PRE-FEASIBILITY REPORT

By

Shyam Steel Manufacturing Limited

[Expansion of Steel Plant – DRI Kilns (Sponge Iron from 1,80,000 TPA to 7,57,500 TPA), Induction Furnace (MS Ingots / Billets/ Hot Charging from 2,17,800 TPA to 6,13,800 TPA), New Electric Arc Furnace (1,98,000 TPA), Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod - 2,00,000 TPA to 6,29,000 TPA), Ferro Alloys (32,400 TPA to 81,000 TPA), WHRB based Power Plant from 8 MW to 50 MW, AFBC based Power Plant from 7 MW to 57 MW, New Galvanization Plant (1,00,000 TPA), New Oxygen Plant (4000 TPA), New I/O Beneficiation Plant (8,00,000 TPA – throughput), New Pellet Plant (6,00,000 TPA) and Dropping Sponge Iron briquette, Coal / Coke / Chrome fines briquette, Mini Blast Furnace, Sinter Plant]

at

J.L.No. 11, Jemua Mouza, Mejia Block,

Bankura District, West Bengal-722143

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Chapter –1:EXECUTIVE SUMMARY

1.1 SALIENT FEATURES OF THE PROJECT

Shyam Steel Manufacturing Ltd. (Formerly Sova Ispat Ltd.) is an existing plant located J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal-722143. Existing plant has obtained Environment Clerance from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 4th August 2008. Accordingly obtained Consent to Establishment and Consent to Operate from the WBPCB for few units and same are under operation. Now, as part of expansion, company proposed to expand the existing plant as mentioned below:

S.No.	Unit (Product)	Configuration for which CTE / EC Granted (J-11011/ 724/ 2007- IA II (I) dated 04.08.08, 18.04.12, 06.02.15 & 27.02.17)	Existing units commissioned / Under Implementation as per EC	Proposed Expansion	Final Configuration after Proposed Expansion
		[1]	[2]	[3]	[4] = [2] + [3]
1	Iron Ore Beneficiation Plant (Beneficiated Iron Ore)	Nil	Nil	8,00,000 TPA throughput (6,80,000 TPA – Beneficiated Iron ore)	8,00,000 TPA throughput (6,80,000 TPA – Beneficiated Iron ore)
2	Pellet Plant (Pellet)	Nil	Nil	6,00,000 TPA	6,00,000 TPA
3	DRI Kilns (Sponge Iron)	3,60,000 TPA (3X300 TPD + 3X100 TPD)	1,80,000 TPA (1X300 TPD + 3X100 TPD)	Instead of remaining 1,80,000 TPA (2 x 300 TPD), now proposed to install 5,77,500 TPA (5 X 350 TPD)	7,57,500 TPA (1X300 TPD + 3X100 TPD + 5X350 TPD)
4	Induction Furnace (MS Ingot/Billet/ Hot Charging)	3,56,000 TPA	2,17,800 TPA (6 X 11 T)	Instead of remaining 138200 TPA, now proposed to install 3,96,000 TPA (8 X 15T)	6,13,800 TPA (6 X 11 T + 8 X 15 T)

S.No.	Unit (Product)	Configuration for which CTE / EC Granted (J-11011/ 724/ 2007- IA II (I) dated 04.08.08, 18.04.12, 06.02.15 & 27.02.17)	Existing units commissioned / Under Implementation as per EC	Proposed Expansion	Final Configuration after Proposed Expansion
		[1]	[2]	[3]	[4] = [2] + [3]
5	Electric Arc Furnace with 30 T Laddle Refining Furnace and AOD Converter (Bloom)	Nil	Nil	1,98,000 TPA (1 x 30 T)	1,98,000 TPA
6	Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod)	3,15,000 TPA	2,00,000 TPA (Under Implementation)	Instead of remaining 1,15,000 TPA, now proopsed to install 4,29,000 TPA (2 x 650 TPD)	6,29,000 TPA
7	Ferro Alloy Plant (FeSi/FeMn/SiMn/FeCr)	55,000 TPA	2 x 9 MVA (FeMn 32,400 TPA / SiMn 32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA)	Instead of remaining 1 x 9 MVA, now proposed to install 3 x 9 MVA (FeMn 48,600 TPA / SiMn 48,600 TPA / FeCr – 40,500 TPA / FeSi – 23,400 TPA)	5 x 9 MVA (FeMn 81,000 TPA / SiMn 81,000 TPA / FeCr – 67,500 TPA / FeSi – 39,000 TPA)
8	Power Plant (WHRB)	32 MW	8 MW	Instead of remaining 24 MW, now proposed to install 42 MW (40 MW + 2 WM)	50 MW
9	Power Plant (AFBC)	20 MW	7 MW	Instead of remaining 13 MW, now proposed to install 50 MW	57 MW

S.No.	Unit (Product)	Configuration for which CTE / EC Granted (J-11011/ 724/ 2007- IA II (I) dated 04.08.08, 18.04.12, 06.02.15 & 27.02.17)	Existing units commissioned / Under Implementation as per EC	Proposed Expansion	Final Configuration after Proposed Expansion
		[1]	[2]	[3]	[4] = [2] + [3]
				(2 x 25 MW)	
10	Galvanization Plant	Nil	Nil	1,00,000 TPA	1,00,000 TPA
11	Oxygen Plant	4,000 TPA	Nil	Instead of 4,000 TPA of Earlier EC, now proposed to install 4,000 TPA	4,000 TPA
12	Cement Plant	75,000 TPA	75,000 TPA	Nil	75,000 TPA
13	Sponge Iron Briquette	60,000 TPA	Nil	Nil	Dropping Now
14	Coal / Coke / Chrome fines Briquette	90,000 TPA	Nil	Nil	Dropping Now
15	Mini Blast Furnace-165 M^3 (Pig iron)	1,20,000 TPA	Nil	Nil	Dropping Now
16	Sinter Plant -15M^2 (Sinter)	80,000 TPA	Nil	Nil	Dropping Now

1.2 PROJECT PROPONENT

Shyam Steel Manufacturing Limited is a group company of Shyam Steel Industries Group , which was Established in 1953, Shyam Steel Industries Ltd, one of the group company of Shyam Steel Group, is one of the leading primary steel producers in India, manufacturing TMT Rebar and Structural steel. Guided by a philosophy to produce safe and sustainable steel, it is a pioneer in quality steel products, operating with cutting edge technology in order to meet the stringent requirements of its reputed customers both in India and abroad.

Operating for over six decades and now an INR 15 billion group, Shyam Steel has emerged as a large, growing, competitive and multi-product steel organization by delivering quality material through innovation, excellence and dedication.

The products of the company are manufactured at its state-of-the-art integrated steel plant in Durgapur and marketed under the brand SHYAM. Shyam Steel's flagship product – Shyam

TMT Rebars are earthquake proof and corrosion resistant. Shyam TMT Rebar has a wide market presence across various infrastructure segments including rail, roads, bridges, ports, airports, defence and energy.

Name of Directors of Shyam Steel Manufacturing Limited

- Shri Govind Beriwal
- Shri Lalit Beriwala

Chapter – 2: INTRODUCTION OF THE PROJECT / BACKGROUND INFORMATION

2.1 BRIEF DESCRIPTION OF THE NATURE OF THE PROJECT

Shyam Steel Manufacturing Ltd. (Formerly Sova Ispat Ltd.) is an existing plant located J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal.

Now the company intends to

- Establish New I/O Beneficiation Plant to manufacture 6,80,000 TPA of beneficiated iron ore (8,00,000 TPA throughput).
- Establish New Pellet Plant to manufacture 6,00,000 TPA of Pellet.
- Enhance the capacity of Sponge Iron unit by installing 5 x 350 TPD DRI Kiln from 1,80,000 TPA to 7,57,500 TPA.
- Enhance the capacity of Induction Furnace (to manufacture MS Ingot/Billet/ Hot Charging of MS Billets) by installing 8 x 15 T from 2,17,800 TPA to 6,13,800 TPA.
- Establish New Electrc Arc Furnace of 30 T along with Laddle Refining Furnace and AOD Converter to manufacture 1,98,000 TPA of Bloom.
- Enhance the capacity of Rolling Mill by installing 2 x 650 TPD from 2,00,000 TPA to 6,29,000 TPA of Hot rolled TMT / Structural / Cold Rolled bars / Wire rod.
- Enhance the capacity of Ferro Alloys Plant by installing 3 x 9 MVA SEAF to manufacture FeMn 81,000 TPA / SiMn 81,000 TPA / FeCr – 67,500 TPA / FeSi – 39,000 TPA.
- Enhance Power generation from 8 MW to 50 MW through Waste Heat Recovery boilers.
- Enhance Power generation of 7 MW to 57 M through AFBC based boilers.

Proposed expansion will be carried out in the existing plant and land adjoining the existing plant.

2.2 NEED FOR THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY AND OR REGION

India's economic growth is contingent upon the growth of the Indian steel industry. Consumption of steel is taken to be an indicator of economic development. While steel continues to have a stronghold in traditional sectors such as construction, housing and ground transportation, special steels are increasingly used in engineering industries such as power generation, petrochemicals and fertilizers. India occupies a central position on the global steel map, with the establishment of new state-of-the-art steel mills, acquisition of global scale capacities by players, continuous modernization and up gradation of older plants, improving energy efficiency and backward integration into global raw material sources. Steel production in India has increased by a compounded annual growth rate (CAGR) of 8 percent over the period 2002-03 to 2006-07. Going forward, growth in India is projected to be higher than the world average, as the per capita consumption of steel in India, at around 52 kg, is well below the world average (170 kg) and that of developed countries (400 kg). Indian demand is projected to rise to 300 million tonnes by 2025. Given the strong demand scenario, most global steel players are in a massive capacity expansion mode, either through brownfield or Greenfield route. Steel production capacity in India is expected to touch 170 million tonnes by 2020. While Greenfield projects are slated to add 30 million tonnes, brownfield expansions are estimated to add 50 million tonnes to the existing capacity of 90 million tonnes. Steel is manufactured as a globally tradable product with no major trade barriers across national boundaries to be seen currently. There is also no inherent resource related constraints which may significantly affect production of the same or its capacity creation to respond to demand increases in the global market. Even the government policy restrictions have been negligible worldwide and even if there are any the same to respond to specific conditions in the market and have always been temporary. Therefore, the industry in general and at a global level is unlikely to throw up substantive competition issues in any national policy framework. Further, there are no natural monopoly characteristics in steel. Therefore, one may not expect complex competition issues as those witnessed in industries like telecom, electricity, natural gas, oil, etc.

2.3 DEMAND AND SUPPLY GAP

Demand for steel is high and as soon as they are processed they will be supplied to nearby industries.

2.4 EXPORT POSSIBILITY

As the Indian steel industry has entered into a new development stage from 2007-08, riding high on the resurgent economy and rising demand for steel. Rapid rise in production has resulted in India becoming the 4th largest producer of crude steel and the largest producer of sponge iron or DRI in the world. As the demand is more the export possibility of Sponge Iron will also be more. As the demand is more the export possibility will also be more.

2.5 DOMESTIC/EXPORT MARKETS

While the demand for steel will continue to grow in traditional sectors such as infrastructure, construction, housing automotive, steel tubes and pipes, consumer durables, packaging, and ground transportation, specialized steel will be increasingly used in hi-tech engineering industries such as power generation, petrochemicals, fertilizers, etc. The new airports and railway metro projects will require a large amount of steel. Hence the domestic and export markets for steel sector will rise.

2.6 EMPLOYMENT GENERATION (DIRECT AND INDIRECT) DUE TO THE PROJECT

The estimated manpower requirement for the proposed expansion project is 1500 numbers; the total manpower requirement for the after the expansion will be 2500 numbers.

Chapter – 3 : PROJECT DESCRIPTION

3.1 TYPE OF THE PROJECT

Shyam Steel Manufacturing Ltd. is an existing plant located J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal.

Now the company intends to

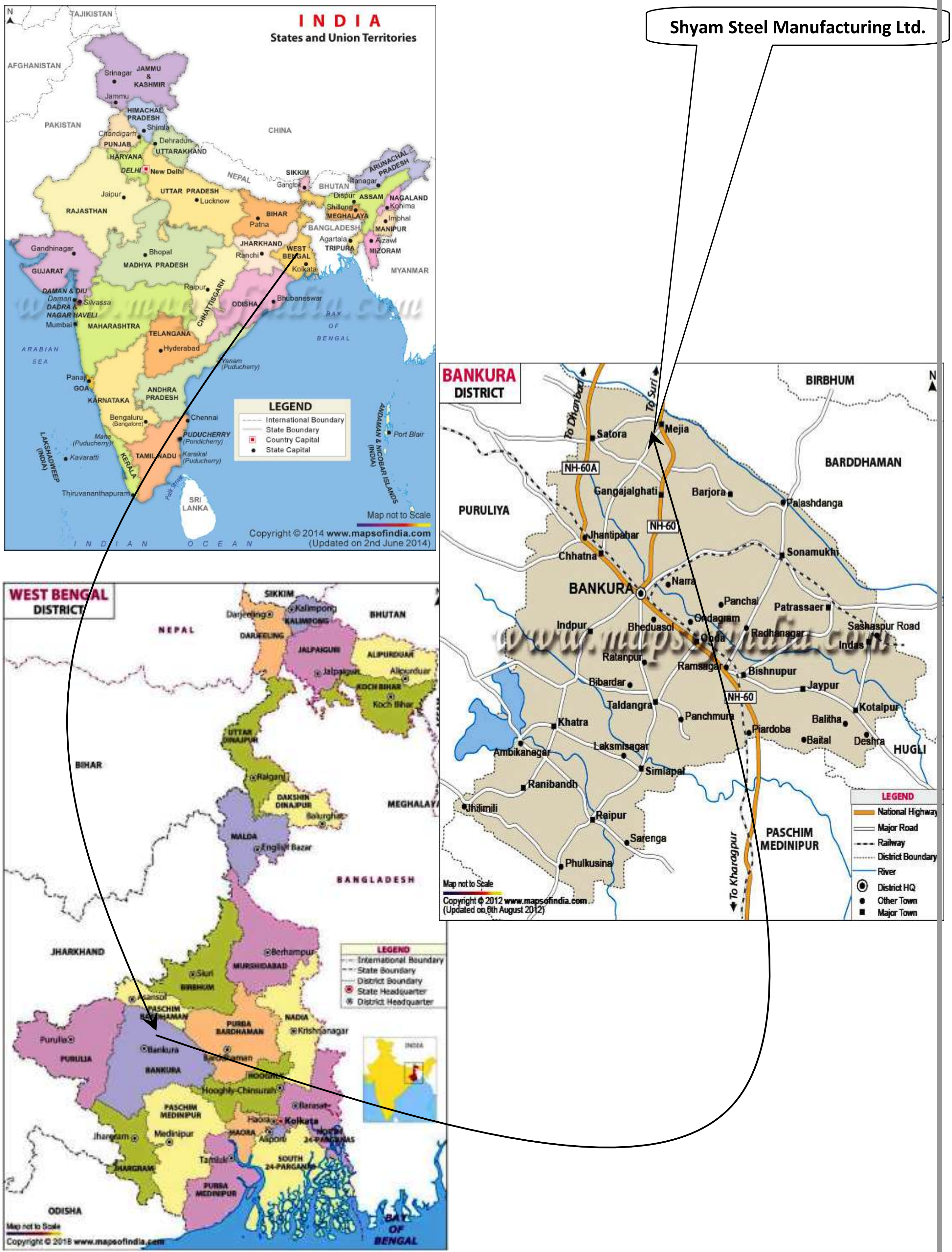
- Establish New I/O Beneficiation Plant to manufacture 6,80,000 TPA of beneficiated iron ore (8,00,000 TPA throughput).
- Establish New Pellet Plant to manufacture 6,00,000 TPA of Pellet.
- Enhance the capacity of Sponge Iron unit by installing 5 x 350 TPD DRI Kiln from 1,80,000 TPA to 7,57,500 TPA.
- Enhance the capacity of Induction Furnace (to manufacture MS Ingot/Billet/ Hot Charging) by installing 8 x 15 T from 2,17,800 TPA to 6,13,800 TPA.
- Establish New Electrc Arc Furnace of 30 T along with Laddle Refining Furnace and AOD Converter to manufacture 1,98,000 TPA of Bloom.
- Enhance the capacity of Rolling Mill by installing 2 x 650 TPD from 2,00,000 TPA to 6,29,000 TPA of Hot rolled TMT / Structural / Cold Rolled bars / Wire rod.
- Enhance the capacity of Ferro Alloys Plant by installing 3 x 9 MVA SEAF to manufacture FeMn 81,000 TPA / SiMn 81,000 TPA / FeCr – 67,500 TPA / FeSi – 39,000 TPA.
- Enhance Power generation from 8 MW to 50 MW through Waste Heat Recovery boilers.
- Enhance Power generation of 7 MW to 57 M through AFBC based boilers.

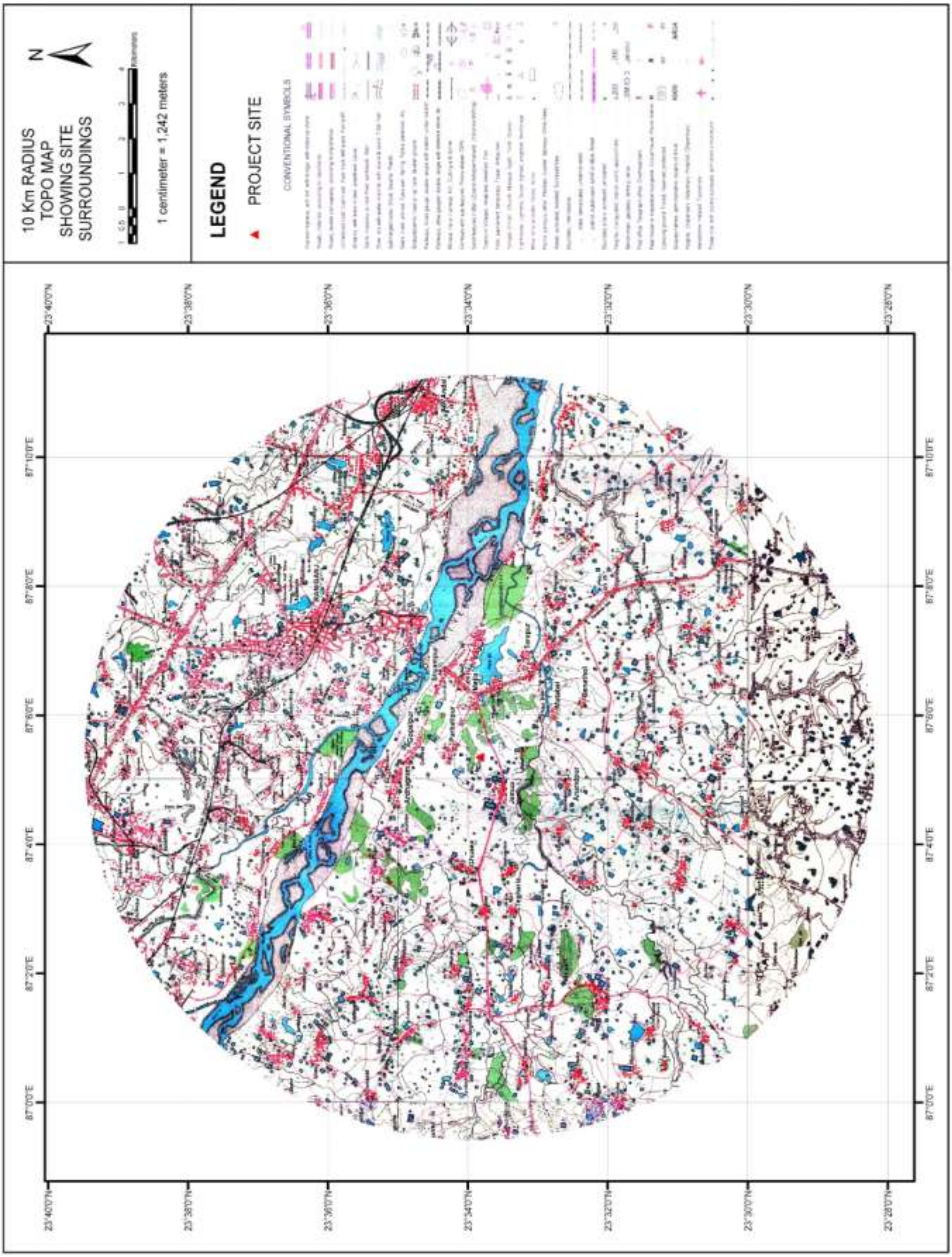
Proposed expansion will be carried out in the existing plant and land adjoining the existing plant which will be taken on lease from the sister concern unit.

3.2 LOCATION OF THE PROJECT

- Existing plant is located at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal.
- Existing plant is located in 150 acres (60.7 Ha.) of land.

- Proposed expansion will be taken up partially in the Existing plant (i.e. 150 acres / 60.7 Ha.) and partially in the land adjacent to the existing plant (i.e. 13.3 acres / 5.4 Ha.) which will be taken on lease from the sister concern unit.
- Total land after proposed expansion will be 163.3 acres / 66.1 Ha..
- Mouza Numbers (Plot Nos.) of total land area are enclosed as Annexure - 1
- Coordinates of the project site are 23°33'50.00"N 87° 5'21.00"E.
- The entire project area will fall in the Survey of India topo sheet no. 73 M/2
- The Index map of the project site is shown in Figure – 1.


Shyam Steel Manufacturing Ltd.
INDIA
States and Union Territories
LEGEND
International Boundary
State Boundary
Country Capital
State Capital
Map not to Scale
Copyright © 2014 www.mapsofindia.com
(Updated on 2nd June 2014)
WEST BENGAL
DISTRICT
BANKURA
DISTRICT
BIRBHUM
BARDDHAMAN
PURULIYA
HUGLI
PASCHIM
MEDINIPUR
Mejia
Satora
Gangajalghati
Barjora
Palashdanga
Jhantipahar
Chhatna
Sonamukhi
BANKURA
Bishnupur
Khatra
Ranibandh
Simlapal
Raipur
Sarenga
Phulkusina
To Dhanbad
To Suri
To Kharagpur
NH-60A
NH-60
LEGEND
National Highway
Major Road
Railway
District Boundary
River
District HQ
Other Town
Major Town
Map not to Scale
Copyright © 2012 www.mapsofindia.com
(Updated on 6th August 2012)


10 Km RADIUS
TOPO MAP
SHOWING SITE
SURROUNDINGS
1 centimeter = 1,242 meters
LEGEND
PROJECT SITE
CONVENTIONAL SYMBOLS

3.3 DETAILS OF THE ALTERNATE SITES

No alternative site has been considered, as the proposed expansion will be taken up in the existing plant premises and partly in the land adjoining the existing plant.

3.4 SIZE OR MAGNITUDE OF OPERATION

S.No.	Unit (Product)	Configuration for which CTE / EC Granted (J-11011/ 724/ 2007- IA II (I) dated 04.08.08, 18.04.12, 06.02.15 & 27.02.17)	Existing units commissioned / Under Implementation as per EC	Proposed Expansion	Final Configuration after Proposed Expansion
		[1]	[2]	[3]	[4] = [2] + [3]
1	Iron Ore Beneficiation Plant (Beneficiated Iron Ore)	Nil	Nil	8,00,000 TPA throughput (6,80,000 TPA – Beneficiated Iron ore)	8,00,000 TPA throughput (6,80,000 TPA – Beneficiated Iron ore)
2	Pellet Plant (Pellet)	Nil	Nil	6,00,000 TPA	6,00,000 TPA
3	DRI Kilns (Sponge Iron)	3,60,000 TPA (3X300 TPD + 3X100 TPD)	1,80,000 TPA (1X300 TPD + 3X100 TPD)	Instead of remaining 1,80,000 TPA (2 x 300 TPD), now proposed to install 5,77,500 TPA (5 X 350 TPD)	7,57,500 TPA (1X300 TPD + 3X100 TPD + 5X350 TPD)
4	Induction Furnace (MS Ingot/Billet/ Hot Charging)	3,56,000 TPA	2,17,800 TPA (6 X 11 T)	Instead of remaining 138200 TPA, now proposed to install 3,96,000 TPA (8 X 15T)	6,13,800 TPA (6 X 11 T + 8 X 15 T)
5	Electric Arc Furnace with 30 T Laddle Refining Furnace and AOD Converter (Bloom)	Nil	Nil	1,98,000 TPA (1 x 30 T)	1,98,000 TPA
6	Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod)	3,15,000 TPA	2,00,000 TPA (Under Implementation)	Instead of remaining 1,15,000 TPA, now proopsed	6,29,000 TPA

S.No.	Unit (Product)	Configuration for which CTE / EC Granted (J-11011/ 724/ 2007- IA II (I) dated 04.08.08, 18.04.12, 06.02.15 & 27.02.17)	Existing units commissioned / Under Implementation as per EC	Proposed Expansion	Final Configuration after Proposed Expansion
		[1]	[2]	[3]	[4] = [2] + [3]
				to install 4,29,000 TPA (2 x 650 TPD)	
7	Ferro Alloy Plant (FeSi/FeMn/SiMn/FeCr)	55,000 TPA	2 x 9 MVA (FeMn 32,400 TPA / SiMn 32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA)	Instead of remaining 1 x 9 MVA, now proposed to install 3 x 9 MVA (FeMn 48,600 TPA / SiMn 48,600 TPA / FeCr – 40,500 TPA / FeSi – 23,400 TPA)	5 x 9 MVA (FeMn 81,000 TPA / SiMn 81,000 TPA / FeCr – 67,500 TPA / FeSi – 39,000 TPA)
8	Power Plant (WHRB)	32 MW	8 MW	Instead of remaining 24 MW, now proposed to install 42 MW (40 MW + 2 MW)	50 MW
9	Power Plant (AFBC)	20 MW	7 MW	Instead of remaining 13 MW, now proposed to install 50 MW (2 x 25 MW)	57 MW
10	Galvanization Plant	Nil	Nil	1,00,000 TPA	1,00,000 TPA
11	Oxygen Plant	4,000 TPA	Nil	Instead of 4,000 TPA of Earlier EC, now proposed to install 4,000 TPA	4,000 TPA

S.No.	Unit (Product)	Configuration for which CTE / EC Granted (J-11011/ 724/ 2007- IA II (I) dated 04.08.08, 18.04.12, 06.02.15 & 27.02.17)	Existing units commissioned / Under Implementation as per EC	Proposed Expansion	Final Configuration after Proposed Expansion
		[1]	[2]	[3]	[4] = [2] + [3]
12	Cement Plant	75,000 TPA	75,000 TPA	Nil	75,000 TPA
13	Sponge Iron Briquette	60,000 TPA	Nil	Nil	Dropping Now
14	Coal / Coke / Chrome fines Briquette	90,000 TPA	Nil	Nil	Dropping Now
15	Mini Blast Furnace-165 M^3 (Pig iron)	1,20,000 TPA	Nil	Nil	Dropping Now
16	Sinter Plant -15M^2 (Sinter)	80,000 TPA	Nil	Nil	Dropping Now

3.5 MANUFACTURING PROCESS

3.5.1 IRON ORE BENEFICIATION PLANT

Beneficiation process is a combination of crushing, screening, washing, grinding, classifying by gravity separation, magnetic separation, floatation processes. The final concentrate slurry is filter pressed to get a dry enriched ore quality with Fe > 65% and moisture ~10%. The water is recycled in the process. The tailings are processed in a thickener & Filter pressed and the excess water will be recovered and circulated in the process. The tailings filter cake is of low value with Fe <45% and moisture content ~10%. This Filter cake will be stored in storage yard earmarked within the plant premises.

Pollution Free Technology

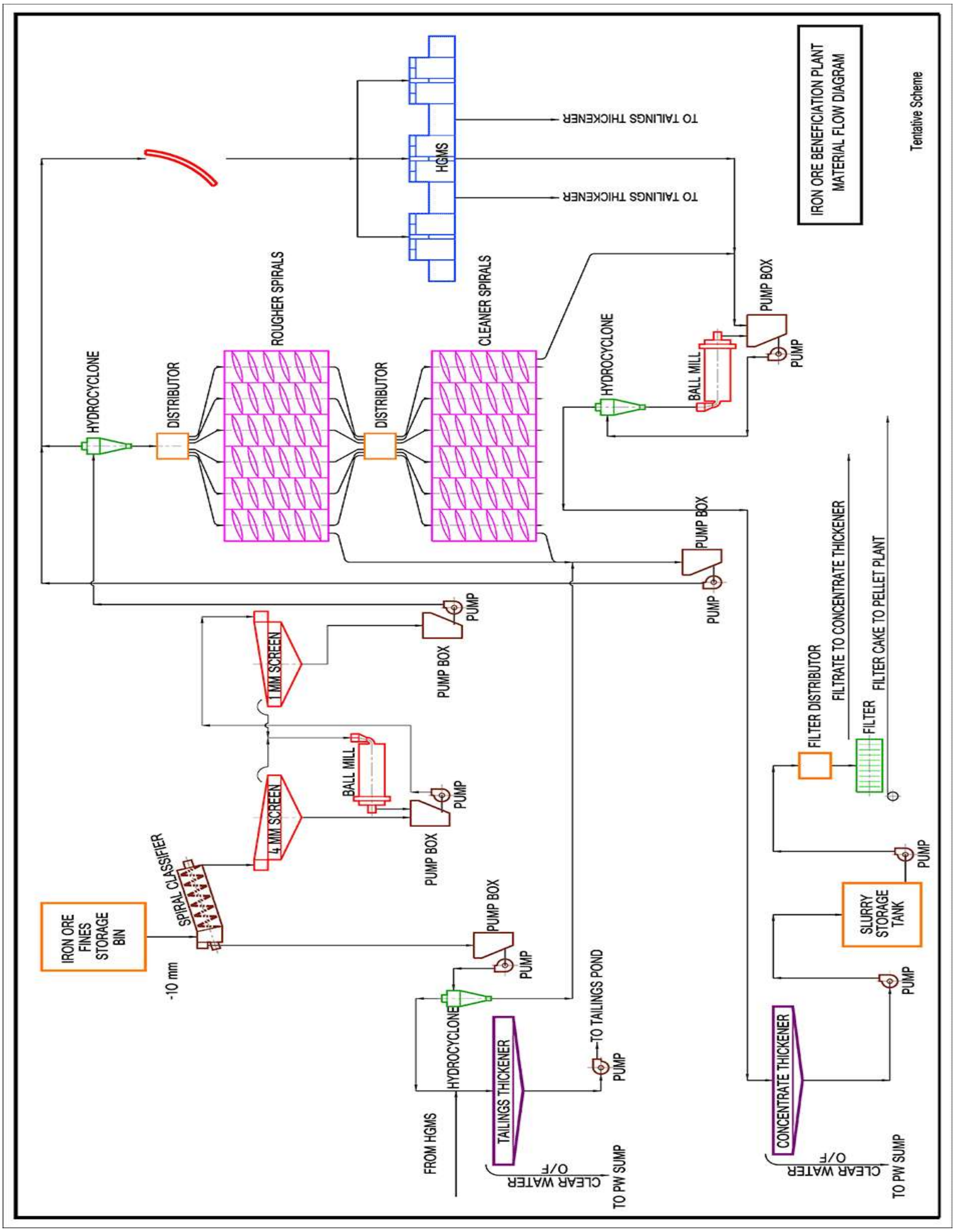
- The process of beneficiation of iron ore can be rendered pollution free with no effluents being discharged.
- The fugitive emissions are arrested in the crushing and grinding zone by dust suppression systems. Further the emissions are low as these circuits are wet and does not allow high emissions.
- The process does not use any hazardous chemical.
- The quality of the iron ore concentrate is envisaged as follows:

Fe ; >65%

$SiO_2 + Al_2O_3$; 4-5%

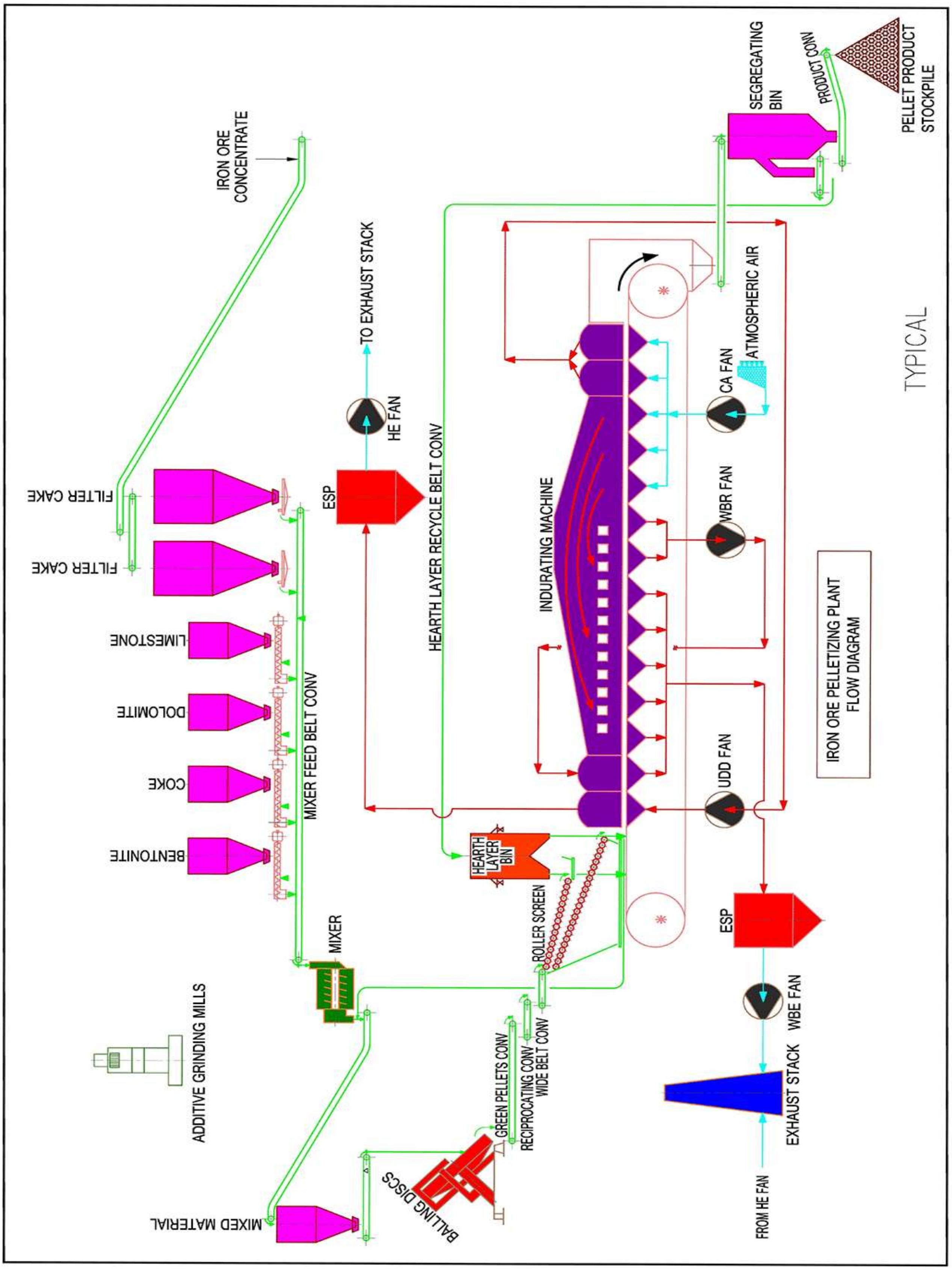
LOI ; 3.5 – 4.5%

- Moisture content ; 10%
- The Beneficiation plant would produce concentrate to the tune of 6.9 MTPA for feeding the Pellet Plant.



3.5.2 PELLETISATION PLANT

In this process all raw materials will be proportioned as per requirement of the product quality and intensely mixed to have homogenity in the quality. The mixed material will be processed in a battery of disc or a drum pelletiser for formation of green balls / pellets. The pellets are controlled for size as well as certain amount of green strength. The pellets are then classified in a roller screen to separate the undersize(-8 mm) and oversize(+18 mm). The rest of the sized pellets are charged onto the travelling grate chain. The travelling grate is an endless chain where the pellets are subjected to controlled rate of heating with updraft, downdraft, and two stages of preheating to a temperature of ~1050deg. C. The recuperated heat from the process is utilised very effectively resulting in lower fuel consumption. In the preheating zone small amount of heavy oil may be used to stabilise the preheating zone temperature. At the end of the travelling grate the pellets would gain sufficient strength to be discharged into rotary kiln for induration. The hot pellets are discharged in a circular cooler which maintains a fixed bed depth and the cooling is done by updraft air from atmosphere. The pellets in the rotary kiln will be heated by a long flame single burner from the discharge end fired by anthracite coal powder. The rotary kiln moves slowly thereby indurating the pellets homogeneously at a temperature ~ 1300deg. C. The cooler is divided into three zones and the recuperated hot gas from each zone is utilized for process requirements. The pellets will be transported for processing where they are screened to sizes between 9 to 18 mm and sent to the storage yard. These pellets are very stable and do not degrade on storage or transportation.


IRON ORE PELLETIZING PLANT
FLOW DIAGRAM
TYPICAL
IRON ORE CONCENTRATE
FILTER CAKE
FILTER CAKE
LIMESTONE
DOLOMITE
COKE
BENTONITE
MIXER FEED BELT CONV
MIXER
ADDITIVE GRINDING MILLS
MIXED MATERIAL
BALLING DISCS
GREEN PELLETS CONV
RECIPROCATING CONV
WIDE BELT CONV
ROLLER SCREEN
HEARTH LAYER BIN
HEARTH LAYER RECYCLE BELT CONV
ESP
HE FAN
TO EXHAUST STACK
INDURATING MACHINE
ATMOSPHERIC AIR
CA FAN
WBR FAN
UDD FAN
ESP
WBE FAN
EXHAUST STACK
FROM HE FAN
SEGREGATING BIN
PRODUCT CONV
PELLET PRODUCT STOCKPILE

3.5.3 DRI KILN BASED SPONGE IRON PLANT

The Direct Reduced Iron (DRI) plant will comprise of 5 x 350 TPD kilns and related accessories including Waste Heat Recovery power generating unit.

The major plant facilities for the Sponge Iron plant envisaged are as follows:

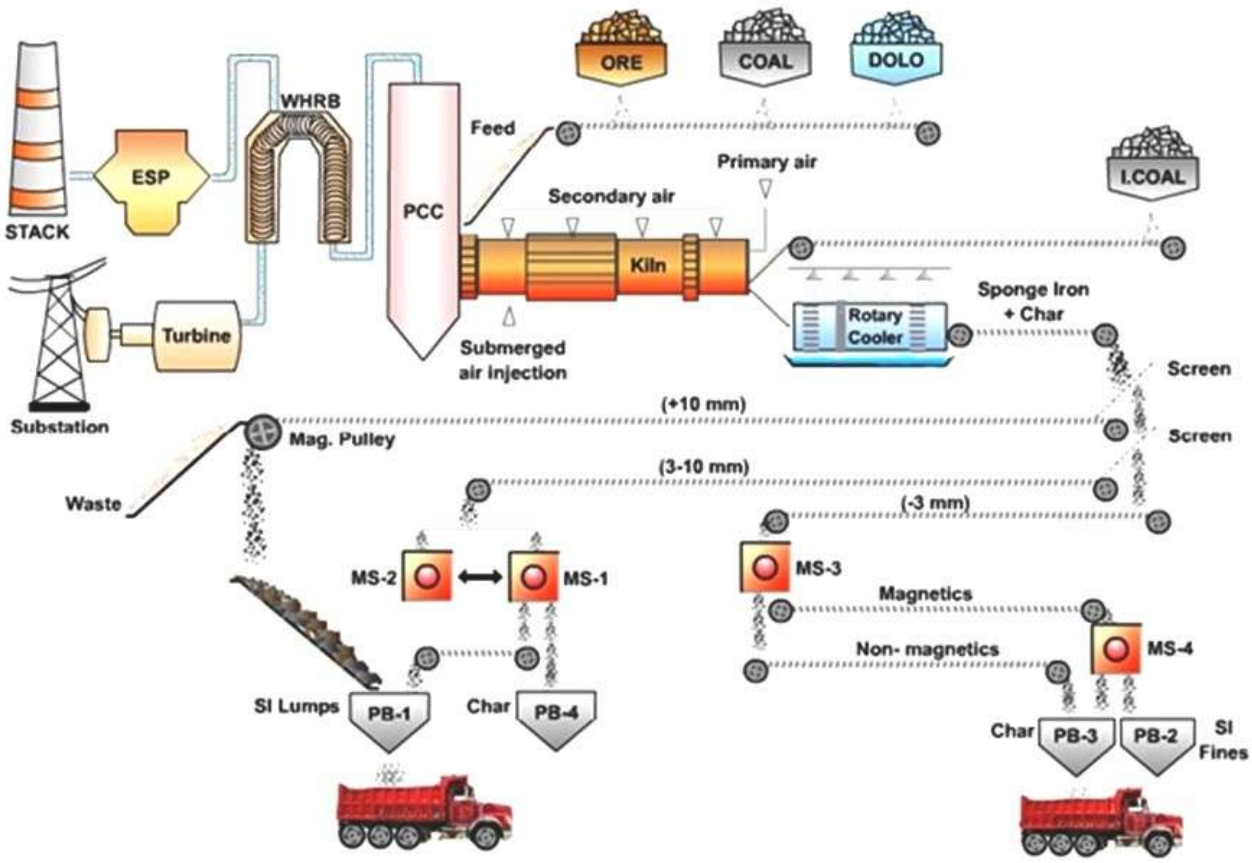
- Day bins
- Rotary Kiln & Cooler
- Central Control Room
- Product processing and product storage
- Off gas system including waste heat recovery power generation

There will be one day bin building for kiln. The day bin building will have bins for meeting raw material required for kiln. This bin will have the storage facility for pellets, feed coal, dolomite etc.

A refractory lined rotary kiln will be used for reduction of Iron ore in solid state. A central Burner located at the discharge end will be used for initial heating of the kiln. Sized Iron ore will be continuously fed into the kiln along with coal which has dual role of fuel as well as reductant. Dolomite will be added to scavenge the Sulphur from the coal. A number of air tubes will be provided along the length of the kiln.

The desired temperature profile will be maintained by controlling the volume of the combustion air through these tubes. The Carbon monoxide generated due to the combustion of coal, reduces the iron ore and converts it into sponge iron. The rotary kiln is primarily divided into two zones viz. the pre heating zone and the reduction zone. The preheating zone extends over 30 to 50 % of the length of the kiln and in this the moisture in the charge will be driven off and the volatile matter in the coal will be burnt with the combustion air supplied through the air tubes. Heat from the combustion rises the temperature of the lining and the bed surface. As the kiln rotates, the lining transfers the heat to the charge. Charge material, pre-heated to about 1000^{o}C enters the reduction zone. Temperature of the order of 1050^{o}C will be maintained in the reduction zone, which is the appropriate temperature for solid state reduction of iron oxide to metallic iron. This hot material will be transferred to rotary cooler. In rotary cooler the material will cool from 1000^{o}C to 100^{o}C in cooler by spraying water. The cooler discharge material consists of sponge iron lumps, sponge iron fines and char. Magnetic and non-magnetic material will be separated through magnetic separators and stored in separate bins.

Process flow diagram – Sponge iron



3.5.4 STEEL MELTING SHOP (INDUCTION FURNACE – MS INGOTS / BILLETS/HOT CHARGING)

In Steel Melting Shop (SMS), Sponge Iron will be melted along with melting scrap and fluxes to make pure liquid steel and then to mould it in required size billets. The SMS will consist of following equipment and subassemblies:

Induction Furnace: Induction Furnaces is a device to melt the charge material using electrical power. It consists of Crucible lined with water cooled induction coils, Electrical system to give controlled power to induction coil, Hydraulic tilting system, Heat exchanger to cool the circulating water, water softener for generating soft water, furnace transformer, Power Factor improvement system and surge suppressor.

Ladles: Ladles are pots with refractory lining inside to withstand 1600^{0}C temperature. It has side arms so that can be lifted with the help of crane. Ladles are used to stores the liquid steel from Induction Furnace and take it for further processing. Ladles are with bottom nozzle and pneumatically operated gate for discharge of liquid.

Cranes: Electric Over-head (EOT) cranes of various capacities are used to carry the ladles/materials at different places. Cranes are used in Melting hall to charge melting scrap, remove the ladles to the LRF, further to place it over the Tundish of the Continuous Caster, to remove billets from the cooling bed and store at designated places, and also for other petty use. Accordingly, the sizes, capacity and numbers of cranes are decided.

Continuous Casting Machine (CCM): CCM is used to continuously cast the liquid steel in required cross section and in length. It consists of Tundish, Mould, Bow with Withdrawal mechanism, straightening mechanism and cooling bed, hydraulic system for withdrawal mechanism, water pumps and cooling towers for water spray on the withdrawn section as well as on the cooling bed. Dummy bar is provided to start the casting. Tundish is a rectangular vessel, lined with refractory and having discharge nozzle with pneumatically operated gate. A stand is erected over it where the ladle is stationed for discharging the liquid in it. Mould is of copper with water cooled jacked. Its cross-section in the bottom is of the size of which billet is to be drawn. Initially the dummy for of the same size is kept inserted. When the liquid steel is poured in the mould, the dummy bar is drawn slowly, so that the liquid steel in partially frozen state comes out of the mould. Water spray nozzles are installed to spray water over the just drawn billet to cool it further and to harden the skin of the drawn billet.

There will be 8 x 15 T Induction Furnaces. MS Ingot/Billet/Hot Charging will be produced in Continuous Casting Machine.

3.5.5 ELECTRIC ARC FURNACE

The Electric Arc Furnace will be of AC arc type with high power transformer. Major technological features which will be incorporated in electric arc furnace are as follows:

- Eccentric bottom tapping
- Water cooled side wall panels and roof
- Water spray cooling of the graphite electrodes
- Oxygen lancing
- Continous charging of Direct Reduced Iron (DRI)

- Hote metal usage

Furnace liquid hot metal will charged into vessel of hot metal pretreatment for desiliconisation and dephosphorization. Pretreated hot metal is charged into electric arc furnace and blown by injecting oxygen. Lime is added after the bath temperature rises. On attaining the bath temperature above 16000C, feeding of DRI is commenced at pre determined rate with transformer at full load. During continuous charging and melting of DRI, oxygen is injected for foamy slag operation and de-carburisation of melt. The foamy slag shields the arcs promoting better heat transfer to bath as well as to arrest radiation to the side walls. Lime will be charged to maintain the slag basicity. Dolomite is charged to maintain certain level of MgO in slag as well as for slag door maintenance.

As soon as the charge is melted, bath sample is taken and the steel temperature measured. The steel at this stage is ready for tapping. if necessary, the temperature is adjusted and the steel tapped into a pre-heated ladle placed on the ladle transfer car below the furnace tap hole.

Predetermined quantity of ferroalloys and de-oxidisers are dosed into the ladle during tapping. After tapping of the furnace, EBT is closed, furnace walls and banks are inspected and if necessary gunned/fettled. The furnace is then ready to commence the next melting operation.

The EAF slag will be collected on the ground floor below the EAF slag door. Liquid slag will be poured into the slag dump from where, it will be disposed off using pay loaders and dumpers.

For production of stainless steel and alloy steels, AOD and vacuum degassing unit has been envisaged. After vacuum treatment the treated steel ladle from vacuum tank is transported to Ladle furnace and then to caster with the help of EOT crane for onward processing.

The ladle is lifted from ladle transfer car and placed on ladle stand for LF treatment. The LF roof is swung and placed over the ladle rim. Heating starts by striking the arcs. Inert gas (argon) is bubbled through a porous plug provided at the ladle bottom throughout the LF treatment. During the treatment, temperature is measured and samples are taken periodically. Lime, ferro-alloys and fluorspar are weighed and added to adjust steel analysis and slag composition. On demand from the caster, the ladle is transported to the caster with the help of EOT crane for casting.

3.5.6 ROLLING MILL

A pusher type furnace has been envisaged for the heating of Ingots/Billets. The furnace will be end charging and side discharging. It will have single row as well as double row charging facility. The furnace will be heated with FO. The furnace combustion system will comprise of air blowers, FO storage, supply and preheating system and other associated facilities. The product of combustion will leave the furnace at charging end and exhausted through underground flue tunnel and passed through a metallic tubular recuperator before finally let off to a self-supporting steel chimney of sufficient height. A set of instrument will be used for smooth operation of the furnace.

Bar and Round mill

A cross country type mill has been envisaged for the plant. The stands have been grouped into roughing, intermediate and finishing groups. Roughing group will have 4 (four) stands, intermediate group will have 8 (eight) stands and finishing mill will have 8 (eight) stands. Roughing group of stands will be driven by one motor. 4 nos. of intermediate stands will be driven by two motors and balance 4 nos. will be driven by a separate motor. Each stand of finishing group will be driven by single motor. Necessary guides and troughs will be provided at entry and exit of mill stands.

One wire rod outlet has been provided in the mill. The wire rod line will have 4 stand blocks driven by a single motor through gear box. Coil forming and handling of coil is provided.

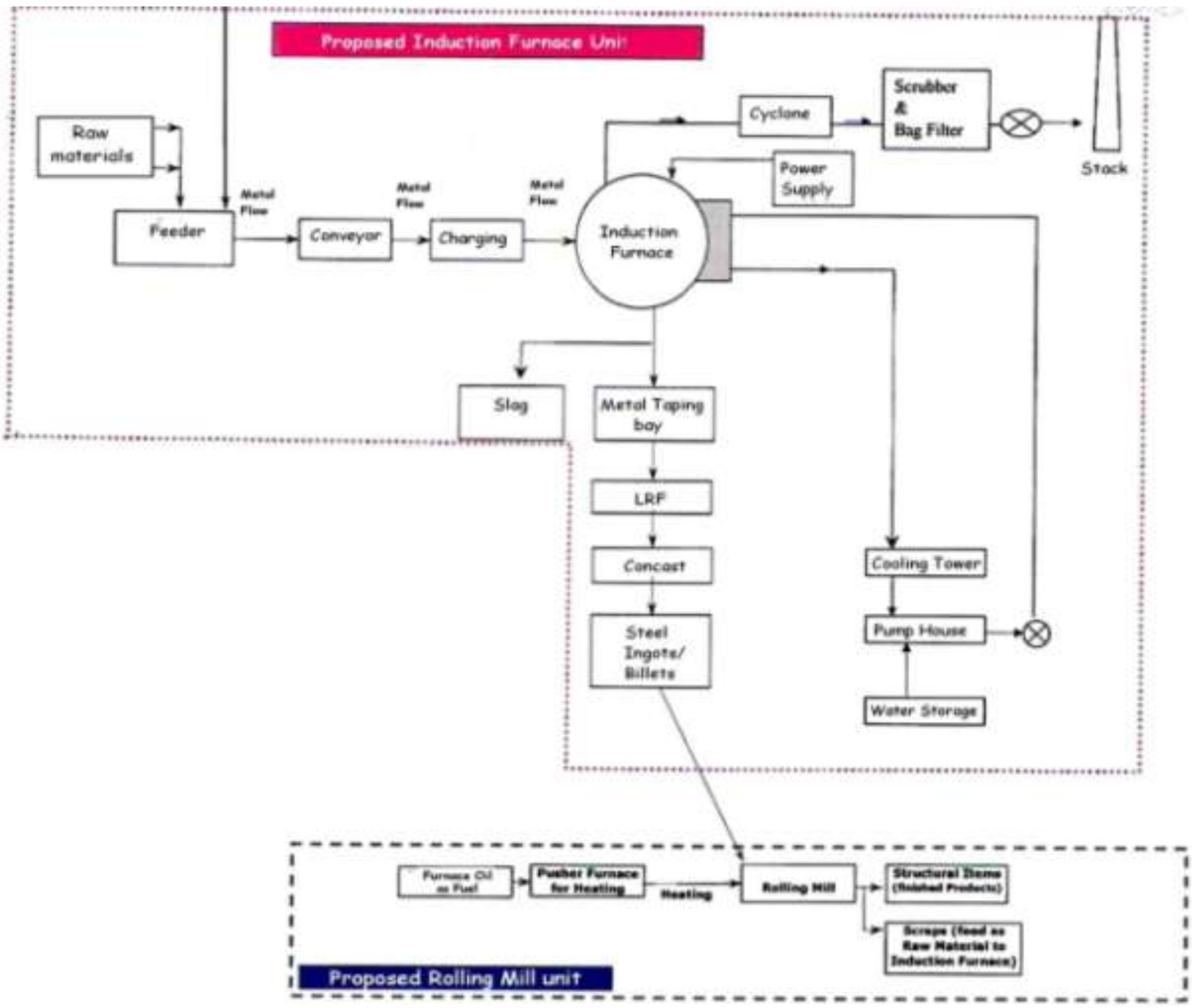
Automated tilting, drop type tilter and feeding arrangement will be provided in roughing group of stands. Repeaters have been provided in roughing / intermediate stands as necessary.

Design provision has been made for introduction of slit rolling facility in future to roll 8 mm, 10 mm & 12 mm rebars in two strands. The rebars discharged from the mill will pass through a water cooling system comprising cooling pipes with high pressure water nozzles for rapid water quenching. At the cooling pipes the bar skin temperature will be reduced to about 600^{o}C. The core of the bar still remains hot. This entrapped heat tempers the bar. This thermo-mechanical treatment of the bars increases tensile strength without adversely effecting weldability and elongation properties. This process eliminates requirement of cold twisting of bars for production of rebars.

A dividing shear, to cut the products to cooling bed length, will be located immediately after the water cooling system. This shear will divide all products to cooling bed lengths. Rake type cooling beds have been envisaged to receive the rolled product. Cooling bed will be provided with incoming and outgoing roller tables. One cold shear has been provided to cut the bars coming out of cooling bed into commercial length of 6 to 12 m. The bar products will be formed into bundles and will be strapped by strapping machine manually.

The finished products will be removed by overhead EOT crane and stored in the storage area or dispatched through road vehicles.

In the proposed expansion project, 2 x 650 TPD capacity Rolling Mill will be installed, for producing 4,29,000 TPA Hot rolled TMT / Structural / Cold rolled bars / wire rod.



3.5.7 POWER PLANT

Its is proposed to install 42 MW WHRB & 50 MW AFBC based power plant in the proposed expansion project to meet the power requirement for various processes of integrated plant including auxillaries of power plant.

WHRB Power Plant

Production of sponge iron in DRI kiln generates huge quantities of hot flue gases carrying considerable sensible heat. The energy content of these gases can effectively be used to generate electric power as well as steam for meeting various process requirements. Thus a WHRB (Waste Heat Recovery Boiler) power plant would be an ideally suited proposition to effectively make use of this waste gas. This WHRB Power plant would not only make the plant independent of external source of electric power to some extent but would also result in energy conservation and environment protection.

Steam Turbo-generators (STGs) envisaged for the Power plant will be single cylinder, multistage, extraction – cum – condensing type complete with condenser, air evacuation system, 2 x 100% condensate extraction pumps, electronic governing system, lubricating oil system, regenerative feed heating system etc. The turbine will be fed with steam generated from HRSG in DR kiln. The STGs will be located in the machine hall of the power plant.

5 x 35 TPH Boilers will be installed for 5 x 350 TPD DRI Kilns to generate 40 MW Power and 1 x 10 TPH Boiler will be installed to the existing 1 x 300 TPD DRI Kiln.

AFBC Power Plant

The unit will have Two AFBC boilers (2 x 120 TPH Capacity) to generate 2 x 25 MW Power. The boiler shall be designed for continuous operation at Turbine Maximum Continuous Rating (TMCR). A margin of 10% over TMCR shall be taken into account to arrive at Boiler rated capacity. The boiler will be natural circulation, circulating fluidized bed combustion, two pass, non reheat, single drum, balanced draft, semi-outdoor type. The boiler will have continuous evaporation rating of approx. 360 tonnes/hr. (BMCR shall not be less than 110% of TMCR) with steam parameters at super heater outlet as 98 kg/cm^2 and 540^0C (± 50C). The feed water temperature at MCR at inlet to economizer is expected to be around 2300C. Steam parameter are to be fine tuned at Boiler outlet based on actual plant layout and piping arrangement. The boiler will be complete with ash /solid separator, economizer, air heater, ducting, FD fans, ID fans and PA fans.

Air cooled condensers envisaged for Power plant to conserve water.

3.5.8 FERRO ALLOYS PLANT

Ferro Alloys will be smelted at about 1350 – 1500^{0}C. This will be achieved by a conventional, Open Submerged Electric Arc Furnace. The three carbon Electrodes, partially submerged in the charge, are supported on hydraulic cylinders for upward and down ward movements to maintain the desired electrical conditions.

The body of the furnace is cylindrical in shape, and is lined with firebricks, silicon carbide bricks and carbon tamping paste. Three tap – holes are provided at 120 degree apart for drawing out both the molten alloy and Slag. During the repair works one of the tap – holes the other will function as stand by.

The weighed raw materials will be thoroughly mixed in the proper proportion before charging into the furnace, through Skip, Telfer hoist and charging chutes. The charge will be pushed near to electrodes on Furnace top by a Charging Stoker.

As the charge enters the smelting zone, the alloy formed by chemical reactions of the oxides and the reductants, will be heavy, gradually settles at the bottom. At regular intervals the furnace will be tapped. The tap hole will be opened by Oxygen lacing pipe and after tapping is completed, it will be closed by clay plugs.

The liquid Silico manganese and Slag will be collected in a Ladle and Slag will be over flowed to sand beds. The metal being retained in the ladle having a Nozzle at bottom which allows metal flows on to C.I. Pans. After solidification the cakes will be broken manually to required lump size.

SILICO MANGANESE & FERRO MANGANESE PROCESS

Manganese ore is in the form of MnO, SiO_2, FeO, Al_2O_3, MgO and other Oxides. MnO is reduced to Mn and FeO is reduced to Fe taking Carbon from Coke / Coal and the product is produced as Si Mn/Fe Mn. The other oxides are simultaneously removed as Slag along with metal. The Slag and Metal are separated by virtue of its self-differential gravities after collecting in the ladle. The ladle will have a nozzle in the bottom portion through which the metal flows in to C.I. Pans.

Chemical Composition of Si Mn

S.No.	Constituent	Percentage
1.	Mn	60 – 65%
2.	Si	+ 15%
3.	C	2%

4.	S & P	0.03% Max

Chemical Composition of Fe Mn

S.No.	Constituent	Percentage
1.	Mn	70 - 75%
2.	Si	+ 1.5%
3.	C	7 - 8 %
4.	S	0.05% Max
5.	P	0.4 %

FERRO SILICON PROCESS

Ferro Silicon is a Slagless process. Quartz is the main raw material which contains 99%of SiO_2. Charcoal and a small percentage of Coal is used as reductants. Mill Scale / Iron Ore is added to obtain Ferro Silicon. FeO is reduced to Fe and SiO_2 is reduced to Si Combining with Carbon and produced as Fe Si.

Chemical Composition of Fe Si

S.No.	Constituent	Percentage
1.	Si	70 - 75%
2.	C	7 – 8 %
3.	S	0.05 %
4.	P	0.4% Max

FERRO CHROME PROCESS

Chrome Ore is in the form of Cr2 O3, Fe2O3, SiO2, Al2O3, CaO and MgO. These oxides react with carbon in the coke and reduced to Fe, Cr, Si, C etc. Other oxides i.e Al2O3, SiO2, CaO, MgO are removed in the form of Slag.

Chemical Composition of Fe Cr

S.No.	Constituent	Percentage
1.	Cr	60 – 65 %
2.	C	1 - 8 %
3.	Si	1 - 3 %
4.	S	0.04 %
5.	P	0.04%
6.	Cu	0.5 %

THE PROCESS:

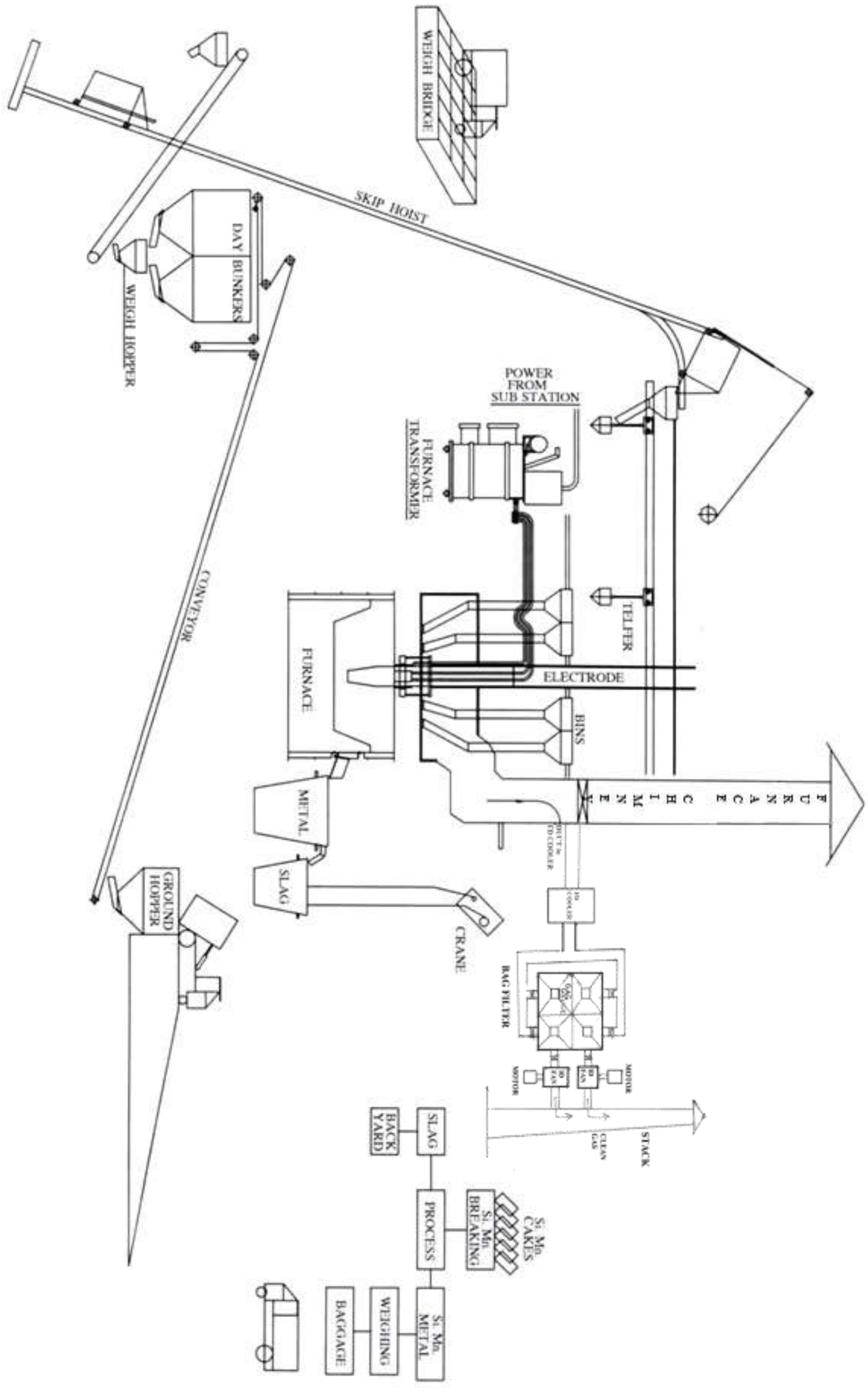
Ferro Alloys will be smelted at about 1350 – 1500^{0}C temperature. This will be achieved by a conventional, Open Submerged Electric Arc Furnace. The three carbon Electrodes, partially submerged in the charge, are supported on hydraulic cylinders for upward and down ward movements to maintain the desired electrical conditions.

The body of the furnace is cylindrical in shape, and is lined with firebricks, silicon carbide bricks and carbon tamping paste. Three tap – holes are provided at 120 degree apart for drawing out both the molten alloy and Slag. During the repair works one of the tap – holes the other will function as stand by.

The weighed raw materials will be thoroughly mixed in the proper proportion before charging into the furnace, through Skip, Telfer hoist and charging chutes. The charge will be pushed near to electrodes on Furnace top by a Charging Stoker.

As the charge enters the smelting zone, the alloy formed by chemical reactions of the oxides and the reductants, will be heavy, gradually settles at the bottom. At regular intervals, the furnace will be tapped. The tap hole will be opened by Oxygen lacing pipe and after tapping is completed, it will be closed by clay plugs.

The liquid Silico manganese and Slag will be collected in a Ladle and Slag will be over flowed to sand beds. The metal being retained in the ladle having a Nozzle at bottom which allows metal flows on to C.I. Pans. After solidification, the cakes will be broken manually to required lump size.


WEIGH BRIDGE
SKIP HOIST
DAY BUNKERS
WEIGH HOPPER
POWER FROM SUB STATION
FURNACE TRANSFORMER
CONVEYOR
TELFER
FURNACE
ELECTRODE
BINS
FURNACE CHIMNEY
METAL
SLAG
CRANE
GROUND HOPPER
BAG FILTER
MOTOR
MOTOR
STACK
CLEAN GAS
SLAG
BACK YARD
PROCESS
Si. Mn. BREAKING
Si. Mn. CAKES
Si. Mn. METAL
WEIGHING
BAGGAGE

PROCESS OF FERRO CHROME RECOVERY (ZIGGING PLANT)

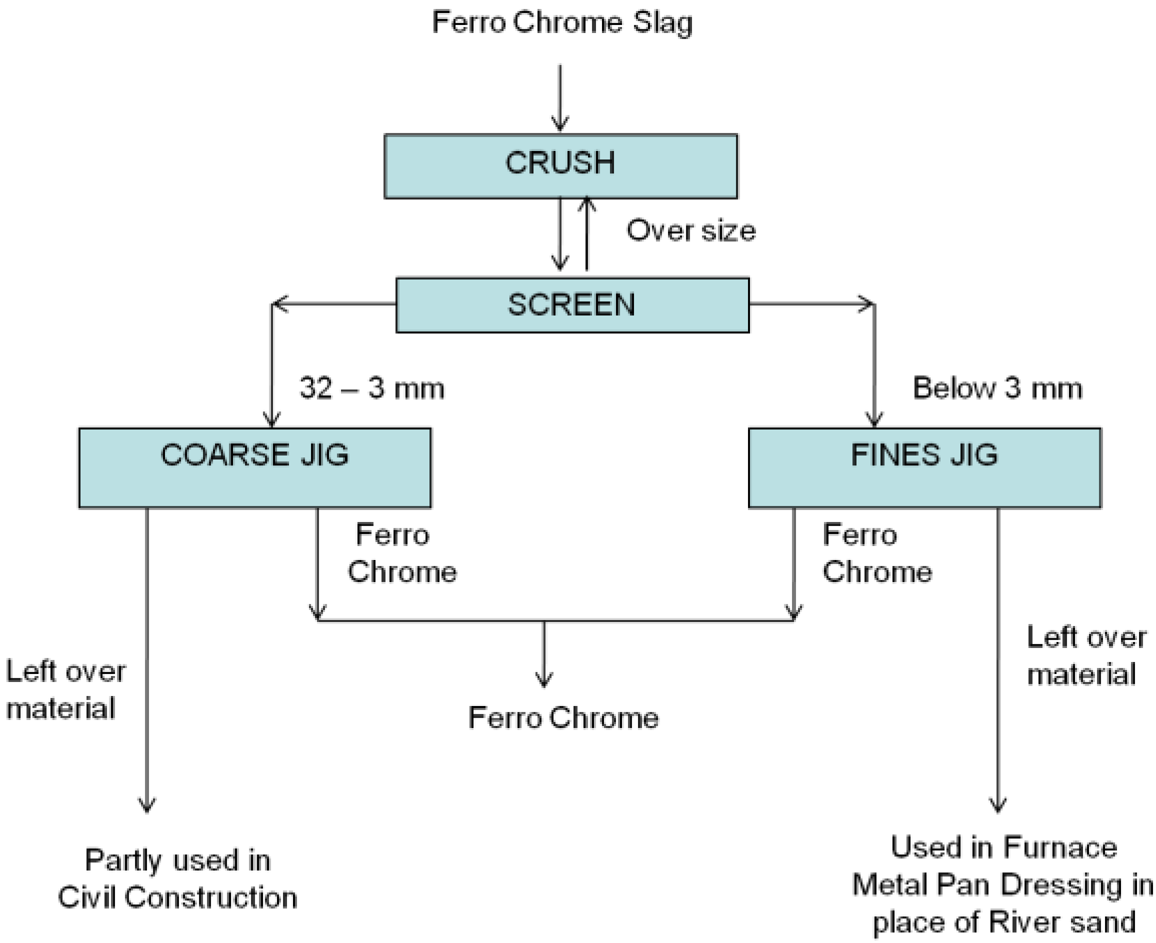
Ferro chrome recovery process involves the following steps

i. Crushing & screening: In this slag is crushed to smaller size particles as close as possible

ii. Coarse jigging: In this particles having coarse fraction (approximately -32 to -3mm) is separated through two stage air pulsated jig for recovery of metal.

iii. Fine jigging: In this particles of fine fraction (-3mm) is separated through diaphragm pulsed (through the bed' jigs for recovery of metal.)

iv. The recovered metal will be reused in the process.

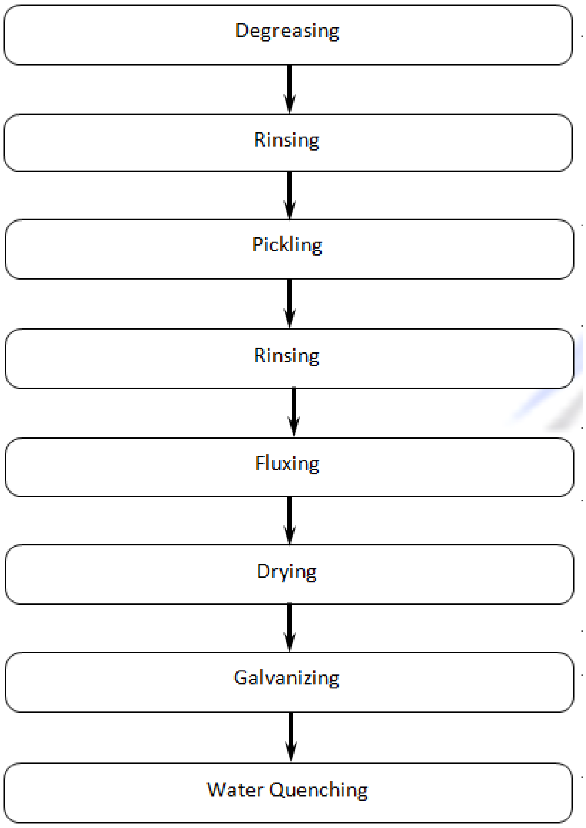


3.5.9 GALVANIZATION PLANT

Galvanizing is the process of applying a protective zinc coating to steel of iron to prevent rusting. The most common method is hot-dip galvanizing, in which continuous running thin sheets, obtained after coal rolling, are submerged in a bathof molten zinc. The heat required for melting the zinc is generally obtained by usingfuel gases. The galvanized sheet are thefinished products of cold rolling mills.

Process for Galvanizing:		
Degreasing:	:	Conventionally it is in practice to dipped in caustic solution for removal of grease and paint; but as the fabrication is in-house process and items fabricated will be devoid of grease and paint material hence “de-greasing is not proposed.
Rinsing – 1:	:	Fabricated items (FI) will be rinsed with plain water for removal of dust and mill scales.
Pickling	:	After rinsing angles are dipped in 15% HCL solution for 20 – 30 minutes for removing the rust from the Fabricated Items. (FI)
Rinsing – 2	:	After pickling Fabricated Items will again washed with plain water.
Fluxing	:	Acid cleaned Fabricated Items after washing in water are dipped in flux solution containing salt mixture of Ammonium Zinc Chlorides.
Drying	:	Fluxed angles dried on the drying Platform.
Galvanizing	:	Fabricated Items are dipped in molten zinc to get the desired thickness of zinc coating on it.
Water Quenching	:	The hot dip galvanizing angles are quenched in water before inspection.

Process for Galvanizing



3.6 RAW MATERIAL REQUIREMENT (FOR PROPOSED EXPANSION)

The following will be the raw material requirement for the proposed expansion project:

Raw Material	Quantity (TPA)	Sources	Mode of Transport
For Iron ore beneficiation plant (Beneficiated Iron ore – 6,80,000 TPA)			
Iron ore fines	8,00,000	Rungta Mines, Essel Mines & Other mines in Barbil & Jharkand	By Rail (through proposed railway siding upto site)
For Pellet plant - 600000 TPA			
I/O concentrate	6,80,000	Inhouse Generation	---
Coal & Coke fines	18000	Jharkhand	By Road (through covered trucks)
Bentonite	4500	Local market, West Bengal	By Road (through covered trucks)
Furnace Oil	6900	IOCL, West Bengal	By Tankers
Lime Powder	12000	Madhya Pradesh	By Road (through covered trucks)
For DRI Kilns (Sponge Iron) – 577500 TPA			
Pellet	600000	Inhouse Generation	---

Raw Material		Quantity (TPA)	Sources	Mode of Transport
Iron ore		324000	Barbil, Orissa, Chhattisgarh	By rail & road (through covered trucks)
Coal	Indian	693000	ECL, West Bengal	By rail & road (through covered trucks)
	Imported	520000	South Africa	Through sea route, rail route & by road
Dolomite		29000	Bhutan, Chhattisgarh	By road (through covered trucks)
For Steel Melting Shop (MS Ingots / Billets/Hot Charging) – 396000 TPA				
Sponge Iron		327100	Own generation	----
Scrap		140000	Local area, West Bengal	By road (through covered trucks)
Ferro alloys		6000	Own generation	By road (through covered trucks)
For Electrict Arc Furnace (Bloom) – 198000 TPA				
Hot metal		107000	Own generation	----
DRI		87000	Own generation & Local Market, West Bengal	----
Scrap		4400	Own generation & Local Market, West Bengal	----
Calcined Lime & Dolomite		24000	Bhutan, Chhattisgarh	By road (through covered trucks)
Ferro Alloys		2000	Own generation	----
Electrode paste		500	Jharkhand	By road (through covered trucks)
For Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod) – 4,29,000 TPA				
MS Billets / Ingots		459030	Own generation	----
Furnace Oil		17,000 KL	IOCL, West Bengal	By road
For AFBC Boiler [Power Generation 50 MW]				
Dolochar		173250	In plant generation	through covered conveyors
Coal	Indian	277500	ECL, West Bengal	By rail & road (through covered trucks)
	Imported	60375	South Africa	Through sea route / rail route / by road

For Ferro Silicon unit (For 3 x 9 MVA)				
S.No.	**Raw Material**	**Quantity (TPA)**	**Source**	**Mode of Transport**
1	Quartz	25350	Chhattisgarh / Andhra Pradesh	By Rail & Road (covered trucks)
2	Pet coke	8400	Vizag	By Rail & Road (covered trucks)
3	MS Scrap	525	Inhouse Generation & Local, West Bengal	By Road (covered trucks)
4	Electrode paste	1260	Jharkhand	By Rail & Road (covered trucks)

For Ferro Manganese unit (For 3 x 9 MVA)				
S.No.	**Raw Material**	**Quantity (TPA)**	**Source**	**Mode of Transport**
1	Manganese Ore	79950	MOIL / OMC	By Rail & Road (covered trucks)
2	Pet coke	46050	Vizag	By Rail & Road (covered trucks)
3	MS Scrap	3090	Local, West Bengal	By Road (covered trucks)
4	Electrode Paste	18000	Jharkhand	By Road (covered trucks)

For Silico Manganese unit (For 3 x 9 MVA)				
S.No.	**Raw Material**	**Quantity (TPA)**	**Source**	**Mode of Transport**
1	Manganese Ore	47550	MOIL / OMC	By Rail & Road (covered trucks)
2	Mn. Slag	27000	In house generation	----
3	Quartz	11700	Chhattisgarh / Andhra Pradesh	By Rail & Road (covered trucks)
4	Pet coke	4800	Vizag	By Rail & Road (covered trucks)

For Ferro Chrome unit (For 3 x 9 MVA)				
S.No.	**Raw Material**	**Quantity (TPA)**	**Source**	**Mode of Transport**
1	Chrome Ore	1,20,000	Sukinda, Odisha Import, South Africa	By Road (Covered Trucks) From Port By Road (Covered Trucks)
2	Pet coke	47250	Chhattisgarh / Bihar	By Road (Covered Trucks)

For For Galvanizing unit (For 100000 TPA)				
S.No.	**Raw Material**	**Quantity (TPA)**	**Source**	**Mode of Transport**
1.	Rerolled Steel or MS Pipe	110000	In house generation & Local Market, West Bengal	----
2.	Zinc	20 TPD	Rajasthan	By road
3.	HCl	14.4 TPD	Local area, West Bengal	By road
4.	Ammonium Zinc Chloride	1.4 TPD	Local area, West Bengal	By road
5.	Sodium di-chromate	8 Kg/day	Local area, West Bengal	By road
6.	Furnace oil	6.6 KLD	IOCL, West Bengal	By road

3.7 WATER REQUIREMENT AND ITS SOURCE

- Water required in the existing plant is 1050 KLD and same being sourced from Damodar river
- Water required for the proposed expansion project will be 3050 KLD and same will be sourced from Damodar river.
- Air cooled condensers have been provided in existing power plant. In expansion also air cooled condensers will be provided.
- Water permission from Damodar Valley Corporation has already been obtained.

Following is the break up of water requirement:

S.No.	Unit	Quantity in KLD		
		Existing Plant	Proposed Expansion	Total after Expansion
1.	Iron Ore Beneficiation Plant (Beneficiated Iron Ore)	---	400	400
2.	Pellet Plant (Pellet)	---	200	200
3.	DRI Kilns (Sponge Iron)	100	300	400
4.	Induction Furnace (MS Ingot/Billet)	200	400	600
5.	Electric Arc Furnace - Laddle Refining Furnace and AOD Converter (Bloom)	---	200	200
6.	Rolling Mill	200	400	600
7.	Ferro Alloy Plant	30	50	80
8.	Cement Plant	150	---	150
9.	Power Plant (AFBC)	350	1000	1350
10.	Galvanization Plant	---	60	60

11.	Oxygen Plant	---	10	10
12.	Domestic	20	30	50
		1050	3050	4100

3.8 WASTEWATER GENERATION & ITS MANAGEMENT

Existing

- There is no wastewater generation from the existing plant as Closed circuit cooling system is being adopted.
- Boiler blowdown & DM plant regeneration wastewater is being treated in Neutralization tanks and is being mixed in a Central Monitoring Basin (CMB). The treated effluent from CMB is being utilized for dust suppression, ash conditioning and for greenbelt development.
- Only wastewater is sanitary wastewater, which is being treated in Septic tank followed by Soak pit.
- Zero liquid effluent discharge is being maintained in the existing plant.

Proposed

- There will be no effluent generation in the I/O Beneficiation, Pellet Plant, DRI, Induction Furnace, EAF, Rolling mill, Ferro Alloys unit, Oxygen Plant as closed circuit cooling system will be adopted.
- Effluent from power plant will be treated and after ensuring compliance with WBPCB norms, it will be utilized for dust suppression, ash conditioning and for greenbelt development.
- Effluent from Galvanization plant will be treated in ETP.
- Sanitary waste water will be treated in septic tank followed by sub-surface dispersion trench.

3.9 SOLID WASTE GENERATION & ITS MANAGEMENT

S.No	Waste	Quantity (TPD)		Method of disposal
		Existing	Proposed	
1.	Tailing	--	400	Will be given to Ceramic industries / other mineral based industries.
2.	Ash from Pellet Plant	--	54	Will given to Brick manufacturing unit
3.	Ash from DRI	577	525	Is being utilized in the existng Cement Plants (Partly) & given to Brick manufacturers (partly). The same practice will be continued after expansion also.
4.	Dolochar	577	525	Is being utilized in the exising AFBC boiler based power palnt. The same practice will be continued after expansion also.
5.	Kiln Accretion Slag	17	16	Is being utilised in road construction & given to brick manufacturer and same practice will be continued after the proposed expansion also.
6.	Wet Scraper Sludge	88	80	Is being utilised in road construction & given to brick manufacturer and same practice will be continued after the proposed expansion also.
7.	SMS Slag	73	120	Slag from SMS is being crushed and iron is being recovered & remaining non -magnetic material being inert by nature is used as sub base material in road construction/ used for brick manufacturing and same practice will be continued after the proposed expansion also.
8.	Mill scales from Rolling Mill	33	65	Mill scales from Rolling Mill will be reused in the SMS
9.	Slag from SiMn	--	113	will be utilised in road construction
10.	Slag from FeMn	--	90	will be used in manufacture of Silico manganese as it contains high MnO_2
11.	Slag from FeSi	--	2.5	will be given to cast iron foundries
12.	Slag from FeCr	--	120	will be further processed in Zigging plant for Chrome recovery and the non-chrome contents will be sent for land filling.
13.	Zinc ash	--	1680 Kg/day	Will be sold to recyclers
14.	Zinc dross	--	2.2	Will be sold to recyclers / extrusion plant
15.	ETP Sludge	--	400 Kg/day	Will be sent to TSDF sites
16.	Ash from Power Plant (with Indian Coal)	58	380	Is being utilized in the existng Cement Plants (Partly) & given to Brick manufacturers (partly). The same practice will be continued after expansion also.

3.10 POWER REQUIREMENT

Power requirement for the existing plant is being met from Captive Power plant and Damodar Valley Corporation (DVC). Power required for propsed expansion will be 116.20 MW and will be met partly from proposed 42 MW WHRB, 50 MW AFBC based power plant and remaining from Damodar Valley Corporation (DVC).

Following is Power consumption break up for each unit:

S.No.	Plant	Power Requirement		
		Existing	Expansion	After Expansion
1.	I/O Beneficiation Unit	---	8.0 MW	8.0 MW
2.	Pellet plant			
3.	DRI	3.0 MW	9.0 MW	12.0 MW
4.	SMS	19.0 MW	38.0 MW	57.0 MW
5.	EAF	---	19.0 MW	19.0 MW
6.	Rolling Mill	4.0 MW	9.0 MW	13.0 MW
7.	Ferro Alloys	12.0 MW	19.0 MW	31.0 MW
8.	Cement plant	1.0 MW	--	1.0 MW
9.	Oxygen plant	---	1.0 MW	1.0 MW
10.	Galvanization Plant	---	4.0 MW	4.0 MW
11.	Power Plant – WHRB	0.8 MW	4.2 MW	5.0 MW
12.	Power plant – AFBC	0.7 MW	5.0 MW	5.7 MW
Total		**40.5 MW**	**116.20 MW**	**156.7 MW**

Chapter – 4 : SITE ANALYSIS

4.1 INFRASTRUCTURE

For establishment and successful operation of plant, it is imperative to ensure availability of the following infrastructure:

- Availability of raw coal & iron ore and its proximity to the plant to reduce cost of transportation.
- Road / Rail head connection so that the raw materials and products can be easily and economically transported.
- Availability of water.
- Permanent and reliable source of power.
- Adequate land for the plant, storage of raw material and products & disposal of waste material.

4.2 CONNECTIVITY

The proposed site is well connected with Road network. The following table gives brief regarding connectivity of the proposed site:

Component		Description
Road	:	Site is connected to National Highway # 60
Rail	:	Nearest station – Raniganj Railway Station – 4.4 Kms.
Air	:	Panagarh Airport – 34.0 Kms. Kms.

Below mentioned table gives brief regarding environmental setting of the project site

S.No	Particulars		Distance from the site (within 10 kms.)
1.	Habitation	:	Jemua Village – 0.3 Kms.
2.	National Park	=	Nil
3.	Wild life sanctuaries	=	Nil
4.	Eco Sensitive Areas	=	Nil
5.	Forests	=	Gangajalghati PF (E) – 3.0 Kms.
6.	Surface water bodies	=	Damodar River – 1.5 Kms. Galghata Jhor Nallah – 0.5 Kms. Chouphari Nallah – 3.7 Kms.
7.	Costal Regulation Zone [CRZ]	=	Nil

4.2 Land details

- Existing plant is located at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal.
- Existing plant is located in 150 acres (60.7 Ha.) of land.
- Proposed expansion will be taken up partially in the Existing plant (i.e. 150 acres / 60.7 Ha.) and partially in the land adjacent to the existing plant (i.e. 13.3 acres / 5.4 Ha.) which will be taken on lease from the sister concern unit.
- Total land after proposed expansion will be 163.3 acres / 66.1 Ha..
- Mouza Numbers (Plot Nos.) of total land area are enclosed as Annexure - 1
- Coordinates of the project site are 23°33'50.00"N 87° 5'21.00"E
- The entire project area will fall in the Survey of India topo sheet no. 73 M/2

Chapter – 5 : PLANNING BRIEF

5.1 PLANNING CONCEPT

Shyam Steel Manufacturing Limited is an existing plant located J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal-722143. Existing plant has obtained Environment Clerance from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 4th August 2008. Accordingly obtained Consent to Establishment and Consent to Operate from the WBPCB for few units and same are under operation. Now, as part of expansion, company proposed to expand the existing plant as mentioned below:

S.No.	Unit (Product)	Configuration for which CTE / EC Granted (J-11011/ 724/ 2007- IA II (I) dated 04.08.08, 18.04.12, 06.02.15 & 27.02.17)	Existing units commissioned / Under Implementation as per EC	Proposed Expansion	Final Configuration after Proposed Expansion
		[1]	[2]	[3]	[4] = [2] + [3]
1	Iron Ore Beneficiation Plant (Beneficiated Iron Ore)	Nil	Nil	8,00,000 TPA throughput (6,80,000 TPA – Beneficiated Iron ore)	8,00,000 TPA throughput (6,80,000 TPA – Beneficiated Iron ore)
2	Pellet Plant (Pellet)	Nil	Nil	6,00,000 TPA	6,00,000 TPA
3	DRI Kilns (Sponge Iron)	3,60,000 TPA (3X300 TPD + 3X100 TPD)	1,80,000 TPA (1X300 TPD + 3X100 TPD)	Instead of remaining 1,80,000 TPA (2 x 300 TPD), now proposed to install 5,77,500 TPA (5 X 350 TPD)	7,57,500 TPA (1X300 TPD + 3X100 TPD + 5X350 TPD)
4	Induction Furnace (MS Ingot/Billet/Hot Charging)	3,56,000 TPA	2,17,800 TPA (6 X 11 T)	Instead of remaining 138200 TPA, now proposed to install 3,96,000 TPA	6,13,800 TPA (6 X 11 T + 8 X 15 T)

S.No.	Unit (Product)	Configuration for which CTE / EC Granted (J-11011/ 724/ 2007- IA II (I) dated 04.08.08, 18.04.12, 06.02.15 & 27.02.17)	Existing units commissioned / Under Implementation as per EC	Proposed Expansion	Final Configuration after Proposed Expansion
		[1]	[2]	[3]	[4] = [2] + [3]
				(8 X 15T)	
5	Electric Arc Furnace with 30 T Laddle Refining Furnace and AOD Converter (Bloom)	Nil	Nil	1,98,000 TPA (1 x 30 T)	1,98,000 TPA
6	Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod)	3,15,000 TPA	2,00,000 TPA (Under Implementation)	Instead of remaining 1,15,000 TPA, now proopsed to install 4,29,000 TPA (2 x 650 TPD)	6,29,000 TPA
7	Ferro Alloy Plant (FeSi/FeMn/SiMn/FeCr)	55,000 TPA	2 x 9 MVA (FeMn 32,400 TPA / SiMn 32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA)	Instead of remaining 1 x 9 MVA, now proposed to install 3 x 9 MVA (FeMn 48,600 TPA / SiMn 48,600 TPA / FeCr – 40,500 TPA / FeSi – 23,400 TPA)	5 x 9 MVA (FeMn 81,000 TPA / SiMn 81,000 TPA / FeCr – 67,500 TPA / FeSi – 39,000 TPA)
8	Power Plant (WHRB)	32 MW	8 MW	Instead of remaining 24 MW, now proposed to install 42 MW (40 MW + 2 WM)	50 MW
9	Power Plant (AFBC)	20 MW	7 MW	Instead of remaining 13 MW, now proposed to	57 MW

S.No.	Unit (Product)	Configuration for which CTE / EC Granted (J-11011/ 724/ 2007- IA II (I) dated 04.08.08, 18.04.12, 06.02.15 & 27.02.17)	Existing units commissioned / Under Implementation as per EC	Proposed Expansion	Final Configuration after Proposed Expansion
		[1]	[2]	[3]	[4] = [2] + [3]
				install 50 MW (2 x 25 MW)	
10	Galvanization Plant	Nil	Nil	1,00,000 TPA	1,00,000 TPA
11	Oxygen Plant	4,000 TPA	Nil	Instead of 4,000 TPA of Earlier EC, now proposed to install 4,000 TPA	4,000 TPA
12	Cement Plant	75,000 TPA	75,000 TPA	Nil	75,000 TPA
13	Sponge Iron Briquette	60,000 TPA	Nil	Nil	Dropping Now
14	Coal / Coke / Chrome fines Briquette	90,000 TPA	Nil	Nil	Dropping Now
15	Mini Blast Furnace-165 M^3 (Pig iron)	1,20,000 TPA	Nil	Nil	Dropping Now
16	Sinter Plant -15M^2 (Sinter)	80,000 TPA	Nil	Nil	Dropping Now

5.2 POPULATION PROJECTION

In the 2011 census, Bankura municipality had a population of 3,596,292 out of which 1,840,504 were males and 1,755,788 were females, constituting 954 females per 1000 male as sex ratio. There was change of 12.64% in the population compared to population as per 2001. Effective literacy rate as in Census 2011 is 70.95%.

As of 2011 India census, Bankura town has a population of 3,596,292. Males constitute 1,840,504 of the population and females 1,755,788. Bankura has an average literacy rate of 70.95%, with 81.00% of the males and 60.44% of females literate. Total Child population in Bankura area is 405,401 out of which 208,632 are boys and 196,769 are girls, under the age of 6 years.

5.3 LAND USE PLANNING

- Existing plant is located at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal.
- Existing plant is located in 150 acres (60.7 Ha.) of land.
- Proposed expansion will be taken up partially in the Existing plant (i.e. 150 acres / 60.7 Ha.) and partially in the land adjacent to the existing plant (i.e. 13.3 acres / 5.4 Ha.) which will be taken on lease from the sister concern unit.
- Total land after proposed expansion will be 163.3 acres / 66.1 Ha.

5.4 AMENITIES / FACILITIES

Facilities like canteen, rest room has already been provided in the existing plant as basic facilities to workers. No other additional facilities are proposed.

Chapter – 6 : PROPOSED INFRASTRUCTURE

6.1 INDUSTRIAL AREA (PROCESSING AREA)

The main plant area comprises of I/O Beneficiation unit, Pellet Plant, DRI Kilns, Furnace sheds, Rolling mill area, raw material storage and product storage etc.

6.2 RESIDENTIAL AREA (NON PROCESSING AREA)

No colonization is proposed; however, facilities like canteen, rest room and indoor games facilities will be provided in the proposed plant and one Admin building is also proposed.

6.3 GREEN BELT

More than 1/3rd of total land availability is reserved for plantation i.e. greenery.

Greenbelt development plan

- Local DFO will be consulted in developing the green belt.
- Greenbelt of 33% of the area will be developed in the plant premises as per CPCB guidelines.
- 10 m wide greenbelt is being maintained all around the plant.
- The tree species to be selected for the plantation are pollutant tolerant, fast growing, wind firm, deep rooted. A three tier plantation is proposed comprising of an outer most belt of taller trees which will act as barrier, middle core acting as air cleaner and the innermost core which may be termed as absorptive layer consisting of trees which are known to be particularly tolerant to pollutants.

6.4 SOCIAL INFRASTRUCTURE

Social infrastructure will be developed as per need based in the Villages of the close vicinity of the project.

6.5 CONNECTIVITY

The proposed site is well connected with Road network. The following table gives brief regarding connectivity of the proposed site:

Component		Description
Road	:	Site is connected to National Highway # 60
Rail	:	Nearest station – Raniganj Railway Station – 4.4 Kms.
Air	:	Panagarh Airport – 34.0 Kms. Kms.

6.6 DRINKING WATER MANAGEMENT

It is estimated that 30 KLD of water will be required for domestic purpose during operation of proposed expansion project.

The desired amount of water will be Sourced from Ground water sources.

6.7 WASTEWATER GENERATION & ITS MANAGEMENT

Existing

- There is no wastewater generation from the existing plant as Closed circuit cooling system is being adopted.
- Boiler blowdown & DM plant regeneration wastewater is being treated in Neutralization tanks and is being mixed in a Central Monitoring Basin (CMB). The treated effluent from CMB is being utilized for dust suppression, ash conditioning and for greenbelt development.
- Only wastewater is sanitary wastewater, which is being treated in Septic tank followed by Soak pit.
- Zero liquid effluent discharge is being maintained in the existing plant.

Proposed

- There will be no effluent generation in the I/O Beneficiation. Pellet Plant, DRI, Induction Furnace, EAF, Rolling mill, Ferro Alloys unit, Oxygen Plant as closed circuit cooling system will be adopted.

- Effluent from power plant will be treated and after ensuring compliance with WBPCB norms, it will be utilized for dust suppression, ash conditioning and for greenbelt development.
- Effluent from Galvanization plant will be treated in ETP.
- Sanitary waste water will be treated in septic tank followed by sub-surface dispersion trench.

Chapter – 7: REHABILITATION & RESETTLEMENT (R & R) PLAN

No rehabilitation and resettlement is required as existing Steel Plant is already in operation at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal.

Existing plant is located in 150 acres (60.7 Ha.) of land.

Proposed expansion will be taken up partially in the Existing plant (i.e. 150 acres / 60.7 Ha.) and partially in the land adjacent to the existing plant (i.e. 13.3 acres / 5.4 Ha.) which will be taken on lease from the sister concern unit.

Total land after proposed expansion will be 163.3 acres / 66.1 Ha.

Chapter – 8 : PROJECT SCHEDULE & COST ESTIMATES

8.1 PROJECT SCHEDULE

Proposed expansion project will be implemented in 72 months from the date of receipt of Environmental Clearance from the MoEF&CC, New Delhi & Consent from WBPCB.

8.2 PROJECT COST

The estimated cost for the proposed expansion project will be Rs. 1560 Crores.

Chapter – 9 : ANALYSIS OF PROPOSAL

9.1 FINANCIAL AND SOCIAL BENEFITS

With the implementation of the proposed expansion project, the socio-economic status of the local people will improve substantially. The land rates in the area will improve in the nearby areas due to the proposed expansion activity. This will help in upliftment of the social status of the people in the area. Educational institutions will also come-up and will lead to improvement of educational status of the people in the area. Primary health centre will also be developed by us and the medical facilities will certainly improve due to the proposed expansion project.

9.2 SOCIO-ECONOMIC DEVELOPMENTAL ACTIVITIES

The management is committed to uplift the standards of living of the villagers by undertaking following activities / responsibilities as the part of Corporate Social Responsibility.

- Health & hygiene
- Drinking water
- Education for poor
- Village roads
- Lighting