

**SUMMARY  
OF  
ENVIRONMENTAL IMPACT ASSESSMENT  
AND  
ENVIRONMENTAL MANAGEMENT PLAN  
OF**

**PROPOSED EXPANSION OF FERRO ALLOYS PLANT  
(0.055 to 0.293 MTPA FERRO ALLOYS) ALONG WITH 150 MW CPP)**

**AT**

**VILLAGES: TULASIDIHA, CHARARHAAGARHIA & KANGELAPAL  
DISTRICT DHENKANAL, ODISHA  
(AREA: EXISTING 52.525 ACRES [21.257 ha],  
ADDITIONAL PROPOSED 93.575 ACRE [37.869 HA.],  
TOTAL 146.10 ACRE [59.126 HA.]**

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## EXECUTIVE SUMMARY

### 1.0 INTRODUCTION

#### 1.1 General background

Rungta Mines Ltd. has been working in the mining business since the last 6 decades and has established several steel & power plant in Odisha and Jharkhand.

Rungta Mines Ltd. is operating a ferro alloys division in village Tulasidiha in District Dhenkanal of Odisha. It has a capacity of 55,008 tonnes per annum ferro alloys (ferro manganese 55,008 tonnes per annum or silico manganese 39,960 tonnes per annum) and sinter plant (manganese) of 43,200 tonnes per annum. It is operating based on the Consent to Establish received from Odisha State Pollution Control Board.

The company now proposes to expand the ferro alloys division. The expansion shall be carried out by enhancing the capacity of ferro alloys production from 55,008 to 293,376 tonnes per annum and addition of two more ferro alloy products, namely, ferro chrome and ferro silicon. There shall also be enhancement of metal recovery plant from 19,980 to 115,400 tonnes per annum and sinter plant from 43,200 to 561,600 tonnes per annum. There shall be addition of pig iron (369,600 tonnes per annum), briquette plant for ferro chrome (461,127 tonnes per annum), briquette plant for ferro manganese (586,754 tonnes per annum), chrome ore beneficiation (660,000 tonnes per annum) and power plant (150 megawatt). There shall be expansion of land from 21.257 to 59.126 hectare. The expected cost of the project expansion is proposed as Rs. 950 Crores

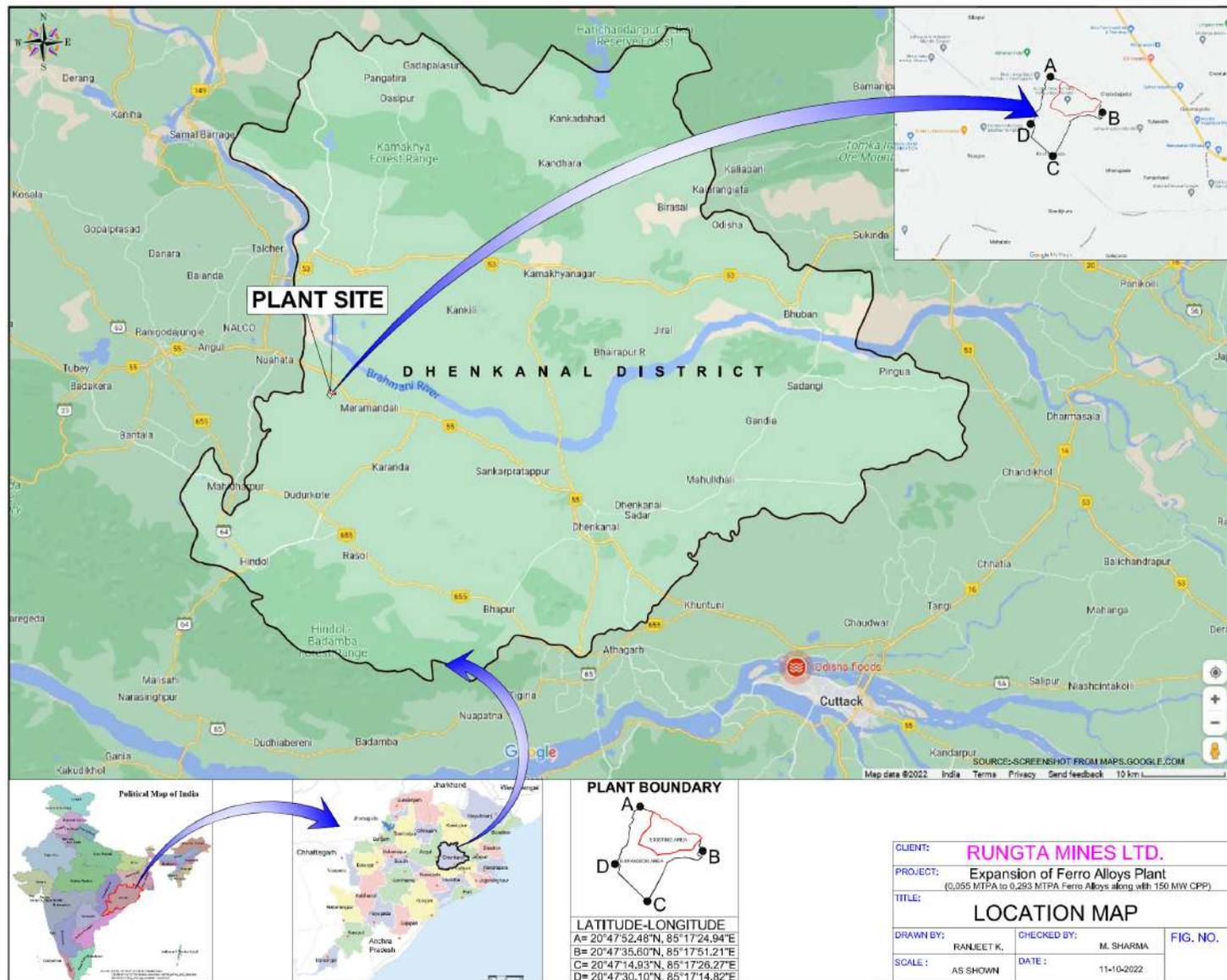
#### 1.2 Location and communication

The existing plant is located in village Tulasidiha. For proposed expansion phase, land of two additional villages Chararhagarhia and Kangelapal shall be added. These villages are in District Dhenkanal, Odisha. Location map is shown in **Fig 1**. The coordinates of the plant area based on Google Earth is as follows:

**Latitude :** 20° 47' 14.93" to 20° 47' 52.48"N  
**Longitude :** 85° 17' 14.82" to 85° 17' 51.21"E

The plant is accessible by all-weather road from the collector office in Angul, which is 20.7 km in west north west direction. District headquarter Dhenkanal is 34.6 km. The site is located 0.85 km from NH-55, which connects Bhubaneswar to Angul. The nearest railway station is Meramandali at a distance of 1.1 km in North. The nearest airport is at Bhubaneswar, which is 79 km in south east.

FIG 1: LOCATION MAP



## 2.0 PROJECT DESCRIPTION

### 2.1 Plant layout

The total plot area after expansion shall be 59.126 hectares. After construction of project, it shall comprise of Plants, facilities & tailing management (28.496 hectares), Stock yards (2.428 hectares), Area for solid waste management (2.631 hectares), Green belt & plantation (19.579 hectares), Administration buildings (0.607 hectares), Water reservoir (2.444 hectares) and roads (2.941 hectares).

### 2.2 Process Description

Submerged arc furnaces produce a wide range of metal products by smelting various minerals to metal products. In the submerged arc furnace, electric power heats the raw materials and provides the energy to reduce the ore to a metallic state. The term "Submerged Arc" is used because the electrodes are usually buried deep in the furnace burden. Generally, carbon serves as the reducing agent and fluxes are often added to facilitate the process. The common practice is to mix the ore materials, the reducing agent, and any fluxes outside of the furnace and then to periodically charge this mixture (often called charge mix) into the furnace. Charge mix is added periodically but the reduction reactions and metal production occur continuously. The metal is usually allowed to accumulate and removed at appropriate intervals into ladles or casting pans or sand pits. The slag containing impurities is removed.

The products to be made in this plant will be as follows:

**Ferro Manganese:** Manganese ores, which usually contain iron oxide, are mixed with coal or coke reductant and usually a small quantity of fluxes to form the charge mix. The charge is smelted and the slag is removed first before removing ferro manganese. The slag and ferro manganese are removed in sand pits, solidified and then cooled for further processing. Ferro Manganese slag has utility as raw material in silico manganese manufacturing.

**Silico manganese production:** Silico manganese is made in submerged arc furnace. It is done by heating a mixture of Manganese Ore, iron oxides, quartz (for silicon), dolomite, coal, ferro manganese slag and charcoal/ coke (for carbon). These are melted simultaneously and reduced reaction takes place. The process is carried out continuously. Charging is done from the top and removal of slag and molten metal takes place from bottom.

**Ferro Chrome production:** raw material such as chrome briquettes, chrome ore lumps, coke and quarts are heated and smelted. The heating of the input charge by the heat of burning gases leaving the furnace removes volatiles and moisture also. Melting and reduction of iron and chromium with simultaneous formation of chromium and iron carbides takes place. This is

followed by the formation of the molten ferro chrome which further removed and cooled. Slag formed is also removed.

**Ferro silicon production:** It is manufactured by smelting iron oxides, quartz, dolomite and charcoal/ coke. Ferro silicon smelting is essentially a slag-less process. Still some slag formation takes place because of the presence of impurities in raw materials.

**Pig Iron :** It is manufactured by smelting iron oxides (ore/ sinter/ mill scale, etc.), metallurgical/ pearl coke, quartz, flourspar, dolomite/ limestone and coal. The process of pig iron manufacturing will also create slag.

**Metal Recovery Plant:** The ferroalloy slags consist of some portion of valuable ferroalloy materials also. These can be recovered from the slag in a condition that can be directly sold or reused. Thus, a metal recovery plant is being used to recover this portion of metal from slag and it shall be enhanced for expansion phase.

**Briquette Plant for ferro chrome and for ferro manganese:** The briquette plants will use the fines and concentrates purchased or received from in house metal recovery, ore beneficiation plants or bag filter to create briquettes. The briquettes bring the fines in a usable form which can fed into the submerged arc furnace.

**Sinter Plant:** The sintering process is the process of agglomeration of fine particles of manganese ores, manganese oxide wastes, coke fines and fines from material handling and bag filter by heating. The process is carried out in three stages. Raw material is handled and preparation of Green Mix is carried out. Sintering of Green Mix produces sinter cakes. Crushing of sinter cakes is done to produce desired size suitable to use in furnace.

**Chrome Ore Beneficiation:** The plant will beneficiate the low grade chromite ore fines received from mines. Sizing in jaw crusher shall take place. The crushed material from jaw crusher will be fed into roll crusher. It will then be separated in double deck vibrating screens. The separated material will be conveyed to wet vibrating screen through belt conveyor. Primary separation of  $\text{SiO}_2$ ,  $\text{MgO}$ ,  $\text{Al}_2\text{O}_3$  and other floating material will occur in hydro-cyclones and goes to tailing along with water. The gravity separation occurs in spiral bank to achieve better quality chromium.

**Power plant:** 150 megawatt AFBC/CFBC based power plant has been proposed. It will operate on coal. The power generated from the CPP will meet the requirement of the Ferro Alloys Plant.

### 2.3 Raw material, power and water

**Raw Material:** The raw material requirement would be fulfilled by in-house intermediate products and open market. The out-house raw material and fuel requirement for the project will go upto 3,432,200 tonnes per annum. Fuel & raw materials consumption will be mainly iron ore fines, coke fines,

lime stone, dolomite, quartz, charcoal / coke, manganese ore, low-grade high silicon MOIL ore, coal, chrome ore lump, manganese ore concentrate, molasses, chrome-ore concentrate and low grade chrome ore. The transportation shall be done by road and rail/road combination.

**Power:** Total power requirement for existing and proposed expansion shall be 150 megawatt. This will be met through proposed 150 megawatt captive power plant.

**Water:** The total fresh water requirement for the entire project will be 237 kilo litres per hour. The water required for the plant shall be sourced from Lingara nadi or Brahmani river for industrial use and ground water for domestic use. Water shall also be collected through rainwater harvesting also for use within plant.

## 2.4 Manpower

The existing manpower is 500 and additional manpower requirement will be 1500. Employment shall be required for various activities like operation, supervision, maintenance, loading, unloading, handling, transportation, housekeeping, horticulture, security and other miscellaneous works inside the plant. Unskilled and semi-skilled manpower will be sourced from the local villages. Some skilled manpower may be required from other parts of the state and country. Three shifts working is planned. Number of working days shall be increased from 325 to 350 days per annum.

## 2.5 Site services

Infrastructure like canteen, rest room, first aid centre, vehicle parking, cycle stand, drinking water, sanitation facilities, etc. are existing. They shall be enhanced for the expansion phase. These will be used for workers & drivers during operation phase. No residential facilities are envisaged for the employees. Temporary sheds for workers will be established at the site during construction phase only.

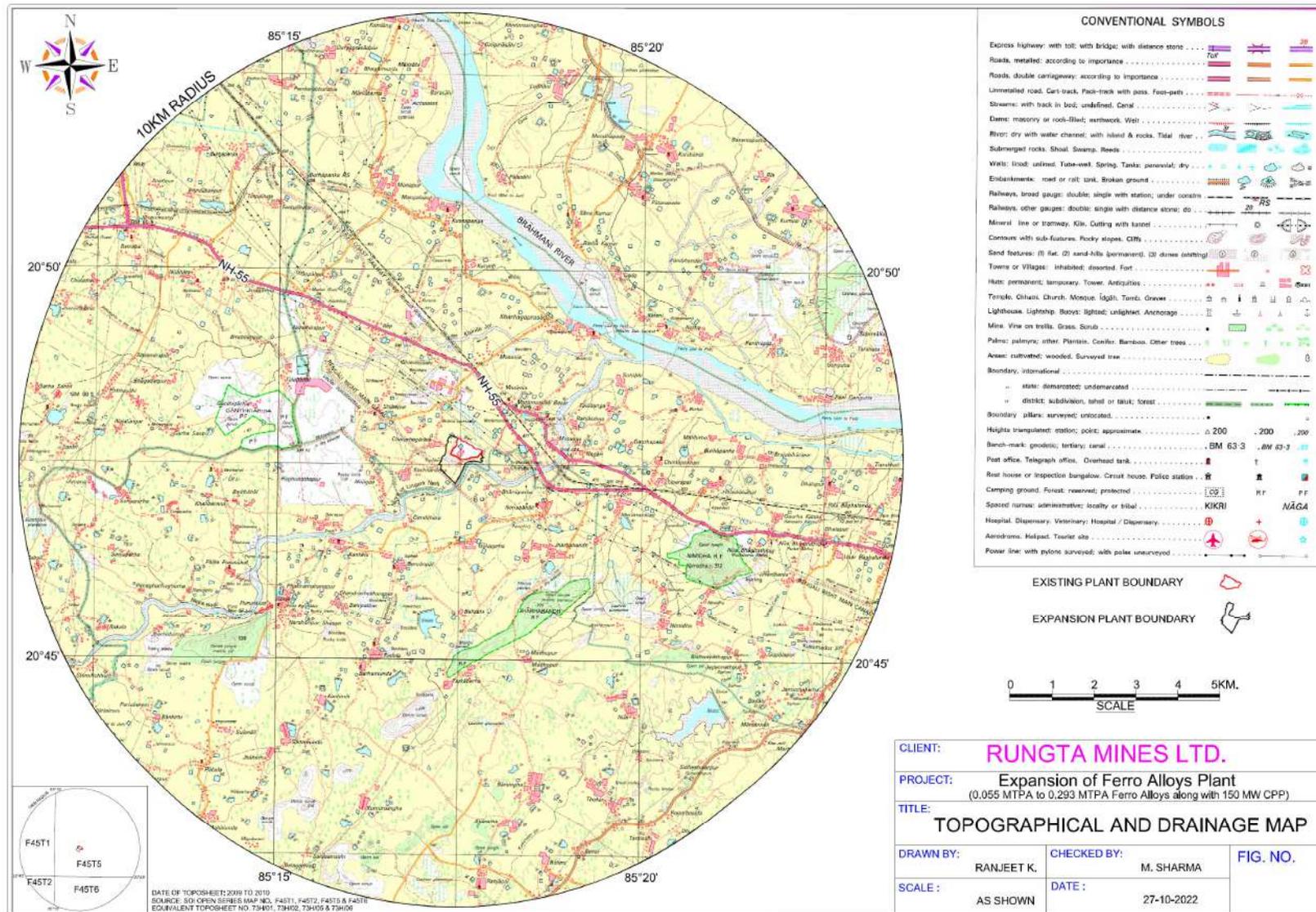
## 3.0 PRESENT ENVIRONMENTAL SCENARIO

For the description of baseline environmental scenario, the plant area 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”. Together they comprise the study area which can be seen **Fig 2**.

### 3.1 Topography and drainage

**Core zone:** The core zone represents nearly flat land having elevation from 61 m – 73 m amsl, as per google earth of the existing and expansion plant area.

FIG 2: TOPOGRAPHY AND DRAINAGE MAP OF THE STUDY AREA



**Buffer zone:** The study area (10 km radius around project) is sloping from the southern side towards Brahmani river in the north east. There are few hills in the southern portion with a maximum elevation of 312 m above mean sea level (amsl) at Nimidha RF. The lowest elevation of around 56 m amsl near Rorha is observed in study area. Open scrub patches are scattered in the buffer area. Most of the buffer area is agricultural private land with a few large industries.

The drainage of the study area is controlled mainly by the Brahmani river flowing 3.8 km north east of the project. Its tributaries are Nigra or Lingara Nadi (adjoining to plant), Kisinda Jor (2.1, N), Kusumdor Jor (7.0, SSE) and Ria Jor (5.9, NE). These form the main drainage in the study area with seasonal surface flow. The drainage network in study area is dendritic in nature.

### 3.2 Climate and micro-meteorology

The climate of region is mainly tropical type. Monthly average of minimum temperatures recorded at IMD station Angul from 1991-2020, ranges from 13.6°C to 25.6°C and maximum temperature ranges from 28.7°C to 40.2°C and total of average monthly rainfall is 1272.6 mm.

The micro meteorological data of the core zone has been recorded using an automatic weather station from 1st March to 31st May 2022. The temperature ranged between 20.22°C to 43.74°C and relative humidity ranged between 36.6% to 86.4% during the monitoring period. The wind speed varied between 0.07 to 19.4 km/hr and the predominant wind direction was observed from south east with 14.5% of occurrences (including calm).

### 3.3 Ambient air quality

Ambient air quality study was monitored at 8 locations. One location was in the core zone (project area). Seven stations were in buffer zone at Chararhagarhia, Bhanuparha, Jharbhandh, Naraharipur Shasan, Motanga Meramandali Bazar and Gandijhara villages. Twenty four hour average PM10 level was found to range from 38.2 to 67.9  $\mu\text{g}/\text{m}^3$ , PM 2.5 was found to vary from 22.8 to 41.6  $\mu\text{g}/\text{m}^3$ , SO<sub>2</sub> from BDL to 16.2  $\mu\text{g}/\text{m}^3$  and NO<sub>2</sub> from 7.6 to 22.1  $\mu\text{g}/\text{m}^3$ . Carbon monoxide, Ammonia, Benzo(a) Pyrene, Benzene, Lead, Arsenic and Nickel were also measured and found within permissible limit or below detectable limit.

### 3.4 Water resource and quality

Brahmani river and it's tributaries control the drainage of the study area. Brahmani is a perennial river. The drainage pattern is dendritic in nature

Nine surface water samples were collected. These were (i) reservoir within existing plant area, (ii) Pond in Chararhagarhia village, (iii) Lingara nadi near Gandhijhara village (up stream), (iv) Lingara nadi near Motanga village

(down stream), (v) Pond near Chararhagarhia, (vi) Pond in Nimabahali village, (vii) Brahmani River near Kusnapanga village (up stream) (viii) Brahmani River near Bido village (down stream) and (ix) Canal in expansion area.

Eight ground water samples were collected. These were from (i) existing plant area (borewell), (ii) Chararhagarhia (handpump), (iii) Nuagan village (hand pump), (iv) Jharbandh village (hand pump), (v) Chitiparha village (hand pump), (vi) Meramandali village (hand pump), (vii) Shibapur Village (hand pump) and (viii) Galaparha village (hand pump). 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 except Total hardness, Total Alkalinity, Magnesium in Chararhagarhia village (handpump) water.

### **3.5 Land use pattern and soil quality**

Existing plant premises area is 21.257 hectares. Additional land required for expansion will be 37.869 hectares. The total plot area after expansion shall be 59.126 hectares. 37.869 hectares additionally required land area consists of 33.061 hectares private land and 4.808 hectares government land. It does not have any forest land.

Land use pattern of study area is available from Census 2011. The data shows that 51.12% is net area sown, 20.78% is area under non-agricultural uses, 11.80% is barren and un-cultivable land, 4.08% of total area is forest land, 3.77% is fallows land other than current fallows, 3.76% is permanent pastures and other grazing land, 2.55% is current fallows, 1.44% land under miscellaneous tree crops and 0.69% is culturable waste land.

Top soil samples were collected from four locations. One from existing core zone of the project site, two from expansion plant area in south direction and north direction and one from Chararhagarhia village at 0.5 km in west direction. Texture of soil is medium grained sand and dark brown to medium brown in colour.

The soil is slightly acidic to moderately alkaline in nature. Conductivity of soil shows it is salt free. Organic carbon in two soil samples is deficient and optimum in other two. Soil is deficient in nitrogen, phosphorous and potassium.

### **3.6 Noise and traffic volume**

Noise levels at eight stations were observed. One station was within the core area and seven within buffer area. Leq values observed during day time varies from 50.04 to 65.18 dB (A) and at night time varies from 39.55 to 57.20 dB (A).

A traffic density survey was conducted at two locations. The first was on NH55 from Angul to Dhenkanal (Near Nimabahali Bazar Village) at a

distance of 0.7 km north east and second was on road from NH 55 to Plant at a distance of 0.9 km in ENE. Total number of equivalent passenger car units were found as 28,665 and 595 per day respectively at the two locations.

### **3.7 Ecology**

There are no national parks or wildlife sanctuaries within 10 km radius. The nearest National Park is Simlipal (proposed) at a distance of 136.27 km in north east direction. The nearest sanctuary is Satkosia Gorge sanctuary at a distance of 21.25 km in south west. Mahanadi Elephant Reserve (proposed) is at a distance of 21.91 km in south west and Kahnejena-Anantpur elephant corridor is at a distance of 25.49 km in north west.

Forest of the study area are classified as Tropical Moist Deciduous Forest 3C by Champion and Seth. There are 13 trees, 7 shrubs, 3 herbs and 4 grasses in core zone. There are 41 species of trees, 2 species of bamboo, 15 species of shrubs, 8 species of herbs, 11 species of climbers and 4 species of grasses in buffer zone.

A total of 43 species of terrestrial fauna were recorded in the study area. These comprise 11 species of mammals, 11 species of reptiles, 42 species of amphibians, 19 species of birds and 21 fish species have been recorded by researchers at Brahmini river near Kamalanga.

### **3.8 Socio-economic conditions**

There is no habitation within the project area. There are no displacees. There are only land losers for the balance land to be acquired (33.061 hectares).

There are 147 inhabited villages and census towns in the buffer zone of the study area. The total population within the study area is 1,70,881 persons, as per Census 2011. It includes 89,198 males and 81,683 females. The schedule caste population is 23.05% and schedule tribe population is 5.25%. The average literacy rate is 71.29%. The literacy amongst women is lower at 30.88%. Main workers are 24.00% of the total population. Marginal workers are 10.52 % and 65.47% are non workers.

### **3.9 Places of archaeological/ historical/ tourist/ religious importance and other industries**

There is no important archaeological (ASI)/ historical place or other place of tourist or religious importance within the study area except village temples, mosques & other places of prayer. There are about 23 industries and mines within 10 km radius of the project. These are steel and ferro alloys manufacturing units, brick kilns and crushers.

## 4.0 ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

### 4.1 Topography and drainage

**Impact:** Permanent change in topography has occurred in 21.257 ha area in existing plant due to leveling and construction activities of the past. There will be permanent changes in topography in future due to leveling and construction in expansion area of 37.869 ha. This will be due to construction of buildings, plant facilities, tailing management facility, stock yards, area for solid waste management, green belt & plantation, administration buildings, water reservoir, roads, etc. The change in topography will require management of rain water flow in project area. There will be no impact on topography of the buffer zone.

One first order and one second order drain is visible on toposheet. However, on ground, these are low lying areas where villagers carry out agriculture also. Hence, well defined channel do not exist on ground. However, the runoff from these areas will have to be managed. Impact on the drainage in the buffer zone is not anticipated because no construction will be taking place outside project boundary.

**Management:** The change in topography in the core zone will be permanent and irreversible. Excavated soil will be used in leveling, filling and landscaping to minimise the impact of change in topography. Changes in drainage shall have to be managed through construction of storm water drains. The flow from the low lying areas shall be realigned during construction and operation through linear drainage system connecting the flow from western side to the Lingara Nadi on eastern side of the plant. The flow volume will reduce by the quantum used for rain water harvesting. Thus, the impact of the new construction on drainage 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 proposed ferro alloys plant, power plant and other allied activities will not tend to influence the climate. However, emission of greenhouse gases due to combustion of fossil fuels and localised temperature rise in vicinity of chimneys and buildings will be there.

**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<sub>2</sub> emissions by using better quality raw materials and fuels. Regular maintenance of all fossil fuel based machinery and equipment shall be done to ensure that their emissions remain within limit.

### 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. During operation phase, the emissions will be due to process stack emissions, material handling in stock yards, crushing, fugitive dust within project and due to transportation.

**Management:** During construction, the dust generated due to excavation, leveling and transportation activities will be control 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 bag filters will be installed to control the particulate emission from the furnaces. Electrostatic precipitator shall be installed at the power plant. Sprinkling systems will be installed during crushing and slag processing to 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 mathematical model. There will be an increase by  $21.79 \mu\text{g}/\text{m}^3$ ,  $15.18 \mu\text{g}/\text{m}^3$ ,  $33.97 \mu\text{g}/\text{m}^3$  and  $10.22 \mu\text{g}/\text{m}^3$  for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>x</sub>, respectively. The traffic movement due to project, on public roads will also cause an increase in pollutants. This will cause an increase by  $0.14 \mu\text{g}/\text{m}^3$ ,  $0.03 \mu\text{g}/\text{m}^3$ ,  $0.00 \mu\text{g}/\text{m}^3$  and  $0.03 \mu\text{g}/\text{m}^3$  for PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> and NO<sub>2</sub>, respectively. After these increments, the impact of the project will remain within permissible limits of National Ambient Air Quality Standards 2009, for business as usual scenario.

### 4.4 Water environment

**Impact:** During construction phase, the 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. 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 Lingara nadi, Brahmani river and harvested rain water. Drinking water will be sourced from borewells. The total waste water generation from the existing & proposed ferro alloys plant will be 11 KLD.

**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.

During operation phase, the discharge will be from cooling water system. It will be collected in water tank and used for dust suppression and greenbelt. The sewage from toilets, washrooms and canteen shall be treated in sewage treatment plant and reused. Sludge removed will be used as manure. The water in the tailings of beneficiation plant will be 100% recirculated back into the beneficiation plant in a close loop. The project will have zero liquid effluent discharge in non-monsoon. In monsoons, runoff water as well as unutilised treated water shall be discharged.

The rainwater falling on rooftops of buildings, roads and open areas will be routed to the raw water reservoir for storage and reuse. Rain water from green area will be recharged to the ground through trenches.

#### 4.5 Land use and soil quality

**Impact:** Existing plant premises area is 21.257 hectares and under industrial use. Additional land required for expansion will be 37.869 hectares whose pre-industrial use is 43.97% agriculture, 41.86% industrial and 14.18% others (grazing, barren, water body, road & debasthali). The total plot area after expansion shall be 59.126 hectares. Construction and development has taken place in 21.257 hectares and will take place in 37.869 hectares. There will be construction of roads, water reservoir, buildings, raw material shed, product shed, green belt, etc. The construction activities will disturb the top soil. The temporary storage yard for raw material and slag can also impact the soil quality.

**Management:** The topsoil generated during construction in expansion area will be removed carefully, stored temporarily and spread over area where additional plantation is proposed. Stabilisation of soil with plants will minimise erosion. One third 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. The land use of the expansion area will permanently become 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 90-110 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:** Raw material transportation is being carried out and shall be carried out after expansion also from various locations in Odisha, Chhattisgarh and Maharashtra. Manufactured finished products will be sold in the open markets available in Dhenkanal, Bhubaneshwar and Talcher city. There will be additional to and fro movement of 1028 trucks per day of 20-25 tonnes capacity due to expansion. This is equivalent to 3084 passenger car units. The impact of traffic will be felt on the roads and adjoining habitation. They will utilise 3.43% of the maximum carrying capacity of the approach road (7 m width) from NH-55 and 1.46 % of the NH-55 (18 m width).

**Management of traffic:** 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 every three months or more depending upon the category of vehicle. 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 gate.

#### 4.8 Solid waste

**Impact:** During the construction phase, the generation of solid waste will be low. It will comprise of waste construction material and used packaging material, boxes, containers, etc. In the operation phase, the main solid waste generated will be slag from ferro alloys production. After metal recovery from slag, the reject slag will be the main waste. Another solid waste will be the dust collected in bag filters. There shall be fly ash and bottom ash from the boiler of the power plant and fly ash from electro static precipitator attached to power plant. Domestic waste shall be generated from workers during construction as well as operation phase.

**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 and used as manure.

Solid waste management during operation shall be as follows:

- **Ferro manganese slag-** 47% directly reusable in ferro-silicon manufacturing in-house and balance sold to other manufacturers

- **Ferro silicon slag-** 100% reusable in in house sinter plant.
- **Ferro-chrome slag-** 100% to be sent for Chrome recovery (~5%) through Chrome Beneficiation Plant. After Toxicity Characteristic Leaching Procedure (TCLP) test on remaining material (~95%), it will be used as landfill/ base material in roads (when Chromium within permissible limits), else sent to the nearest Treatment, Storage, and Disposal Facility (TSDF) facility. Fe-Cr slag is also reusable for making in refractory castables in non recovery coke oven batteries, coal-fired power boilers, industry furnaces, etc.
- **Silico manganese slag** - 100% to be sent to metal recovery plant for Manganese recovery (~5%), balance (95%) usable as construction sand
- **Pig iron slag** - 100% to be sent to metal recovery plant for Fe recovery(~5%), balance (95%) usable as construction sand
- **Rejects from metal recovery plant (silico-managnese/ pig iron)** - 100% reusable as construction sand, as road base, filling and construction
- **Rejects from chrome beneficiation plant** - after dewatering from tailing, 100% reusable as road base, filling and construction after Toxicity Characteristic Leaching Procedure (TCLP) test & when chromium will be within permissible limits
- **Sinter plant fines** shall go back into the sinter plant
- The **fines collected in bag filters** and from material handling will be used for sinter making. The sinter will be used in ferro alloys manufacturing.
- Thus, entire waste from the submerged arc furnace will be re-utilisable.
- **Ash from power plant & electro static precipitator** - 100% reused as per Fly Ash Utilisation Notification 1999 and its amendments of 2003, 2009, 2016, 2022. Sent for cement making, brick making, block making, aggregate making and road making.
- The yards for raw material, slag and ash will be laid on top of a liner to avoid leaching of contaminants during monsoon.

#### 4.9 Ecology

**Impact:** Since the boundary wall of the existing plant has already been made in the past, there is little interaction of the existing project area with surrounding large sized fauna. Similarly, boundary wall of proposed expansion area will also restrict any man-animal conflict. There is no forest land in the project area. Minimum adverse impact of proposed project is anticipated on the flora or fauna in the immediate surroundings. This

conclusion is based on the low biodiversity level of the surrounding areas and air quality prediction modelling, which indicates that the average resultant pollutant values shall remain within the national ambient air quality standards.

**Management:** Total existing plant area is 21.257 hectares out of which 7.082 hectares is green belt. This is 33 % of existing plant area. After expansion, plant area will become 59.126 hectares and green belt will be 33.11% (19.579 hectares) of the plant area. Plantation of saplings at the rate of 2500 trees per hectare shall be carried out to make a three-tier green belt along the peripheral boundary and in designated plantation area. Hence, approximately 12500 trees will be planted for expansion area. 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 Siris, Neem, Mango, Peepal, Kaju, Bel, Kendu, Mahul, etc. and bio indicators such as Gulmohar.

#### 4.10 Socio-economics

**Impact:** There are no households to be displaced from project site. There are only land losers in the expansion area land. 16.16 ha private land directly has been purchased from land owners. 16.90 hectares private land has to be directly purchased from land owners. Balance government land of 4.808 hectares is also to be obtained. Approximately 300 persons will be required during construction phase. During operation phase, 1500 people will be required for direct employment. In addition to this, there will be similar number of persons indirectly employed due to the project.

**Management:** Most of the work force required for construction and operation phase will be taken from the surrounding areas, to the extent possible. 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 local persons to become employable. Thus, the direct and indirect employment will lead to economic growth. The company will also carry out activities for social welfare. The commitments made during public hearing shall also be fulfilled.

#### 4.11 Occupational Health

The Company has and will have a safety officer who will be the Deputy Manager (Safety). He has and will develop, implement and monitor Occupational Health and Safety Policy, Programs and Procedures. A first aid center is there in existing plant area, which will be enhanced and used for expansion. It will be equipped and manned by competent person. First-aid boxes will be provided and maintained in different locations. Personal protective equipment's (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

After analysis of alternative sites, the location of the expansion plant has been chosen because this proposed project site is adjacent to the existing plant. It is most suitable from the point of utilising existing resources and cost control. The technologies which will be used in the proposed plant are primarily used by many ferro alloys industries. Submerged arc furnaces have been chosen as the manufacturing route.

## 6.0 ENVIRONMENTAL CONTROL AND MONITORING ORGANISATION

Rungta Mines Ltd. already has an Environment Management Department at the headquarter. There is an environment cell at the project also. They both are and 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. 231.4 lakhs and recurring expenditure during operation will be Rs. 74.52 lakhs /year for expansion phase.

## 7.0 ADDITIONAL STUDIES

**Risk Assessment :** All types of industries face certain types of hazards which can disrupt normal activities abruptly. The 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 has been and will be set up with communication facility. The emergency team is and shall be headed by the plant manager, who is and 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 BENEFITS

The additional direct employment generation from expansion project will be 1500 persons during operation. In addition to this, there will be similar number of persons indirectly employed due to the project. As majority of unskilled and semi-skilled persons will be from the surrounding villages, 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, schools, etc.) and for activities desired by villagers. The amount earmarked shall be as per the corporate social responsibility program under the Companies Act

2013, which requires 2% of the average profit of the previous three years to be spent annually.

## 9.0 ENVIRONMENT MANAGEMENT PLAN

The environment cell at site 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 dust extraction system and bag filter connected to submerged arc furnace, electro static precipitator connected to power plant chimney, sprinkling on roads and material handling areas, green belt for absorption of pollutants.
- **Noise level management plan:** plant machinery will be established in enclosed shed to prevent noise propagation to surrounding, machines will have vibration dampners, diesel generator set will have acoustic enclosure, boundary wall and green belt will also absorb and mitigate noise.
- **Solid waste and hazardous waste management plan:** Slag generated from Ferro Alloys plant is 100% reuseable for direct use or metal recovery. After metal recovery, the rejects have several uses such as construction material or filling of low lying areas. The fines generated from bag filter will be recycled in the production process after sintering. The fly ash from electro static precipitator and ash from boiler is usable for cement making, brick making, block making, aggregate making and road making.
- **Effluent management plan:** There will be no process discharge from the plant. The blow down from the cooling system of the furnaces and power plant shall be reused for sprinkling and green belt watering.
- **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, recharged to the extent possible and sent to settling tank prior to release to natural drain.
- **Occupational health and safety management plan:** Pre-induction and during employment monitoring of occupational health shall be carried out as per Odisha Factories Rules 1950. First aid room with necessary medicines will be maintained as per norms. Personal protective equipment (PPE) will be provided to workers. Regular training shall be provided for safe handling of material and machines. Company shall put 100% efforts for a zero accident rate. These measures are already in place for existing plant.

- **Proposed Green belt development plan:** shall be undertaken over 33% of the plot area comprising of 12.497 hectare land and planted with native species.
- **Socio economic management plan:** social welfare measures to fulfill to the issues raised during public hearing.

The total investment for the proposed project is Rupees 950 Crores. The environmental management cost for the project shall be Rs. 3842.52 capital cost and Rs. 1692.14 lakhs/ annum recurring cost for expansion phase. 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, which has been renewed as per procedure since (latest certificate no. TC-6337). In 2012, lab had been accredited under Environment Protection Act (EPA) by Ministry of Environment, Forest & Climate Change, Government of India and renewed till 2024. 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 was accredited by QCI-NABET for preparing EIA/EMP Reports vide Accreditation Certificate No. NABET/ EIA/2225/IA 0096 valid till 29.03.2025.