

Pre-Feasibility Report for  
Expansion of  
Integrated Steel Plant  
at Raigarh  
of  
M/s Jindal Steel & Power Ltd.  
(JSPL)  
(from 3.6 to 7.2 MTPA)

January 2019

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## 1.0 Introduction

Jindal Steel & Power Ltd. is operating a steel plant with capacity of 3.6 MTPA at Raigarh, Chhattisgarh. The Company produces steel through coal-based DRI-BF-EAF route. List of units installed at the existing plant along with the capacities is given in **Table 1**.

**Table 1: List of units in existing 3.6 MTPA integrated steel plant**

S No.	Plant Unit	Capacity as per EC dated 29.04.2016	Units
1.	DRI I	0.6	MTPA
2.	DRI II	0.72	MTPA
3.	Coke Oven	0.8	MTPA
4.	Sinter Plant	2.85	MTPA
5.	Blast Furnace I	0.8	MTPA
6.	Blast Furnace II	2.25	MTPA
7.	SMS I	1.25	MTPA
	SMS II	1.1	
	SMS III	1.25	
8.	Rail and Universal Beam Mill (RUBM)	0.75	MTPA
9.	Plate Mill	1.0	MTPA
10.	Medium and Light Structural Mill (MLSM)	0.7	MTPA
11.	Lime-Dolime kilns	0.4165	MTPA
12.	Submerged Arc Furnace (SAF)	0.06	MTPA
13.	Producer Gas Plant	79200	Nm <sup>3</sup> /hr
14.	Oxygen Plant	37683	Nm <sup>3</sup> /hr
15.	Captive Power Plant	299	MW

## 2.0 Brief Description of the proposed project

The Company now proposes to expand its steel manufacturing facilities by optimizing the existing DRI, Sinter plant and coke oven along with addition of new units such as Sinter Plant, Coke Oven, Blast Furnace, Lime Kilns, SMS, Casters, etc. The expansion is proposed adjacent to the existing plant and on the land which is already under possession of the company.

The capacities of the existing units after optimization and the new facilities of the expansion project are given in **Table 2 & 3 respectively**.

**Table 2: List of existing units to be optimised**

S No	Existing Plant	Existing capacity (MTPA)	Capacity (MTPA) after proposed capacity optimization
1.	DRI	1.32	1.45
2.	Sinter Plant	2.85	3.15
3.	Coke Oven	0.8	0.9

**Table 3: List of new units to be installed in Expansion Project**

S No.	Plant	Unit	Capacity
1.	Sinter Plant II	MTPA	5.0
2.	Coke Oven II	MTPA	2.0
3.	Blast Furnace III	MTPA	3.6
4.	Lime-dolo plant II	MTPA	0.5
5.	SMS (BOF) IV	MTPA	3.6
6.	Rolling mills	MTPA	3.0
7.	Oxygen Plant II	TPD	3000

### 3.0 Steel industry Scenario

As per the Annual Report 2017-18 of Ministry of Steel, the capacity for domestic crude steel production was 128.77 million tonnes per annum (MTPA) during the year 2016-17 whereas the actual crude steel production for the year 2016-17 was 97.936 million tonnes.

#### 3.1 Import/Export of Finished Steel

Production for sale of total finished steel (alloy/Stainless + non-alloy) stood at 101.805 million tonnes during 2016-17 and India became a net exporter of total finished steel in 2016-17 as well as during April-December 2017-18.

The **Table 4** below shows the trend in production for sale, import, export and actual consumption of finished steel (alloy/stainless + non-alloy) in the country for the last five years and April-December 2017-18.

**Table 4: Trend of Steel in Last Five Years**

(in million tonnes)

Description	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18 (April-December)
Production for Sale	81.681	87.675	92.156	90.981	101.81	79.049
Imports	7.925	5.45	9.32	11.712	7.227	6.097
Export	5.368	5.985	5.596	4.079	8.243	7.606
Actual Consumption	73.483	74.096	76.992	81.525	84.042	64.868

#### 3.2 Need and Importance to the Country

As per the National Steel Policy, the objective is to build a globally competitive industry. It is anticipated that a crude steel capacity of 300 MT will be required by 2030 based upon the demand projections. Thus achieving crude steel capacity of upto 300 MT will require extensive mobilization of natural resources, finances, manpower and infrastructure including land.

The proposed expansion of the existing steel plant will assist in our endeavour to meet the projected demand of steel in the country.

#### 4.0 Employment potential

Employment generation from the proposed expansion project is envisaged to be around 8250 (approx. eight thousand two hundred fifty in nos.)

#### 5.0 Location and site details

The expansion project of the existing steel plant is proposed in villages Kalmi & Gorka in District Raigarh of Chhattisgarh State. No alternate site has been considered for the proposed expansion project as the proposed project is an expansion of the existing integrated steel plant and thus the site selected is adjacent to the existing plant.

The nearest railway station is Kirodimal Nagar which is located on the Mumbai – Howrah main railway line. The nearest port is Paradip port.

The latitude and longitude of the proposed site based on google earth are as below:

1. 21°55'15.04"N, 83°21'29.08"E
2. 21°55'10.78"N, 83°21'40.32"E
3. 21°55'1.19"N, 83°21'53.22"E
4. 21°54'47.24"N, 83°22'31.47"E
5. 21°54'48.05"N, 83°22'11.06"E
6. 21°54'44.06"N, 83°22'8.56"E
7. 21°54'37.51"N, 83°22'24.70"E
8. 21°54'15.78"N, 83°21'59.62"E
9. 21°54'28.54"N, 83°21'42.31"E
10. 21°54'36.99"N, 83°21'48.01"E
11. 21°54'44.00"N, 83°21'29.00"E

Location of the proposed site on the topography sheet is given in **Figure 1**. The layout designed for the expansion project is given in **Figure 2**. It is pertinent to mention that the layout may change during engineering of the project.

## 5.1 Availability of Land

The area for the proposed expansion project is expected to be 163.2 hectares. The land has been already acquired and is under possession of the Company. Breakup of the proposed land is given in **Table 5**.

**Table 5 Land break-up of the proposed expansion project**

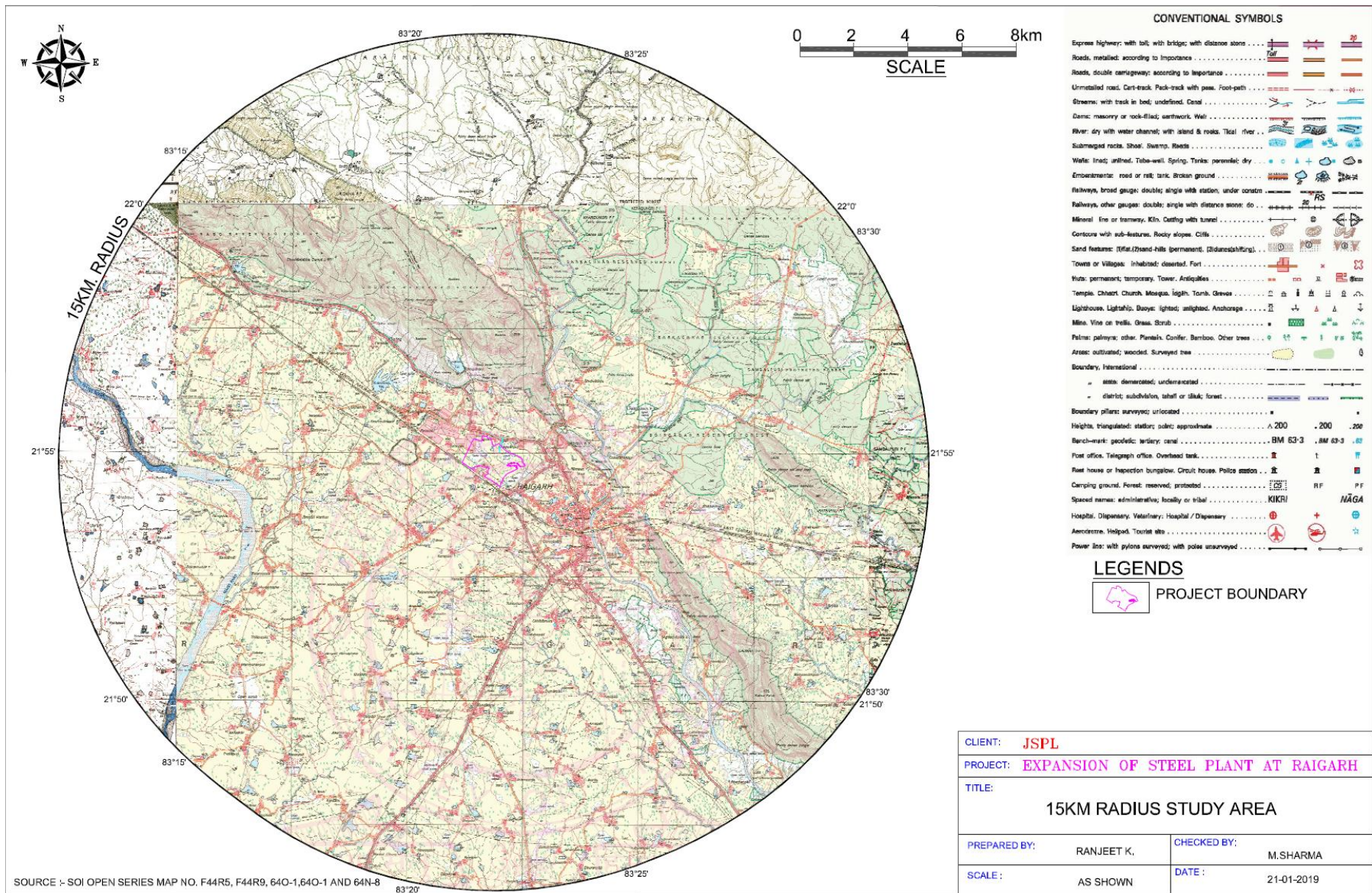
S No.	Village	CSIDC land in Ha	Lease Purchased land in Ha. (Direct)	Forest land in Ha	Total land in Ha
1.	Kalmi	122.779	12.0	8.039	142.818
2.	Gorka	7.382	5.0	8.0	20.382
Total		130.161	17.0	16.039	163.20

## 6.0 Availability of Power

Power requirement for the expansion project is estimated to be around 200 MW. The Company operates a captive power plant at Raigarh and another Captive Power Plant at Dongamahua. Power requirement for the expansion project will be met from the existing captive power plants.

## 7.0 Availability of water

Source of water for the existing plant is surface water from Mahanadi and Kelo rivers. Raw water for the construction and operational phase of the expansion project will be sourced from Mahanadi and/or Kelo rivers. Total water requirement for the proposed expansion project is estimated to be 1155 m<sup>3</sup>/hr.



**Fig 1: Toposheet**



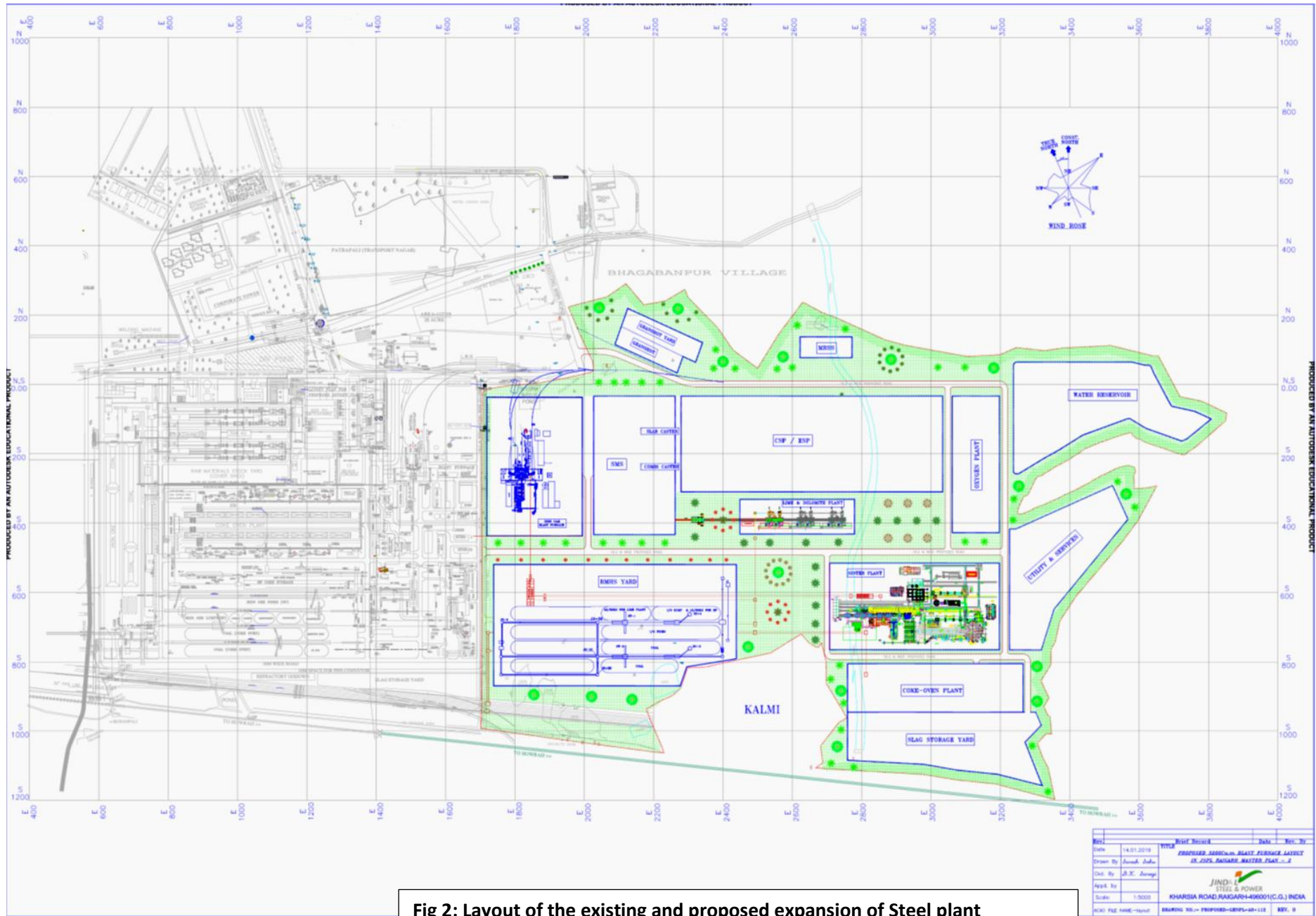


Fig 2: Layout of the existing and proposed expansion of Steel plant

## **8.0 Project Description**

The expansion phase of the steel plant will comprise of optimisation of existing DRI, Sinter and Coke Oven plants along with setting up of additional new units like Blast furnace, Sinter plant, Coke Oven, BOF, Rolling mills etc.

### **8.1 Optimisation of existing facilities:**

#### **Sinter Plant:**

The capacity utilisation of existing Sinter plant will be increased from 2.85 to 3.15 MTPA by carrying out the following activities:

1. Increasing the calcined lime injection
2. Increase in Bed Height
3. Increase in availability of the plant.
4. By using high grade iron ore fines

#### **DRI Plant (DRI I & DRI II):**

The existing DRI plant consists of 10 nos. of kilns installed in two phases i.e. DRI I with 06 nos. of kilns and DRI II with 04 nos. of kilns. The capacity utilisation of existing DRI plant will be increased from 1.32 to 1.45 MTPA by following activities:

1. Use of high fixed carbon and low ash coal
2. Switching from iron ore to 100% pellet

#### **Coke Oven:**

The Coke Oven plant is heat recovery type with an annual capacity of 0.8 MTPA. The plant consists of 16 nos. of batteries. It is proposed to enhance the annual capacity from 0.8 MTPA to 0.9 MTPA by following improvements:

1. Revision of Coal Blend Specification
2. Increase in Coal Cake Height
3. Increase in Coal Cake Bulk Density
4. Increase in Coking Hours

## 8.2 New Facilities

The facilities in the proposed plant expansion will comprise of new Sinter Plant, Blast Furnace, Basic Oxygen Furnace, Oxygen plant, Coke Oven Plant, Rolling mills and lime-dolo plant. The flow sheet of the Integrated Steel Plant after expansion is given in **Figure 3**.

The expansion project will comprise of the following new units:

### **Blast Furnace (BF III):**

The proposed expansion will comprise of a new blast furnace with 3.6 MTPA capacity. The feed mix considered for the new blast furnace is envisaged as Sinter-70%, CLO/Pellet-30% & Coke @ 385Kg/T of hot metal. The new Blast furnace will be located in such a way that hot metal from BF-3 can be transported to the SMS-2 through existing hot metal track.

### **Sinter Plant (Sinter Plant II)**

A new sinter plant with capacity of 5 MTPA is planned in the proposed expansion project to meet the demand of the new blast furnace mentioned above. The proposed Sinter plant will be designed such that blast furnace gas is used as fuel for the new Sinter Plant.

### **Coke Oven (Coke Oven II)**

The existing coke oven at the steel plant is non-recovery type. However it is proposed to install a by-product recovery type coke oven to meet the demand of coke for the new blast furnace and to meet existing shortfall. The capacity envisaged for the new Coke Oven is 2 MTPA.

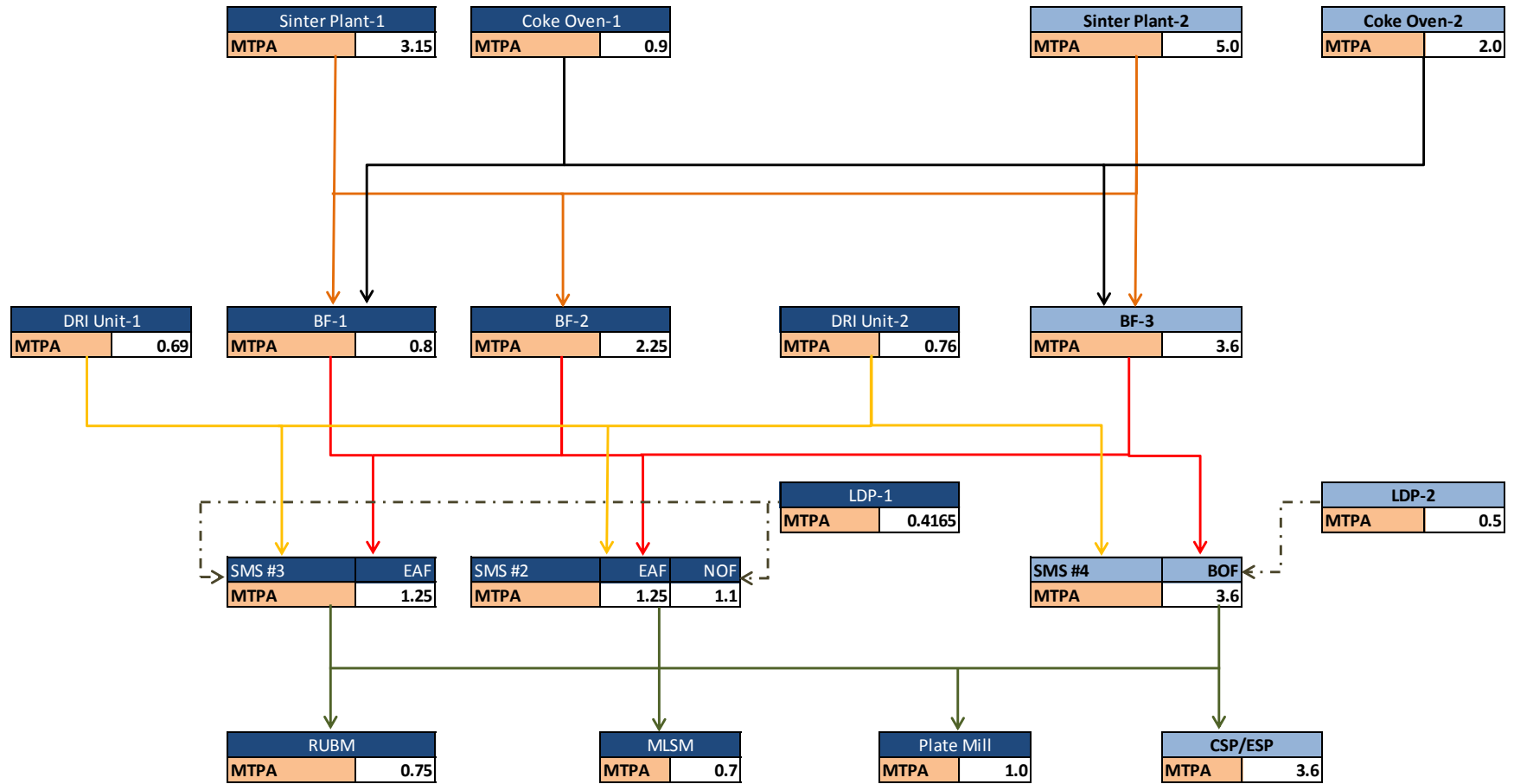
### **Steel Melting Shop (SMS IV)**

A new Basic Oxygen furnace (BOF) with capacity of 3.6 MTPA along with associated facilities like LF, RHOB (Ruhrstahl-Hereaus Oxygen Blowing) and caster machine of matching capacities will be installed in expansion area.

### **Lime Plant (Lime Plant II)**

New Lime plant will have a capacity of 0.5 MTPA. The capacity of the lime kiln plant has been decided so as to cater to existing shortfall and future requirement of the expansion phase.

### Material Flowsheet for JSPL, Raigarh after expansion



- Legend**
- Sinter
  - Coke
  - Sponge Iron
  - Hot Metal
  - - - - -> Lime & Dolo
  - Semi-Finished
  - New Set-up

**Fig 3: Flowsheet of the Steel plant**

## Rolling Mills

Rolling mills with capacity of 3 MTPA will be installed in the expansion phase. The rolling mills will comprise of direct hot rolling facilities to reduce energy consumption.

## Oxygen Plant (Oxygen Plant II)

An Oxygen Plant of about 3000 TPD capacity has been envisaged to meet the requirement of oxygen, nitrogen and argon for the proposed expansion. Oxygen will be consumed in blast furnace for oxygen enrichment of blast, the Steelmaking shop for steel making, in the continuous casting plant to meet the cutting needs, and also to meet the general purpose requirement of various shops of the steel plant. Argon will be required for rinsing in ladles and also to maintain inert atmosphere in the mould/ tundish. Nitrogen will be required for purging of gas pipelines, blast furnace top charging equipment, etc. Oxygen, nitrogen and argon will be produced by air separation process based on low pressure cryogenic cycle and double column rectification system.

## 8.3 Raw Material required

The raw materials like iron ore, coking coal, limestone, dolomite etc. for proposed expansion shall be received inside the steel plant by railways. The Company already has an existing railway siding at Kirorimal Nagar which is adjacent to the existing steel plant.

Additional facilities of unloading and storage shall also be developed from where stored raw materials will be transported.

The annual requirement of the raw materials and the sources of procurement for the proposed expansion is given below:

**Table 6: Envisaged quantity and source of raw materials for proposed expansion**

Raw material	Annual Requirement (million tons)	Source
Iron Ore fines	3.89	Orissa, Chhattisgarh
Pellet	1.97	Orissa, Chhattisgarh
Coking Coal	2.96	Australia
Limestone	0.70	Chhattisgarh, Madhya Pradesh
Dolomite	0.35	Chhattisgarh
Pulverised Coal	0.84	Australia

**Note: Raw material quantities are based upon estimation and may change.**

## 8.4 Site analysis

The proposed site for expansion project is located adjacent to the existing steel plant in Raigarh district of Chhattisgarh.

Mumbai – Howrah main line of South – Eastern Central Railway is passing along the boundary of the existing plant. The nearest railway station is Kirodimal Nagar. The nearest port is Paradip port and Kolkata is about 589 KM on the east and state highway is near to the plant location.

The proposed land is in possession of the company and the existing land use pattern is industrial.

The Company already has township constructed inside the existing plant premises for its employees.

## 9.0 Climatic Data

The Climate of the area is characterised by very hot summer, mild winters and heavy well distributed rainfall.

The year may be divided into four seasons. The summer season lasts from March to the end of May. The period from June to September is the rainy season. October and November constitute the post monsoon season and the cold season is from December to February

### 9.1 Rainfall:

**Table 7: Monthly Rainfall in last 6 years**

Year	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
2013	0.0	0.0	0.0	20.3	0.0	146.2	386.1	371.1	111.3	186.3	0.0	0.0	1221.3
2014	0.0	0.0	0.0	0.0	-	148.2	461.0	367.5	214.2	36.9	0.0	0.0	1227.8
2015	0.0	0.0	54.2	1.6	11.5	897.6	543.3	365.6	247.8	106.1	16.7	0.0	2244.4
2015	0.0	0.0	8.4	0.0	0.0	263.2	335.5	390.1	171.5	20.4	0.0	3.0	1192.1
2016	4.0	6.3	4.3	0.7	3.5	99.3	394.0	406.7	289.1	44.5	0.0	0.0	1252.4
2017	0.0	0.0	0.0	0.0	4.5	203.7	332.9	223.8	208.2	47.2	0.3	0.0	1020.6

\*Source-IMD website

## 9.2 Temperature:

The monthly averages of daily maximum and minimum temperatures during the year 2018 are given below.

**Table 8: Monthly Average of daily max. & min. temperature**

Month	Temperature-°C	
	Minimum	Maximum
January	8.5	31.2
February	12.2	39.6
March	17.4	41.7
April	21.5	42.4
May	23.0	46.6
June	20.5	42.6
July	23.8	37.1
August	22.7	37.2
September	22.2	36.0
October	18.2	35.4
November	13.9	33.9
December	6.6	29.5

## 10.0 Infrastructure

The Company is operating a 3.6 MTPA Integrated Steel plant at Raigarh, Chhattisgarh. Township will facilities like school, club house, gym, community centre, swimming pool, entertainment facilities like auditorium etc. has already been established for executive and non-executive employees within the existing plant boundary.

Fortis Healthcare operates and maintains the 100-bed O.P. Jindal Hospital established by the company in Raigarh. The hospital caters to the employees, their families and the general population of Raigarh and surrounding areas.

A water treatment plant with RO facility has been installed for providing drinking water to the Township and offices. The Company has 5 nos. of sewage treatment plants for treating domestic wastewater and the treated water is reused for horticulture purposes.

Further the company has established an air strip within the plant boundary for better connectivity. The plant is well-connected by rail and is on Howrah-Mumbai line. The Company has already developed a railway siding for transport of the raw material and products. The same railway siding will be used for transporting raw material and products for the expansion project.

## **11.0 Rehabilitation and Resettlement (R&R) Plan**

The expansion project of the existing plant is proposed to be located on land which is already in possession of the Company and which is adjacent to the existing steel plant.

## **12.0 Project Schedule & Cost Estimates**

Estimated project cost for the proposed expansion of the steel plant is approximately Rs. 10,813 Crores. Time period of proposed project construction is estimated to be 48-60 months from the zero date i.e. after finalisation of technology supplier.

## **13.0 Analysis of Proposal**

The proposed expansion will result in achieving the objective set under National Steel Policy, 2017. Implementation of the proposed expansion will have the following benefits on the local people:

1. The project will generate jobs for the skilled local people from the nearby villages.
2. In-flow of people from outside to the site will result in generating other avenues of revenue generation for local people and help in diversifying the society.
3. On implementation and operation of the expansion plant, increased profits would benefit in CSR expenditure.