 nos. X 0.25 MTPA will be installed.

(13) Cement Plant (Grinding Unit), Proposed 0.825 MTPA: Clinker, Slag Generation from Blast Furnace and gypsum will be used for manufacturing Portland Blast Furnace Slag Cement (PBFS) and sold in the market. Cement Plant (grinding unit) will be of 0.825 MTPA capacity with configuration 1 nos. X 2500 tonnes per day.

(14) Lime Calcination/ Dolo Plants, Proposed 0.801 MTPA: There will be 1 no. X 15 TPD + 2 nos. X 115 TPD units. Lime and dolomite will be used in converters and electric arc furnaces, where they will help to form slag which draws off harmful impurities such as silicon and phosphorus. Lime will also be used to improve productivity in the ore agglomeration process.

(15) Coal washery, Proposed 1.5 MTPA: There will be total 1 no. X 250 tonnes per hour washery unit. The raw coal will need crushing and washing to reduce the ash content before it can be used in D.R.I. kilns and producer gas plant. Therefore, a three product coal washery will be provided. It will consist of a coal crusher, screening station and washing equipment. Raw coal will be fed to the washery. Washed coal recovered will be 50%, middlings will be 42.5% and rejects will be 7.5%.

(16) Producer Gas Plants, proposed 630 million Nm^3/annum: It will comprise of 15 nos. X 5000 Nm^3/hr unit. A coal based producer gas plant will be installed to make producer gas, which will be used as fuel for pellet plant, predominantly. Producer gas will be generated by injecting a blast of air and steam through a layer of incandescent coal. The carbon of the coal combines with oxygen of the air to form carbon dioxide. Any carbon dioxide formed also reduces to carbon monoxide as it goes up and passes through hot unburnt coal. Water vapors which pass through the fuel react to form carbon monoxide and hydrogen.

Raw material handling systems: For material handling within plant premises a coal handling system, ash handling system, roads, etc shall be provided.

2.3 Resource requirement

Raw Material : Total raw material requirement will be 25.31 MTPA of which 48% is estimated to be met inhouse and 52% from outside purchase. Major raw material and fuel requirement for project will be 7.91 MTPA of various grades of iron ore/ fines/ concentrate (source- Private mines/ OMC/ NMDC/ Chhattisgarh), 5.06 MTPA of non coking coal & coal dust (source- Talcher, Odisha; Chhattisgarh), 0.73 MTPA coking coal (source - Open

market/ Imported), 0.85 MTPA of dolomite and limestone (source- Rajgangpur, Odisha; Chhattisgarh). Other raw material required will be pig (0.49 MTPA), DRI (0.47 MTPA), Billets (0.465 MTPA), Chrome ore concentrate (0.278 MTPA), Manganese ore concentrate (0.278 MTPA) an other which are consumed inquantities less than 0.1MTPA suh a quartz, manganese ore, bentonite, gypsum, molasses, fuel oil, steel scrap, chrome ore lump, electrde paste, etc. Fuels required in various units will be coking and non coking coal, coke breeze & fines, low sulphur heavy stock diesel oil/ fuel oil, producer gas, coke oven gas and MBF gas.

Power: For the existing plant configuration, 98 MW power will be required out of which 75 MW power requirement will be fulfilled through captive generation i.e. 75 MW (25 MW AFBC+ 50MW WHRB) and remaining 23 MW will be sourced through State Grid (CSPDCL).The power requirement for entire plant after expansion will be 505 MW. The power will be sourced from captive plant (CPP = 335 MW and renewable energy = 170 MW).

Water: Total water requirement for the existing plant is 4,400 cubic meters per day [cum/day] and for proposed expansion phase shall be 33017 cum/day, totalling 37417 cum/day. For the existing plant configuration, water requirement will be met from surface water from Shivnath River (at village Anjora) through pipeline, rain water harvesting & groundwater (permission received on 17.10.2024 from CGWA). For expansion phase, water requirement will be met from same sources.

Water used in various units within the plant will also be re-used through circulating water systems with cooling towers and the blow downs/ discharges treated and reused through common basin or unit-wise treatment systems.

Site services: New supporting infrastructure like canteens, rest room, vehicle parking, cycle stands, drinking water, toilets, medical room, first aid, creche, etc. are proposed. These will be used for workers & drivers during operation phase. No colony is envisaged for the employees. However, residential facilities such as labour barracks and bachelor accommodation within the plant will be made. Temporary sheds for construction workers will be established at the site during construction phase.

Manpower: For operation phase, the existing manpower for the steel plant is 1230 permanent while 1020 and 2800 permanent and temporary respectively for the proposed expansion.

Persons will also get employment in the ancillary & other services connected with this project. Unskilled and semi- skilled (after training) will be hired from land losers and local villagers in and around the plant while skilled, engineers, managerial staff and technical experts will have to be hired from outside.

3.0 PRESENT ENVIRONMENTAL SCENARIO

For the description of baseline environmental scenario, the plant area (existing plus proposed) has been considered as the “core zone”. The area falling within a distance of 10 km from the boundary of the core zone has been considered as the “buffer zone”. The core zone and the buffer zone together form the “study area”. Baseline status and impact assessment has been done for the study area as shown in **Fig 2**.

3.1 Topography and drainage

Core zone: The topography of the proposed project area is flat with an average site elevation of 318 to 329 m amsl as per Google earth. The overall slope is towards the northern side. A branch of canal passes through existing project area. There are two 1st order and one 2nd order stream of nala passing through the project area as per toposheet but are not visible clearly through google earth as on 13.02.2025 nor at site. The drainage is more like sheet flow across agricultural fields.

Buffer zone: The 10 km radius area around project is having predominantly flat land. As per toposheet, the ground elevation in the study area ranges from about 279 m near Changori village in the south eastern part to 320 m in western side of project area. There are hillocks in the reserved forest near Mangata (3.4 km from site). The drainage of the study area is controlled mainly by the Seonath River flowing 3.4 km east of the project. Tandula river merges with Seonath River near Changori in south east. Kharkhara Nadi merges into Seonath in southern part of study area. River Seonath is a perennial river which is the largest tributary of Mahanadi. The drainage network in study area is dendritic in nature.

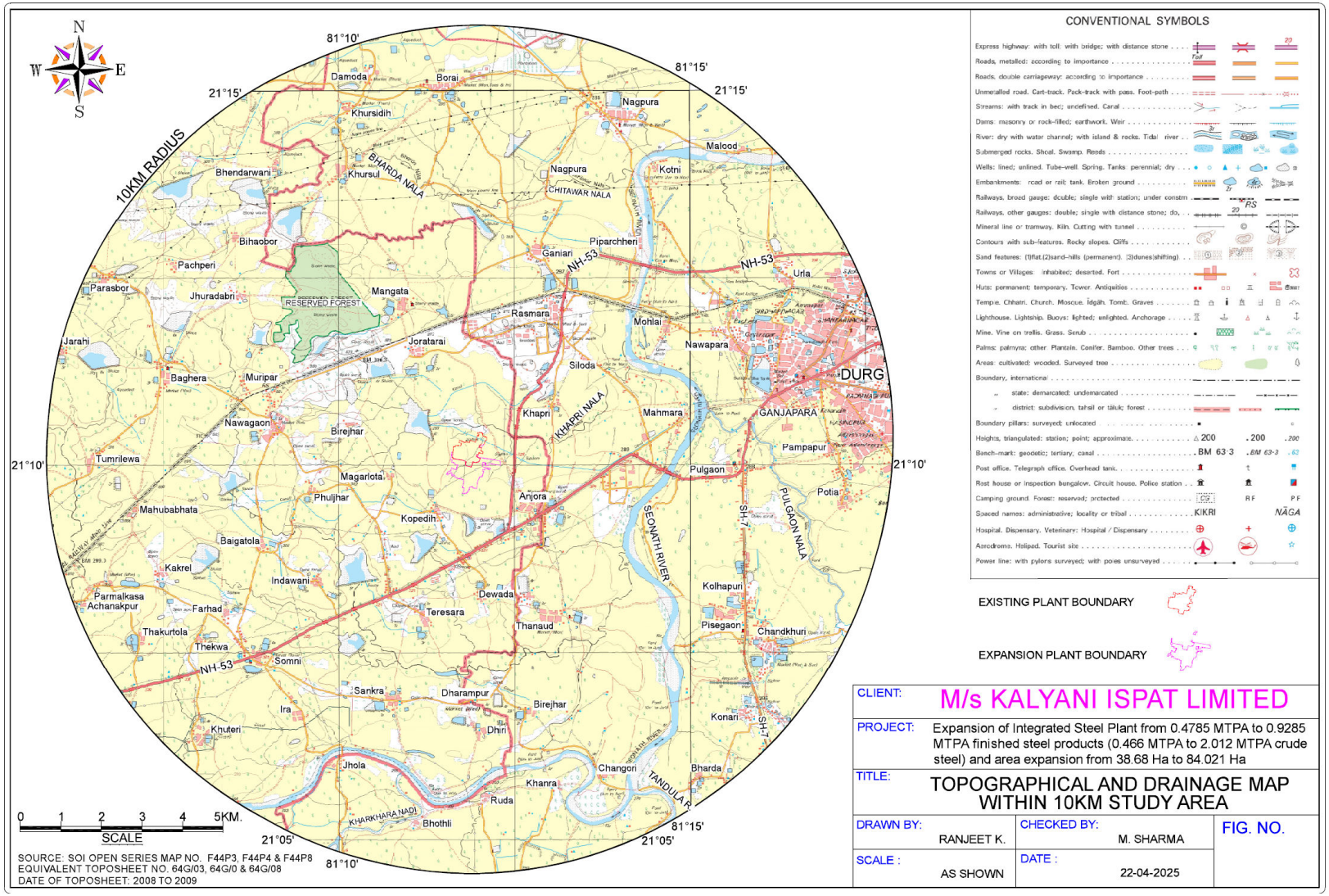
3.2 Climate and micro-meteorology

The climate of the region is a Tropical wet and dry being characterized by hot and dry summer, a monsoon and a cold winter. The winter season extends from November to end of February, which is followed by summer season from March to the middle of June and rainy season from middle of June to September. As per data available from India Meteorology Department for 1991 to 2020 for IMD Raipur station, the average annual rainfall is 1290.3 mm.

Monthly average maximum and minimum temperature was recorded as 41.8 degree Celsius in May and 13.8 degree Celsius in December. Annual average humidity is found to be 67% at 8:30 hrs and 50% at 17:30 hrs.

The micro-meteorology was monitored at site for the post monsoon season from 1st October 2024 to 31st December 2024. The minimum temperature recorded was 8.89 degree celsius and maximum 31.91 degree celsius. Relative humidity varied from 30.20% to 97.90% during the monitoring period.

FIG 2: TOPOGRAPHY AND DRAINAGE MAP OF THE STUDY AREA



SOURCE: SOI OPEN SERIES MAP NO. F44P3, F44P4 & F44P8
EQUIVALENT TOPOSHEET NO. 64G/03, 64G/0 & 64G/08
DATE OF TOPOSHEET: 2008 TO 2009

CLIENT:	M/s KALYANI ISPAT LIMITED		
PROJECT:	Expansion of Integrated Steel Plant from 0.4785 MTPA to 0.9285 MTPA finished steel products (0.466 MTPA to 2.012 MTPA crude steel) and area expansion from 38.68 Ha to 84.021 Ha		
TITLE:	TOPOGRAPHICAL AND DRAINAGE MAP WITHIN 10KM STUDY AREA		
DRAWN BY:	RANJEET K.	CHECKED BY: M. SHARMA	FIG. NO.
SCALE :	AS SHOWN	DATE : 22-04-2025	

The wind speed varies between 0.00 km/hr to 15.60 km/hr and the predominant wind direction was observed from NE (23.78% readings including calm).

3.3 Ambient air quality

Ambient air quality study was monitored at 8 locations. One location was at existing plant area within the core zone (project area). Seven stations were in buffer zone at villages Kopedih (0.7 km, SW), Indawan (4.2 km, SW), Khapri (1.5 km, NE), Magarlota (1.3 km, W), near Anjora (2.2 km, E), Joratarai Village (2.2 km, NW) and near Dewada (1.4 km, S). Twenty four hour average PM10 level was found to range from 42.8 to 78.0 µg/m^3 (limit 100 µg/m^3). PM2.5 was found from 23.8 to 46.8 µg/m^3 (limit 60 µg/m^3). Sulphur dioxide from 6.0 to 13.3 µg/m^3 and nitrogen dioxide from 8.8 to 20.1 µg/m^3 (limit for both 80 µg/m^3). CO level was observed between 0.115 to 0.802 mg/m^3 while the limits are 2 mg/m^3. Lead, Arsenic and Nickel were found below detectable limit and Benzo (a) Pyrene and Benzene were not detected.

3.4 Water environment and quality

The Seonath River, a tributary of the Mahanadi, flows through the study area at a distance of 3.4 km from the project site and is the most significant drainage system in study area.

Eight surface water samples were collected. These were at (1) Canal in Core Zone- Existing Plant area, (2) Seonath river- upstream near Jhola village (7.3 km, SW), (3) Seonath river- near Pisegaon village (5.5 km, SE), (4) Seonath river- downstream near Piparchheri (5.7 km, NE), (5) Reservoir near Birejhar village (0.8 km, NW), (6) Raja Talab near Kopedih village (0.7 km, S), (7) Khapri Nala upstream near plant Khapri (0.2 km, N) and (8) Nala downstream near Siloda village (3.4 km, NE).

Eight ground water samples were collected. These are from (1) Kopedih village (0.9 km, SW), (2) Magarlota village (1.3 km, W), (3) Anjora village (1.6 km, SE), (4) Khapri village (1.5 km, NE), (5) Joratarai village (2.7 km, NW), (6) Nagpura village (8.6 km, NE), (7) Somni village (6.6 km, SW) and (8) Ganjapara Village (6.8 km, NE).

It is observed that the surface water and ground water quality is within the permissible limits as specified by IS: 10500 - 2012 for drinking purposes.

3.5 Land use pattern and soil quality

The proposed and existing project is located in Village Kopedih and Anjora, Tehsil and District Rajnandgaon, Chhattisgarh. The total area of existing plant is 38.680 and is already in possession of the company. Proposed expansion area is 45.341 ha of which 35.391 ha has been has been purchased and 9.95 has is yet to be purchased. Total plant area will become 84.021 ha.

The total plant area comprises 44.507 ha private land and 0.834 ha Government land. The private land is predominantly agricultural in nature.

Land use pattern of study area is available from Census 2011. The data shows that 52.13% is net area sown, 24.89 % of area under non agricultural use, 7.14% is permanent pastures and other grazing land, 5.11% is culturable waste land, 4.33% is fallows land other than current fallows, 4.27% is current fallows, 1.33% is barren and un-cultivable land, 0.67% is land under miscellaneous tree crops and 0.14% is forest land.

Top soil samples were collected from six locations. One from existing plant area, one from expansion plant area and four from buffer zone, namely, (1) Kopedih village (0.6 km, SW), (2) Khapri village (1.4 km, NE), (3) Magarlota village (1.4 km, W) and (4) Near Anjora village (1.5 km, SE).

Texture of soil is medium grained sand and colour varies from medium to dark brown. The soil is slightly acidic at Magarlota Village to slightly basic in nature in Core zone existing plant area. Conductivity of soil shows it is free from salinity. Organic carbon is low in core zone existing plant area while it is rich in soil samples of buffer zone. Nitrate content is medium, potassium high and phosphorus low in soil samples of study area.

3.6 Noise level and traffic density

Noise levels at ten stations were observed. The noise levels was 57.80 dB(A) during day time and at night time it was 44.39 dB(A) in core zone and in buffer it varied from 48.83 dB(A) to 52.48 dB(A) during day time and at night time it varied from 36.19 dB(A) to 42.23dB(A).

A traffic density survey was conducted at 3 locations namely Unmetalled Road Near Joratarai Village, Industrial Area Road Near Rasmara Village and NH-53 Near Khapri Village. Total number of equivalent passenger car units were found as 1339, 5760 and 28228 per day, respectively.

3.7 Ecology

There is no forest present within existing and proposed expansion plant area. Total forest land in the study area as per Census 2011 is 50.01 ha (0.14%).

There is only one reserve forest present within 10 km of the study area of the project i.e. Reserve Forest near Mangata in NW at a distance of 3.4 km. As per Champion and Seth's classification of the revised forest types of India, the forests of Rajnandgaon district is Tropical Dry Deciduous Forests.

There are 13 tree species, 3 shrub species, 2 grasses species, 1 climbers and 2 herbs species that are found in the core zone.

There are 54 species of trees, 12 species of herbs, 20 species of shrubs, 5 species of climbers, 12 species of herbs and 9 species of grasses in buffer

zone**.** Some of the species of trees are *Acacia arabica* (Babul), *Acacia catechu* (Khair), *Adina cardifolia* (Haldu), *Aegle marmelos* (Bel), *Dalbergia paniculata* (Dhobin), etc. Herbs, shrubs, grasses and climbers found in study area include *Abrus precatorius* (Gunj), *Argemone mexicana* (Apamarg), *Azanza lampus* (Bankapas), *Andropogon intermedius* (Ghonsi), *Asparagus racemosus* (Safed musli), etc

There are 4 mammals species, 2 species of reptiles and amphibians and 9 avian species in the core zone. Fauna in the core zone is less as compared to buffer zone. A total of 62 faunal species were recorded, comprising 13 species of mammals, 6 species of reptiles and amphibians and 43 avifaunal species. The mammalian species observed in the study area are spotted deer, field rat, fruit bat, jungle cat, hare, etc.; Avian species are myna, common kingfisher, pied cuckoo, house crow, egret, black kite, spotted dove, baya weaver, etc. and reptiles are Indian cobra, common krait, Russel's viper, etc. No Schedule I species is present within core zone. 5 mammals, 5 reptiles and 2 birds Schedule I species are present within buffer zone.

There are no national parks or wildlife sanctuaries or biosphere reserve within 10 km radius. As per the maps in Wildlife Conservation plan, the Sitanadi Wildlife Sanctuary is at a distance of 92 km in SE, Bhoramdeo Wildlife Sanctuary is at a distance of 89.925 km in North and Barnawapara WLS at a distance 122.344 km in West Direction.

3.8 Socio-economic conditions

There is no habitation within the project area. There will be 25 land losers from 9.95 ha private agricultural land to be purchased. Total land requirement is 45.341 ha out of which 35.391 ha has already been purchased from 44 land owners.

There are 62 inhabited villages and census towns in the buffer zone of the study area. The total population within the study area is 349410 persons, as per Census 2011. The population projected for 2025 is 434097. It includes 50.75% males and 49.25% females.

The schedule caste population is 11.28% and schedule tribe population is 5.72%**.** The average literacy rate is 73.53%. The literacy amongst women is lower at 33.19%. Main workers are 36.0% of the total population. Marginal workers are 4.60 % and 59.40 % are non workers.

3.9 Industries around the project area

Within the 10 km radius of the project area there are total 56 industries comprising manufacturing industries (sponge iron, billet, ferro alloys, PVC, etc.), food processing units etc.

3.10 Places of archaeological/ tourist/ religious importance

There are many religious places in 10 km study area, some of them are Shree Radhakrishna Gaudham (6.8 km, SE), Ganjpara Durga P Mandir Andal (7.2 km, NE), Masjid Abu Bakr Markaz (8.3 km, NE), Shiv Mandir (9.9 km, E) and tourist places are Chirraiya Upwan (6.1, SE) and Thagda Sunset View (10 km, NE) and historical place (non-ASI) is Hindi Bhawan (8.0 km, NE).

4.0 ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

4.1 Topography and drainage

Impact: Change in topography over the existing plant area of 38.680 ha and 45.341 ha proposed expansion area will occur at site due to excavation and leveling activities. Change in topography will occur due to construction of buildings, roads, stock yards, sub station, water reservoir and other plant facilities as well as landscaping. The construction, once achieved, will not be reversed. This will have primary impact on top soil quality, increase in soil erosion, land use and nature of land. There will be secondary impact on the water bodies due to increase in suspended solids in runoff, on humans, animals & flora due to increase in suspended particulates in air due to material handling as well as noise due to construction activities. There will be negligible impact on topography of the buffer zone since no construction is proposed except widening and strengthening of approach roads, if required.

There are no ponds/ tanks/ water logged low lying areas in the existing or expansion area. Although on the toposheet two first order drains joining into a second order are visible, the drainage is not well defined on the ground and can be seen as a sheet flow through fields in the google earth image. Impact on the drainage in the buffer zone is not anticipated because no construction will be taking place outside project boundary. However, the volume of water from the plant area going outside the plant may reduce during rainfall as the rainwater will be stored in raw water reservoir / rain water harvesting ponds.

Management: The change in topography in the core zone will be permanent and irreversible. Excavated soil will be used in levelling, filling and landscaping to minimise the impact of change in topography. Changes in the surface flow pattern of rain water will be managed by constructing storm water drains. Thus, the impact of the new construction will be managed.

4.2 Climate and meteorology

Impact: The climatic conditions including temperature variations, wind direction and speed, rainfall and humidity are governed by regional factors and the monsoon. As such the proposed project and other allied activities will not tend to influence the climate. However, emission of greenhouse

gases due to combustion of fossil fuels and increase in suspended particulate matter concentration will be there. These will have secondary impacts on the health of humans, animals and flora in the vicinity.

Management: Development of greenbelt in the plant premises over 33% area of the total project area will be done during construction phase. The trees planted will help in sequestering of carbon. The company will also undertake measures to minimise the CO_2 emissions. These will include regular maintenance of all fossil fuel based machinery and equipment and ensuring their emissions are within limit. The waste heat recovery and pressure based power generation will also reduce the carbon footprint of the project. To keep suspended particulate matter in limit, water sprinkling will be done.

4.3 Ambient air quality

Impact: During the construction phase there will be several sources of air pollution. These will be vehicle exhausts, dust generation due to excavation work, shifting of construction materials (cement, sand and gravel), vehicle movement on unpaved roads and exhaust from diesel based construction equipment. Primary impact will be dust generation causing an increase in suspended particulate matter levels in the surrounding areas. The secondary impacts of gaseous emissions and dust may be on the health of the workers and villagers living in close vicinity, on fauna and flora. During operation phase, the emissions will be due to process stack emissions, material handling in stock yards, crushing, fugitive dust within project and transportation leading to increase in ground level concentration and deposition of dust. This will further lead to secondary impacts on humans, flora & fauna, properties, water quality of surface water bodies & soil quality.

Management: During construction, the dust generated due to excavation, leveling and transportation activities will be controlled by sprinkling of water. Construction equipment will be maintained regularly to minimize source emissions. During both construction and operation, all trucks being used for transportation of construction material, raw material and finished product will be covered with tarpaulin to prevent spillage, maintained, optimally loaded and have PUC certificates. During operation, high efficiency ESP, bag filters, scrubbers and other air pollution control equipment will be installed to control the particulate emission from the processes. Sprinkling during crushing, handling and transfers will control dust. The establishment of the project is expected to cause an increase of pollutants at ground level around the project. The impact on surrounding air quality has been calculated using a modelling software AERMOD 12.0.0. There will be an increase by 17.89 µg/m^3, 6.74 µg/m^3, 26.88 µg/m^3 and 1.53 µg/m^3 for PM10, $PM_{2.5,}$ SO_2 and NOx, respectively. The traffic movement due to project, on public roads will also cause an increase in pollutants which has been assessed separately (an increase by **13.95** µg/m^3, **3.44** µg/m^3, **0.76** µg/m^3 and **34.51** µg/m^3 for PM10, $PM_{2.5,}$ SO_2 and NO_2, respectively). After adding these increments to baseline scenario, the highest resultant values in study area are likely to be **98.0** µg/m^3, **52.02**µg/m^3, **39.41** µg/m^3 and

53.11 µg/m^3 for PM_{10}, $PM_{2.5,}$ SO_2 and NO_2, respectively and the impact of the project will remain within permissible limits of National Ambient Air Quality Standards 2009, for business as usual scenario. 24 hours average standards for PM_{10} is 100 µg/m^3, $PM_{2.5}$ is 60 µg/m^3, SO_2 80 µg/m^3 and NO_2 80 µg/m^3.

4.4 Water environment

Impact: During construction phase, 30 cum/day requirement of water will be on account of concrete mixing, curing, cooling water for various machines, spraying, sprinkling for dust suppression, irrigation for plantation and for greenbelt and landscaping. This includes the 10 cum/day construction water for existing plant, which is undergoing construction 2025. Waste water generation will be from construction workers and cleaning activities.

During operation phase, water will be required for process. It will be taken from Shivnath River (at village Anjora) through pipeline, rain water harvesting & groundwater (permission dated 04.02.2025 from CGWA). The total waste water generation from the proposed industrial processes will be 503 cum/day. The sewage and sanitary wastewater from toilets, washrooms and canteen will be to the tune of 208 cum/day.

Management: During construction phase, mobile toilet block shall be provided for construction workers. The sewage will be treated in portable batch type sewage treatment plant. As the construction of the plant progresses, permanent toilet blocks with associated treatment systems shall be installed, which shall be continued to be used in operational phase.

During operation phase, the discharge will be from cooling water system, floor washings and process waste waters. Units like beneficiation plant, washery, coke oven, rolling mill, etc will be reusing their discharge waters with or without treatment. Cooling waters will be collected in common monitoring basin and used for dust suppression and greenbelt.

The sewage from toilets, washrooms and canteen shall be treated in sewage treatment plant and reused. Sewage sludge removed will be used as manure. The project will have zero liquid effluent discharge except monsoons, when rainwater runoff as well as treated waster water intended for greenbelt and sprinkling will have to be discharged.

The rainwater falling on rooftops of buildings and sheds will be recharged to the groundwater. Rain water from green area shall be recharged through trenches. Rainwater falling on roads, parking, open area, stock yards, sub station, etc. will be routed to the raw water reservoir or rain water harvesting ponds via desilting chambers.

4.5 Land use and soil quality

Impact: The existing 38.68 Ha land is under the possession of the company. The expansion area is 45.341 Ha out of which 35.391 ha has

been purchased by the company and balance 9.95 ha will be purchased in due course through direct negotiation. Construction and development will take place in the project area. There will be construction of roads, water reservoir, plant buildings, raw material shed, product shed, green belt, etc. The construction activities will disturb the top soil. During operation, the temporary storage of solid wastes like char, ESP & bag filter dusts, sludges, fume extraction system dust, various slags from various sub-units, fly ash and other solid wastes on land would also impact the land use, soil quality, air quality and sub-strata water.

Management: The topsoil generated during construction will be removed carefully, stored temporarily and spread over area where additional plantation is proposed. Stabilization of soil with plants will minimize erosion. 33% of total project area will be under greenbelt. The raw material yard and slag yard will have lining to prevent percolation of contaminants during rainfall. Runoff will be collected in a garland drain around the stock yard & solid waste storage areas, settled in settling pond, treated when required, and directed to rain water harvesting ponds or raw water reservoir. Part of the raw material storage will be covered, thus, reducing interaction with water and soil. The land use of the project will permanently be industrial use.

4.6 Noise

Impact: The noise level during construction will be due to construction machinery and activities. It will be of temporary and reversible nature. During operation, noise will be generated due to operation of various equipment, machinery, pumps, crusher, etc. The noise level at sources are anticipated to be between 70-110 dB(A).

Management: The machinery shall be provided with acoustic shields and enclosures to limit the sound level inside the plant. Vibration dampners shall be used during erection of machinery. Maintenance of machines and vehicles will be done regularly. The proposed green belt will also help to prevent noise generated within the project from spreading beyond the project boundary. Earmuffs/ plugs will be provided to the workers deployed in the close vicinity of noise source.

4.7 Traffic

Impact: There will not be any road diversion due to the existing project area or acquisition of proposed expansion area. The access roads are already constructed. Raw material transportation shall be from various locations such as Chhattisgarh, Odisha, Paradip port (for imported material), etc. to the proposed integrated steel plant via National Highway 53 and last mine connectivity via internal roads of industrial area near Rasmara and the village roads connecting to Kopedih. Manufactured finished products will be sold in the open markets in various parts of the state or even exported via the same routes. There will be to and fro movement of 1703 trucks (20-25 tonnes capacity) per day. The impact of traffic will be felt on the traffic

volume on roads as well as the air quality in habitation, forest and farmlands adjoining roads.

Management of traffic: Policy will be in place that the trucks bringing in raw material are taking finished goods or solid waste to designated consumer. This will keep the trucks volume to its lowest. All trucks used for transportation of raw material and finished product will be covered with tarpaulin, maintained, optimally loaded and have Pollution under control (PUC) certificates. Trucks will be weighed at the weigh bridge to ensure optimal loading, which in turn optimizes emissions. Pollution Under Control (PUC) certificates will be obtained as per specified periodicity for all categories of vehicles. In case of petrol vehicles idling CO measurements will be taken and in case of diesel vehicles, free acceleration smoke will be measured. Water sprinkling on roads and parking area within plant will be done periodically to mitigate dust. Speed breakers and caution signs will be installed along roads. Tyre washing facilities shall be provided at main gate.

4.8 Solid waste

Impact: During the construction phase, the generation of solid waste will be low, around 5 TPA. It will comprise of waste construction material (bricks, concrete, glass, steel) and used packaging material, boxes, containers, etc. Stone obtained during land levelling will be crushed and used as construction material. In the operation phase, the integrated steel plant will generate empty barrels (metal and plastic), bags, fly ash, bed ash, dust from air pollution control equipment, dolochar, various furnace slags, mill scale, scrap, rejected billets, coal fines & rejects, M.B.F. slag, iron ore fines, sinter returns, effluent treatment sludges and sweepings. Domestic waste shall be generated from workers during construction as well as operation phase. Industrial solid waste is expected to be 4.54 MTPA, sludge 21.3 TPA, domestic solid waste (from canteen) 141.8 TPA, Plastic 5.7 TPA, e waste 0.1 TPA, lead acid batteries 1.3 TPA, biomedical waste 0.08 TPA and used & spent oils 4.3 TPA.

Management: Construction wastes will be segregated at site itself. The recyclable material will be recovered for reuse or sale. The non-recyclable material shall be used for leveling. Litter collection bins will be installed around the work site. Empty packaging materials, drums, glass, tin, paper, plastic, pet bottles, wood, thermocol and other packaging materials, solder butts, etc. will be disposed through recyclers. Domestic waste will be generated from the plant office, organic component of which shall be composted/ vermi composted.

Sponge iron kilns' dolochar will be used as fuel in power plant. Various furnace slags will be given for metal recovery, converted into aggregates or precious slag balls and used for several purposes. M.B.F. slag will be used for cement manufacturing. Mill scales, coke fines, iron ore fines, sinter returns and various E.S.P. & bag filter dusts will be used for sinter. Some of these can also be sent to pre-mixing bin of pellet plant. Steel scraps and rejects will be recycled by melting. Fly and bottom ash of power plant shall

be used for brick making in house and balance given to cement plants, brick plants, road projects, filling & other users. All stock piles will be laid on top of a stable liner to avoid leaching of materials to ground water.

4.9 Ecology

Impact: There is no forest land in the proposed expansion area. No significant adverse impact of proposed project is anticipated on the flora or fauna in the immediate surroundings. This conclusion is based on the low biodiversity in the vicinity of the project, distance of forest area from project (3.4 km) and low level of increase in ground level concentrations of pollutants in forest areas due to proposed project (0.86, 0.49, 1.91 & 0.08 micrograms/cum for PM10, PM2.5, SO2 & NO2, respectively).

Management: The project will have a green belt over 33% (27.73 Ha) of the plant area. Plantation of 69,325 lakh saplings is proposed. A three-tier green belt is proposed along the peripheral boundary. The greenbelt will act as a micro-habitat for small sized mammals and birds. The trees to be planted shall be of native species such as *Butea monosperma* (Palas)*, Cassia fistula* (Amaltas)*, Dalbergia latifolia* (Shisham)*, Mangifera indica* (Amba)*, Syyzygium cumini* (Jamun)*, Tamrindus indica* (Imli) etc. Native ethno-medicinal species will be preferred. Existing trees in the project area will be preserved as per layout to the extent possible.

4.10 Socio-economics status

Impact: No households will have to be displaced, resettled and rehabilitated. There will be 25 land losers from 9.95 ha private agricultural land to be purchased. Total land requirement is 45.341 ha out of which 35.391 ha has already been purchased from 44 land owners. These people will lose their agriculture based livelihood permanently from the currently owned parcel of land, if alternate land is not purchased by them. Positive impact will be in the form of direct and indirect, permanent as well as temporary employment generation due to plant construction, operation and incoming & outgoing material handling logistics. Approximately 850 persons (150 permanent, 700 contractual) will be required during construction phase. During operation phase, 5900 people are expected to get direct employment and 1500 people are expected to be temporary/ contractual. Additionally, there will be equal number of indirectly employed persons.

Management: For land that is being purchased by the company, market rates are being paid to sellers as per mutually agreed terms and conditions. The land sellers will be given awareness on the safe investment options in banks for the money from sale and for purchase of alternate land at other places to rehabilitate as cultivators. Furthermore, preference will be given to the land losers for employment. It is proposed to hire the manpower locally, to the extent possible. Most of the work force required for construction and operation phase will be taken from the surrounding areas. This will have a positive socio-economic impact on local people due to steady income. Training for capacity building shall be supported by the company. This will

enable land losers and local persons to become employable. Thus, the direct and indirect employment will lead to economic growth.

Once the plant will commence operation, amenities like education, school, health, medical, entertainment, canteen, etc. will get developed in and around the plant. These facilities will inevitably be available to local people also in addition to those directly associated with the plant. The company will also carry out activities for social welfare through Corporate Social Responsibility (CSR). The commitments made during public hearing shall also be fulfilled.

4.11 Occupational Health and safety

The Company will have a safety officer who will be the Deputy Manager (Safety). He will develop, implement and monitor Occupational Health and Safety Policy, Programs and Procedures. He will be assisted by safety supervisors. Pre-induction and during employment monitoring of occupational health shall be carried out as per Factories Rules. A first aid center will be developed in the plant which will be equipped and manned by competent persons. First-aid boxes will be provided and maintained in different locations. Personal protective equipments (PPE) will be provided to all the workers. Regular safety training will be conducted. Company shall put 100% efforts for a zero accident rate.

5.0 ANALYSIS OF ALTERNATIVES

Three alternate sites were evaluated. One alternative site is located around 1 km east of existing plant and separate by NH53 leading to intra-plant connectivity challenges. The second alternative site is adjacent to the existing plant on north side but canal and village road passes through it. Hence, the third alternative site which is adjoining to existing plant on south side has been chosen since it is relatively free of encumbrances.

With respect to the technologies, various options were explored and the most suitable option were chosen. While chosing, environmental friendliness, capacity and integratability with the remaining units of the plant was seen.

6.0 ENVIRONMENTAL MONITORING MECHANISM

An environment management team shall be responsible for implementation of environment management plan. It will also be responsible for environmental monitoring. Regular monitoring of the statutory environmental parameters will be taken up. The total capital investment on environmental monitoring is envisaged as Rs. 8.8 crores and recurring expenditure during operation will be Rs. 4.65 crores /year.

7.0 ADDITIONAL STUDIES

Risk Assessment and disaster management: All types of industries face certain types of hazards which can disrupt normal activities abruptly. They

can lead to disaster like fires, inundation, failure of machinery, explosion, oil spillage, electrocution, etc. The aim of the disaster management plan is to take precautions, prevent hazard from occurring and avert disaster. It also plans for actions that are taken after a disaster occurs. This limits the damage to the minimum. To tackle a disaster situation, an emergency control room will be set up with communication facility. The emergency team shall be headed by the Unit Head, who will be called Site Main Controller.

Public Consultation: The draft EIA report has been prepared on the basis of which the public consultation will be held. Action plan to address the issues raised during public consultation will be added after conduct of public hearing.

8.0 PROJECT BENEFIT

The total existing manpower is 1230. There will be 4670 additional manpower requirement due to expansion of the project. Hence, the total manpower of the project will be 5900. Many more persons will also get employment in the ancillary & other services connected with this project. In addition to this, there will be indirect employment. As majority of unskilled and semi-skilled persons will be from surrounding villages and the local population will be benefited. Social welfare activities shall be carried out by the project management in the surrounding villages. It will be for improving social infrastructure (road, drainage, water supply, school) or for activities desired by villagers. The amount earmarked shall be as per the corporate social responsibility program which requires 2% of the average profit of the previous three years.

9.0 ENVIRONMENT MANAGEMENT PLAN

An environment management team shall be responsible for implementation of environment management plan, developing greenbelt, ensuring good housekeeping, statutory compliance as well as creating environmentally aware work forces. Regular monitoring of the statutory environmental parameters will be taken up. The parameter wise management plan comprises of following:

- **Air quality management plan:** provision of electro static precipitators, dust extraction systems, bag filters, dry gas cleaning plants, scrubbers, etc. shall be there. Sprinkling on roads and material handling areas and green belt for absorption of pollutants shall be there.

- **Noise level management plan:** plant machinery will be established in enclosed shed to prevent noise propagation to surrounding, will have acoustic enclosure, boundary wall and green belt will also mitigate noise.

- **Solid waste and hazardous waste management plan:** Slag generated from integrated steel plant will be predominantly reuseable

for direct re-use, metal recovery, sinter making, pelletisation etc. Dolochar, washery middlings will be used for power generation. Fly ash will be used for brick making, cement, land filling, etc. Wastes not recyclable in process also have several uses such as for construction material or filling of low lying areas.

- **Effluent management plan:** There will be 706 KLD waste water generation and reused in the plant premises. The blow down from the cooling system shall be reused for sprinkling and green belt watering besides other unit wise treatment and reuse measures. Beneficiation plant and washery will have their closed loop treatment systems.

- **Storm water management plan:** There will be rain water harvesting from roof tops. Rain water from the premises will be collected through storm water drainage system and sent to settling tank prior to storage in rain water harvesting tanks or raw water reservoir and excess released to natural drain.

- **Green belt development plan:** shall be undertaken over 33% of the plot area comprising of 69325 plants of native species.

- **Socio economic management plan:** social welfare measures to fulfill the issues raised during public hearing as well as undertake peripheral development activities under Corporate Social Responsibility

The investment for the proposed expansion project is Rs. 5810.00 crores. The environmental management cost for the project shall be Rs. 71.42 Crore capital cost and Rs. 48.08 crore/ annum recurring cost. This includes monitoring cost.

10.0 DISCLOSURE OF CONSULTANTS

The consultants engaged for the preparation of the EIA/EMP of the project are Min Mec Consultancy Pvt. Ltd. It was registered in July 1983 with the Registrar of Companies, Delhi & Haryana, India. In 1994, Min Mec established a modern R&D Laboratory. Min Mec is ISO 9001: 2015 certified under ANZ-JAS. In June 2006, the laboratory received accreditation from NABL (latest certificate no. TC-14312), which has been renewed as per procedure since. The laboratory also has ISO 14001:2015 and ISO 45001:2018 certification. On 25.02.2021, Min Mec Consultancy was accredited by QCI-NABET as Mine Plan Preparing Agency (MPPA). Min Mec is preparing EIA/EMP Reports vide NABET's Accreditation Certificate No. NABET/ EIA/25-28/RA 0399 valid till 30.03.2028.

11.0 CONCLUSION

The analysis of the cost benefit shows that the project will be profitable after taking into account the requisite environmental management cost. The cost effectiveness analysis in terms of direct and indirect employment, monetory benefits, physical and social development in the villages around the project

shows that the project will have an overall positive impact. Although there will be impacts on topography, drainage, climate, ambient air quality, water resource, water quality, noise level, traffic volume, land environment, soil quality, ecology and land losers, these are being offset through mitigation measures for which budget, responsibility and time frame has been defined in the environmental management plan.