

PRE - FEASIBILITY REPORT

For

Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant- 1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill)- 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW

At

Village - Ghantikhal, Tehsil - Athagarh,
District - Cuttack, State - Odisha

Project Proponent:



AARTI STEELS LTD.

[At: Ghantikhal, P.O: Mahakalabasta, Via: Athagarh, Dist.: Cuttack - 754029, Odisha]

Submitted to
Ministry of Environment, Forest & Climate Change (MoEFCC)
Govt. of India

Environment Consultant:



VISIONTEK CONSULTANCY SERVICES PVT. LTD.

(Committed For Better Environment)

[Plot No. M-22 & 23, Chandaka Industrial Estate, Patia, Bhubaneswar - 751024, Odisha]

JUNE 2022

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Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

1. EXECUTIVE SUMMARY

1.1 Introduction

Aarti Steels Limited represents a fully integrated steel manufacturing company with manufacturing facilities of Carbon and Alloy Steel Rounds and Squares, Sponge Iron, Power and Ferro Alloys. The Aarti Group incorporated in the year 1979, with the establishment of Aarti Steels Ltd. and has slowly and steadily grown and emerged as one of the India's leading manufacturer of Carbon and Alloy steel with state of art and technology plants located in Punjab and Odisha with a capacity of 3 Lakh Tonnes per annum. The company manufactures total range of Carbon, Alloy and Special Steels conforming to National / International specifications including customer specific requirements through a dedicated route of steel making.

In 2004-05 Steel and Power Plant was set up at Ghantikhal in Cuttack, Odisha by Aarti Steels Ltd. after obtaining prior Environmental Clearance from MoEF vide Letter no. J-11011/158/2004-IA-II(I) dated 16.02.2005 (attached as **Annexure-1**). Again after 4 years, it was proposed for expansion of the Integrated Steel Plant, for which prior Environmental Clearance was obtained from MoEF vide Letter no. J-11011/287/2008-IA-II(I) dated 13.05.2009 (attached as **Annexure-2**).

Consent Approvals:

After obtaining 1st CTE from OSPCB vide letter no. 25707, dated 15.12.2003 which was superseded by a revised 2nd CTE vide letter no. 16176/IND-II-NOC-5130, dated 12.10.2009 (attached as **Annexure-3**), 3rd CTE vide letter no. 786/IND-II-NOC-5130 dated 21.10.2010 (attached as **Annexure-4**), 4th CTE vide letter no. 14797/IND-II-NOC-5130 dated 12.09.2014 (attached as **Annexure-5**), 5th CTE vide letter no. 9140/IND-II-



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

NOC-5987 dated 02.06.2016 (attached as **Annexure-6**), and 6th CTE vide letter no. 10214/IND-II-NOC-6162 dated 30.08.2018, which was superseded by 7th CTE conveyed vide letter no. 7263/IND-II-CTE-6162 dated 20.07.2019 (attached as **Annexure-7 & 8** respectively), Aarti Steels Ltd. has installed the units.

The company started operation of units after obtaining 1st CTO from OSPCB vide letter no. 33948-IND-I-CON-4904 dated 25.11.2005 (attached as **Annexure-9**), consequently 2nd CTO was obtained vide letter no. 9051-IND-I-4904 dated 10.06.2009 (attached as **Annexure-10**), 3rd CTO vide letter no. 899-IND-I-4904 dated 19.01.2011 (attached as **Annexure-11**).

At present, ASL is operating an integrated steel plant with 2 Nos. 500 TPD each coal based Rotary Kilns for the production of Sponge Iron, each with a 10 MW Waste Heat Recovery Boiler, a 50 MW CFBC based power plant and a 30 MW AFBC based power plant. A coal washery of 1 MTPA capacity caters to the requirement of coal for Sponge Iron Plant & Power Plant. The SMS has a 35 T EAF, 2 Nos. Matching Ladle Refining Furnaces, 1 Nos. Vacuum Degassing Unit, 2-Strand Bloom/Billet Caster for the production of Alloy Steel Grades. The Ferro Alloy Plant has 2x9 MVA and 1x18 MVA SAFs alongwith a 25 TPH Chrome Ore Briquetting Plant for agglomeration of chrome ore fines.

All the above existing facilities are operating in due diligence of required formalities including Latest Consent to Operate [Issued by SPCB, Odisha vide letter No. 3266/IND-I-CON-4904, dated. 21.03.2018 & letter No. 10254/IND-I-CON-4904, dated. 01.10.2019 (attached as **Annexure-12 & 13** respectively).

With professional and dedicated manpower, Aarti Steels Ltd. has gained a prominent status in the Steel manufacturing industry in the Country. The Company is manned with a dedicated team of well experienced Technocrats and Management professionals in diverse fields.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Aarti Steels Ltd. is now proposing to undertake expansion of the facilities in the existing plant to augment its capacity for producing hot rolled products to an annual capacity of 1.5 million metric tons and to add 2x18 MVA SAFs for the production of Ferro-Alloys.

Table 1.1(A): Details of Products Existing & Proposed Final Capacity

Existing Products & Capacity	Sponge Iron Plant - 3,00,000 TPA
	Steel Products (SMS & Rolling Mill) – 2,00,000 TPA
	Coal Washery Plant - 10,00,000 TPA
	Captive Power Plant - 100 MW
	Ferro Alloy Plant – 50,000 TPA
	Chrome Ore Briquetting Plant – 1,50,000 TPA
Final Products & Capacity (after Expansion)	Iron Ore Beneficiation Plant - 20,00,000 TPA
	Pellet Plant - 12,00,000 TPA
	Sponge Iron Plant - 3,00,000 TPA
	Steel Products (SMS & Rolling Mill) - 15,00,000 TPA
	Captive Power Plant - 215 MW
	Coal Washery Plant - 10,00,000 TPA
	Ferro Alloy Plant - 1,25,000 TPA*
	Chrome Ore Briquetting Plant - 3,00,000 TPA
	Coke Oven Plant (Non-Recovery Type) - 5,00,000 TPA
	Sinter Plant - 17,57,800 TPA
	Blast Furnace - 12,70,500 TPA
	Lime Dolo Plant - 1,65,000 TPA
	Oxygen Plant - 3,02,500 TPA

*No Increase in Pollution Load for Ferro Alloy Plant (Attached as **Annexure-14**)



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Table 1.1(B): Implementation Status as per existing EC & CTO

S.No.	Plant Equipment/Facility	Existing Facilities as per EC dated 13 th May, 2009						As per latest CTO dated 21.03.2018 & 01.10.2019		Proposed Units		Final (Existing +Proposed)	
		Total (A + B)		Implemented (A)		Un-implemented (B)		Config.	Capacity	Config	Capacity	Config.	Capacity
		Config.	Capacity	Config.	Capacity	Config.	Capacity						
1.	Iron Ore Beneficiation Plant	-	-	-	-	-	-	-	-	1x20,00,000 TPA	20,00,000 TPA	1x20,00,000 TPA	20,00,000 TPA
2.	Pelletization Plant	-	-	-	-	-	-	-	-	1x12,00,000 TPA	12,00,000 TPA	1x12,00,000 TPA	12,00,000 TPA
3.	Sponge Iron Plant	4x1,50,000 TPA	6,00,000 TPA	2x1,50,000 TPA	3,00,000 TPA	2x1,50,000 TPA	3,00,000 TPA	2x500 TPD	3,00,000 TPA	-	-	2x500 TPD	3,00,000 TPA
4.	SMS Products	-	-	-	-	-	-	EAF - 1x35 T, VD - 1x35 T, LRF - 2x26 T Billet Caster	-	EOF - 3x65 T, IF - 4x20 T, LRF - 4x65 T, VOD/VD - 2x65 T, AOD - 1x45 T& 1x65 T, 2x3 Strand Billet Caster, 1x8 M Slab Caster	-	EAF - 1x35 T, VD - 1x35 T, LRF - 2x26 T EOF - 3x65 T, IF - 4x20 T, LRF - 4x65 T, VOD/VD - 2x65 T, AOD - 1x45 T& 1x65 T, 2x3 Strand Billet	15,51,763 TPA



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												Caster, 1x8 M Billet Caster,	
5.	Rolling Mill	-	4,99,30 0 TPA	-	2,00,00 0 TPA	-	2,99,30 0 TPA	1x2,00,0 00 TPA	2,00,00 0 TPA	-	13,00,0 00 TPA	-	15,00,0 00 TPA
6.	Captive Power Plant	2x50 MW CFBC; 1x10 MW WHRB; 50 MW	160 MW	2x10 MW - WHRB; 1x50 MW - CFBC; 1x30 MW - AFBC	100 MW	1x50 MW - CFBC; 1x10 MW - WHRB	60 MW	2x10 MW - WHRB; 1x50 MW - CFBC; 1x30 MW - AFBC	100 MW	37 MW - WHRB (Coke Oven Based) 78 MW - CFBC	115 MW	57 MW - WHRB (Coke Oven Based) 128 MW - CFBC 30 MW - AFBC	215 MW
7.	Coke Oven Plant (Non- Recovery Type)	-	2,36,00 0 TPA	-	-	-	2,36,00 0 TPA	-	-	4x50,000 TPA & 4x75,000 TPA	5,00,00 0 TPA	4x50,00 0 TPA & 4x75,00 0 TPA	5,00,00 0 TPA
8.	Sinter Plant	-	3,43,00 0 TPA	-	-	-	3,43,00 0 TPA	-	-	1x65 m ² & 1x105 m ²	17,57,8 00 TPA	1x65 m ² & 1x105 m ²	17,57,8 00 TPA
9.	Blast Furnace	-	3,00,00 0 TPA	-	-	-	3,00,00 0 TPA	-	-	1x450 m ³ & 1x650 m ³	12,70,5 00 TPA	1x450 m ³ & 1x650 m ³	12,70,5 00 TPA
10.	Coal Washery	2x10,00, 000 TPA	20,00,0 00 TPA	1x10,00, 000 TPA	10,00,0 00 TPA	1x10,00, 000 TPA	10,00,0 00 TPA	1x10,00, 000 TPA	10,00,0 00 TPA	-	-	1x10,00, 000 TPA	10,00,0 00 TPA
11.	Ferro Alloy Plant	-	50,000 TPA	-	50,000 TPA	-	-	2x9 MVA & 1x18MV A	50,000 TPA	-	75,000 TPA	-	1,25,00 0 TPA
12.	Lime-Dolo Plant	-	-	-	-	-	-	-	-	2x250 TPD	1,65,00 0 TPA	2x250 TPD	1,65,00 0 TPA



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13.	Oxygen Plant	-	-	-	-	-	-	-	-	1x150 TPD + 1x180 TPD + 1x300 TPD+ 1x260 TPD	3,02,50 0 TPA	1x150 TPD + 1x180 TPD + 1x300 TPD+ 1x260 TPD	3,02,50 0 TPA
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Table 1.1(C): Details of Waste Recovery Plants

S.No.	Facilities	Existing as per CTO dtd. 21.03.2018 & 01.10.2019		Proposed		Total		Remarks
		Config.	Capacity	Config.	Capacity	Config.	Capacity	
1.	Chrome Ore Briquetting Plant	1 x 25 TPH	1,50,000 TPA	1 x 25 TPH	1,50,000 TPA	2 x 25 TPH	3,00,000 TPA	Waste Recovery Plants
2.	Fe-Cr Metal Recovery Plant	-	-	1 x 25 TPH	2,07,000 TPA	1 x 25 TPH	2,07,000 TPA	



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1.2 Salient Features of the Project

A.	Name of the project	Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant 2 MTPA, Pellet Plant 1.2 MTPA, Sponge Iron Plant 0.3 MTPA, Sinter Plant 1.75 MTPA, Blast Furnace 1.27 MTPA, Steel Products (SMS & Rolling Mill) 1.5 MTPA, Coal Washery 1 MTPA, Coke Oven Plant (Non-Recovery Type) 0.5 MTPA, Ferro Alloy Plant 0.125 MTPA, Lime Dolo Plant 0.165 MTPA, Oxygen Plant 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village-Ghantikhal, Tehsil-Athagarh, District-Cuttack, Odisha
B.	Sl. No. in the schedule	S.No.2 (Primary Processing), 2(b) Mineral Beneficiation S.No.3 (Material Production), 3(a) Metallurgical Industries; Category - A
C.	Project Proponent Detail	
	Name of the Company	Aarti Steels Limited
	Registered Head Office	G.T Road, Miller Ganj, Ludhiana – 141003, Punjab, India
	Regional Office	At - Ghantikhal, P.O – Mahakalbasta, Via Athagarh, Dist.-Cuttack – 754029, Odisha, India
D.	Land Area	315.1 Ha (already in possession)
E.	Location Details	
	Village	Ghantikhal
	Tehsil/ Block	Athagarh
	District	Cuttack
	State	Odisha
	Topo Sheet No.	F45T10, F45T11, F45T14, F45T15



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

	Latitude	20°31'3.12" N		
	Longitude	85°43'27.61" E		
F.	Environmental Setting Details (with approximate aerial distance and direction from the project site)			
	Nearest Habitation	Name of Village	Distance & Direction	Population (as per 2011 Cuttack District Census Handbook)
		Ghantikhal	0.26 km (E)	1377
		Nidhipur	0.34 km (E)	1286
		Mahakalbasta	1.50 km (W)	1232
	Nearest Town	<ul style="list-style-type: none"> Athagarh – 8.80 km (W) Cuttack – 9.20 km (ESE) 		
	Nearest National Highway / State Highway	<ul style="list-style-type: none"> Athagarh - Dhableswar Rd – Adjacent to Project Site on the Southern side Ghantikhal – Khuntuni Village Rd - Adjacent to Project Site on the Eastern side NH-55 – 3.63 km (N) 		
	Nearest Railway station	Ghantikhal-Nidhipur Railway Station – 0.15 km (E)		
	Nearest Airport	Biju Patnaik International Airport, Bhubaneswar – 29 km (SSE)		
	National Parks, Wildlife Sanctuaries, Biosphere Reserves	There is no National Parks, Wildlife sanctuaries and Biosphere Reserves within 10 Km from the site.		
	Reserve forest, and Protected forest within 10 km radius	<ul style="list-style-type: none"> Oringa RF – Adjacent to project boundary Khalakhala RF – 0.64 km (S) Brahmanabasta RF – 0.66 km (E) Subasi RF – 2.09 km (NW) Ranibania RF – 5.09 km (NW) Sukasana RF – 5.10 km (SW) Deulia RF – 5.12 km (NNW) Bouda Banakhandi RF – 5.46 km (SW) Adala RF – 5.67 km (NW) Suniamuhan RF – 6.25 km (ENE) Sankhiapoi RF – 6.65 km (NE) Gadabola RF – 7.93 km (NW) 		



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

		<ul style="list-style-type: none"> Baula RF – 8.13 km (ENE)
	Water Body (within 10 km radius)	<ul style="list-style-type: none"> Sapua Nadi – 2.09 km (WSW) Barha Jor – 2.83 km (NW) Mahanadi River – 3.40 km (E) Kathajodi River – 5.84 km (SE) Bhuiyan Jor – 8.74 km (E)
	Distance of nearest HFL	Mahanadi River - Near Naraj (5.58 km, SE); (HFL Data & Flood History vide letter no. TD/905/CE/VI/2020/383 dtd. 31.03.2022 attached as Annexure-15)
	Seismic Zone	Zone – III (Moderate damage risk zone) [as per IS 1893 (Part-I): 2002]
G.	Cost Detail	
	Project Cost	Rs. 6112 Crores (Existing: Rs 1052 Crores + Proposed: Rs 5060 Crores)
	EMP Cost	Rs. 489 Crores (approx.)
	CER Cost	Rs. 16.65 Crores (approx.)
H.	The basic requirement for the project	
	Manpower Requirement	Direct: 6120 (Existing: 2533, Proposed: 3587) Indirect: 12000
	Source	Local people will be given preference in employment as per eligibility.
	Power Requirement (MW)	Existing: 74 MW Proposed: 204 MW Total: 278 MW
	Source	Captive Power Plant - 215 MW, From Nearest Grid - 63 MW (Permission will be obtained) 10 MW from GRIDCO for Emergency startup power (Permission letter no. Gridco-DC-89/2009/5994(12) dtd. 05.09.2009 attached as Annexure-16)
	Make-up Water Requirement	Total: 36,856 KLD Existing: 11,582 KLD Proposed: 25,004 KLD
	Source	Mahanadi River (Agreement Letter dtd. 28.04.2004 for supply of 23,803 KLD water from Mahanadi River has been attached as Annexure-17 . Permission for lifting 9.72 cumecs water in 1 st phase and



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

9.72 cumecs water in 2nd phase from Mahanadi River from Dept. of Water Resources, Bhubaneswar vide letter no. WII-DM-Misc.-5/2003/13857 dtd. 26.12.2003 attached as **Annexure 18)**
Rain water harvesting – 495 KLD

1.3 Land Use Planning

Previously EC was granted over an area of 283.4 Ha. Additional land of 31.7 Ha has been acquired. The total land required for the project is 315.1 Ha, which is already company's possession. As per Toposheet Map (SOI), 2009, a part of the Project is coming within the Oringa RF. But, as per clarification letter from DFO vide letter no. 1445 dated 12.04.2022 and as per Bhulekh, the Kissam of the concerned land is Non-Forest. Land detail sheet attached as **Annexure-19**. Verification Letter from DFO vide letter no. 1445 dtd. 12.04.2022 is attached as **Annexure-20**. Detailed land use plan is furnished below:-



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 1.2: Land Use Break-up

Item No.	Description	Area (Hectares)		Total	Percentage (%)
		Existing	Proposed		
1.	Railway Siding with Wagon Tippler	5.0210	-	5.0210	1.59
2.	Raw Material Storage Yard	4.3896	10.5377	14.9273	4.74
3.	Pellet Plant with Beneficiation Plant		7.6334	7.6334	2.42
4.	2x500 TPD Kilns	5.0833		5.0833	1.61
5.	Steel Melting Shop	4.3385	12.4376	16.7761	5.32
6.	Rolling Mill	4.7006	11.5790	16.2796	5.17
7.	Coke Oven Plant (Non-Recovery Type)		20.1020	20.1020	6.38
8.	Sinter Plant		11.8860	11.8860	3.77
9.	Blast Furnace		11.2213	11.2213	3.56
10.	Ferro Alloy Unit	1.8783	2.6914	4.5697	1.45
11.	Power Plant	2.3152	4.9626	7.2778	2.31
12.	Crusher Plant	1.5316		1.5316	0.49
13.	Coal Washery Plant	4.0705		4.0705	1.29
14.	Solid Waste Storage Area	7.5752		7.5752	2.40
15.	Briquetting Plant	2.3076		2.3076	0.73
16.	SMS Slag Crushing Plant	0.2083		0.2083	0.07
17.	Ferro Chrome Metal Recovery Plant	0.8571		0.8571	0.27
18.	Lime & Dolo Plant		5.8680	5.8680	1.86
19.	Oxygen Plant		8.7943	8.7943	2.79
20.	Brick Making Plant		6.4547	6.4547	2.05
21.	Water Reservoir	4.2214		4.2214	1.34
22.	132/33 KV Sub-Station	1.1058		1.1058	0.35
23.	Main Gate	0.4038		0.4038	0.13
24.	Weigh Bridge	0.1856		0.1856	0.06
25.	Adm. Building, Canteen & Dispensary	0.1200		0.1200	0.04
26.	Staff Colony, Bachelor Quarters & Workers Colony	4.5356		4.5356	1.44
27.	Truck Parking Area	17.0040		17.0040	5.40
28.	Roads and Drain	19.8067		19.8067	6.29
29.	Open Area	1.2323		1.2323	0.39
30.	Tailings Storage Area		1.0500	1.0500	0.33
31.	Greenbelt	107		107	33.96



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32.	Open Area	115.218	-115.218	0	0
	TOTAL	315.1	0	315.1	100

Table 1.3: Co-ordinates of Project Boundary

FID	Latitude	Longitude	FID	Latitude	Longitude
0	20° 31' 20.381" N	85° 43' 56.085" E	145	20° 30' 54.352" N	85° 42' 53.666" E
1	20° 31' 20.359" N	85° 43' 56.515" E	146	20° 30' 52.415" N	85° 42' 52.401" E
2	20° 31' 20.903" N	85° 43' 56.545" E	147	20° 30' 51.134" N	85° 42' 51.970" E
3	20° 31' 21.958" N	85° 43' 56.700" E	148	20° 30' 52.500" N	85° 42' 49.936" E
4	20° 31' 22.796" N	85° 43' 56.729" E	149	20° 30' 53.640" N	85° 42' 48.465" E
5	20° 31' 23.950" N	85° 43' 56.720" E	150	20° 30' 55.222" N	85° 42' 47.023" E
6	20° 31' 24.929" N	85° 43' 56.568" E	151	20° 30' 57.569" N	85° 42' 45.056" E
7	20° 31' 26.222" N	85° 43' 56.188" E	152	20° 30' 59.733" N	85° 42' 43.969" E
8	20° 31' 29.993" N	85° 43' 56.510" E	153	20° 31' 0.470" N	85° 42' 43.258" E
9	20° 31' 34.762" N	85° 43' 56.640" E	154	20° 31' 1.020" N	85° 42' 42.852" E
10	20° 31' 39.853" N	85° 43' 51.935" E	155	20° 31' 1.860" N	85° 42' 42.323" E
11	20° 31' 41.155" N	85° 43' 54.262" E	156	20° 31' 2.393" N	85° 42' 41.834" E
12	20° 31' 40.366" N	85° 43' 56.096" E	157	20° 31' 3.883" N	85° 42' 40.542" E
13	20° 31' 39.388" N	85° 43' 56.505" E	158	20° 31' 4.286" N	85° 42' 40.019" E
14	20° 31' 38.401" N	85° 43' 56.912" E	159	20° 31' 4.684" N	85° 42' 39.607" E
15	20° 31' 38.379" N	85° 43' 56.930" E	160	20° 31' 5.040" N	85° 42' 39.322" E
16	20° 31' 37.419" N	85° 43' 57.363" E	161	20° 31' 5.210" N	85° 42' 39.117" E
17	20° 31' 37.190" N	85° 43' 57.437" E	162	20° 31' 5.802" N	85° 42' 38.682" E
18	20° 31' 36.627" N	85° 43' 57.625" E	163	20° 31' 6.207" N	85° 42' 38.441" E
19	20° 31' 35.831" N	85° 43' 57.811" E	164	20° 31' 6.649" N	85° 42' 38.351" E
20	20° 31' 35.263" N	85° 43' 57.889" E	165	20° 31' 7.035" N	85° 42' 38.319" E
21	20° 31' 34.560" N	85° 43' 58.135" E	166	20° 31' 7.582" N	85° 42' 38.303" E
22	20° 31' 34.014" N	85° 43' 58.358" E	167	20° 31' 8.268" N	85° 42' 38.267" E
23	20° 31' 33.503" N	85° 43' 58.618" E	168	20° 31' 8.698" N	85° 42' 38.212" E
24	20° 31' 33.053" N	85° 43' 58.883" E	169	20° 31' 8.999" N	85° 42' 38.178" E
25	20° 31' 32.624" N	85° 43' 59.221" E	170	20° 31' 9.259" N	85° 42' 38.149" E
26	20° 31' 31.983" N	85° 43' 59.700" E	171	20° 31' 9.484" N	85° 42' 38.114" E
27	20° 31' 31.464" N	85° 44' 0.101" E	172	20° 31' 9.707" N	85° 42' 38.053" E
28	20° 31' 30.695" N	85° 44' 0.606" E	173	20° 31' 9.913" N	85° 42' 37.953" E
29	20° 31' 29.745" N	85° 44' 1.116" E	174	20° 31' 10.091" N	85° 42' 37.848" E
30	20° 31' 28.514" N	85° 44' 1.596" E	175	20° 31' 10.358" N	85° 42' 37.691" E
31	20° 31' 26.651" N	85° 44' 2.307" E	176	20° 31' 10.725" N	85° 42' 37.519" E



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

32	20° 31' 25.315" N	85° 44' 2.662" E	177	20° 31' 10.937" N	85° 42' 37.415" E
33	20° 31' 21.818" N	85° 44' 3.696" E	178	20° 31' 11.037" N	85° 42' 37.630" E
34	20° 31' 20.270" N	85° 44' 4.280" E	179	20° 31' 11.346" N	85° 42' 37.726" E
35	20° 31' 17.068" N	85° 44' 2.862" E	180	20° 31' 11.652" N	85° 42' 37.767" E
36	20° 31' 14.225" N	85° 44' 1.785" E	181	20° 31' 11.886" N	85° 42' 37.826" E
37	20° 31' 13.351" N	85° 44' 1.558" E	182	20° 31' 12.088" N	85° 42' 37.941" E
38	20° 31' 12.446" N	85° 44' 1.501" E	183	20° 31' 12.366" N	85° 42' 38.223" E
39	20° 31' 11.603" N	85° 44' 1.612" E	184	20° 31' 12.546" N	85° 42' 38.483" E
40	20° 31' 10.625" N	85° 44' 1.945" E	185	20° 31' 12.654" N	85° 42' 38.761" E
41	20° 31' 9.861" N	85° 44' 2.201" E	186	20° 31' 12.718" N	85° 42' 39.328" E
42	20° 31' 9.512" N	85° 44' 2.464" E	187	20° 31' 12.794" N	85° 42' 40.391" E
43	20° 31' 7.480" N	85° 44' 3.236" E	188	20° 31' 12.851" N	85° 42' 41.501" E
44	20° 31' 5.885" N	85° 44' 3.564" E	189	20° 31' 12.903" N	85° 42' 41.918" E
45	20° 31' 2.248" N	85° 44' 4.408" E	190	20° 31' 12.978" N	85° 42' 42.758" E
46	20° 31' 1.497" N	85° 44' 4.568" E	191	20° 31' 13.093" N	85° 42' 43.446" E
47	20° 30' 59.909" N	85° 44' 4.918" E	192	20° 31' 13.273" N	85° 42' 44.407" E
48	20° 30' 59.923" N	85° 44' 3.793" E	193	20° 31' 13.328" N	85° 42' 45.491" E
49	20° 30' 57.857" N	85° 44' 3.867" E	194	20° 31' 13.526" N	85° 42' 46.323" E
50	20° 30' 56.476" N	85° 44' 3.988" E	195	20° 31' 13.503" N	85° 42' 47.091" E
51	20° 30' 55.444" N	85° 44' 4.193" E	196	20° 31' 13.498" N	85° 42' 47.770" E
52	20° 30' 53.346" N	85° 44' 4.522" E	197	20° 31' 13.472" N	85° 42' 48.130" E
53	20° 30' 52.456" N	85° 44' 4.499" E	198	20° 31' 13.412" N	85° 42' 48.706" E
54	20° 30' 51.747" N	85° 44' 4.405" E	199	20° 31' 13.320" N	85° 42' 48.855" E
55	20° 30' 51.232" N	85° 44' 4.307" E	200	20° 31' 12.311" N	85° 42' 50.050" E
56	20° 30' 50.605" N	85° 44' 4.247" E	201	20° 31' 11.376" N	85° 42' 51.492" E
57	20° 30' 49.049" N	85° 44' 4.114" E	202	20° 31' 10.515" N	85° 42' 53.650" E
58	20° 30' 45.725" N	85° 44' 4.262" E	203	20° 31' 9.973" N	85° 42' 55.080" E
59	20° 30' 43.587" N	85° 44' 4.628" E	204	20° 31' 9.808" N	85° 42' 55.421" E
60	20° 30' 41.268" N	85° 44' 5.287" E	205	20° 31' 9.614" N	85° 42' 55.842" E
61	20° 30' 36.304" N	85° 44' 6.572" E	206	20° 31' 9.391" N	85° 42' 56.285" E
62	20° 30' 32.247" N	85° 44' 7.650" E	207	20° 31' 9.151" N	85° 42' 56.733" E
63	20° 30' 27.305" N	85° 44' 8.953" E	208	20° 31' 8.934" N	85° 42' 57.105" E
64	20° 30' 27.228" N	85° 44' 6.387" E	209	20° 31' 8.622" N	85° 42' 57.758" E
65	20° 30' 26.320" N	85° 44' 6.412" E	210	20° 31' 8.430" N	85° 42' 58.080" E
66	20° 30' 22.550" N	85° 44' 6.531" E	211	20° 31' 8.255" N	85° 42' 58.604" E
67	20° 30' 22.481" N	85° 44' 6.309" E	212	20° 31' 8.095" N	85° 42' 59.107" E
68	20° 30' 21.990" N	85° 44' 3.780" E	213	20° 31' 7.965" N	85° 42' 59.510" E
69	20° 30' 24.183" N	85° 44' 3.923" E	214	20° 31' 7.805" N	85° 42' 59.770" E
70	20° 30' 24.153" N	85° 44' 3.303" E	215	20° 31' 7.458" N	85° 43' 0.170" E



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

71	20° 30' 24.116" N	85° 44' 1.210" E	216	20° 31' 7.035" N	85° 43' 0.696" E
72	20° 30' 26.177" N	85° 44' 1.435" E	217	20° 31' 6.894" N	85° 43' 1.170" E
73	20° 30' 26.263" N	85° 44' 0.691" E	218	20° 31' 6.912" N	85° 43' 1.365" E
74	20° 30' 27.457" N	85° 44' 0.742" E	219	20° 31' 7.050" N	85° 43' 3.055" E
75	20° 30' 27.494" N	85° 43' 59.776" E	220	20° 31' 7.339" N	85° 43' 4.712" E
76	20° 30' 27.053" N	85° 43' 59.721" E	221	20° 31' 6.594" N	85° 43' 8.481" E
77	20° 30' 27.272" N	85° 43' 57.230" E	222	20° 31' 6.645" N	85° 43' 8.837" E
78	20° 30' 28.046" N	85° 43' 55.495" E	223	20° 31' 7.138" N	85° 43' 8.886" E
79	20° 30' 28.134" N	85° 43' 53.886" E	224	20° 31' 12.472" N	85° 43' 10.294" E
80	20° 30' 28.302" N	85° 43' 51.134" E	225	20° 31' 18.719" N	85° 43' 12.004" E
81	20° 30' 28.507" N	85° 43' 48.112" E	226	20° 31' 20.574" N	85° 43' 12.116" E
82	20° 30' 30.025" N	85° 43' 48.484" E	227	20° 31' 22.627" N	85° 43' 11.049" E
83	20° 30' 30.643" N	85° 43' 46.964" E	228	20° 31' 22.640" N	85° 43' 12.590" E
84	20° 30' 33.087" N	85° 43' 48.206" E	229	20° 31' 22.511" N	85° 43' 15.566" E
85	20° 30' 32.730" N	85° 43' 49.365" E	230	20° 31' 21.945" N	85° 43' 27.626" E
86	20° 30' 36.062" N	85° 43' 50.263" E	231	20° 31' 21.651" N	85° 43' 33.218" E
87	20° 30' 37.076" N	85° 43' 50.527" E	232	20° 31' 21.206" N	85° 43' 41.545" E
88	20° 30' 37.168" N	85° 43' 50.244" E	233	20° 31' 20.647" N	85° 43' 51.302" E
89	20° 30' 38.178" N	85° 43' 47.018" E	234	20° 31' 20.381" N	85° 43' 56.085" E
90	20° 30' 38.564" N	85° 43' 45.632" E	235	20° 31' 55.970" N	85° 44' 3.056" E
91	20° 30' 37.766" N	85° 43' 45.475" E	236	20° 31' 57.200" N	85° 44' 4.129" E
92	20° 30' 37.986" N	85° 43' 43.811" E	237	20° 31' 58.369" N	85° 44' 5.149" E
93	20° 30' 38.406" N	85° 43' 41.299" E	238	20° 31' 59.509" N	85° 44' 6.127" E
94	20° 30' 38.530" N	85° 43' 37.755" E	239	20° 32' 0.586" N	85° 44' 7.072" E
95	20° 30' 38.429" N	85° 43' 35.147" E	240	20° 31' 58.926" N	85° 44' 8.965" E
96	20° 30' 37.460" N	85° 43' 33.608" E	241	20° 31' 59.221" N	85° 44' 11.768" E
97	20° 30' 36.660" N	85° 43' 31.584" E	242	20° 31' 59.220" N	85° 44' 14.569" E
98	20° 30' 36.298" N	85° 43' 29.511" E	243	20° 31' 58.583" N	85° 44' 17.366" E
99	20° 30' 34.914" N	85° 43' 28.745" E	244	20° 31' 57.927" N	85° 44' 18.291" E
100	20° 30' 33.622" N	85° 43' 24.000" E	245	20° 31' 56.885" N	85° 44' 19.269" E
101	20° 30' 32.120" N	85° 43' 21.519" E	246	20° 31' 56.340" N	85° 44' 19.641" E
102	20° 30' 29.614" N	85° 43' 18.195" E	247	20° 31' 56.006" N	85° 44' 19.975" E
103	20° 30' 28.454" N	85° 43' 17.271" E	248	20° 31' 55.611" N	85° 44' 19.615" E
104	20° 30' 27.742" N	85° 43' 16.725" E	249	20° 31' 55.614" N	85° 44' 19.593" E
105	20° 30' 26.715" N	85° 43' 16.257" E	250	20° 31' 55.615" N	85° 44' 19.536" E
106	20° 30' 26.364" N	85° 43' 12.414" E	251	20° 31' 55.647" N	85° 44' 19.431" E
107	20° 30' 26.235" N	85° 43' 10.567" E	252	20° 31' 55.634" N	85° 44' 19.425" E
108	20° 30' 26.186" N	85° 43' 9.564" E	253	20° 31' 55.627" N	85° 44' 19.424" E
109	20° 30' 25.948" N	85° 43' 9.579" E	254	20° 31' 54.411" N	85° 44' 18.257" E



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

110	20° 30' 25.938" N	85° 43' 8.471" E	255	20° 31' 53.741" N	85° 44' 17.617" E
111	20° 30' 25.870" N	85° 43' 5.405" E	256	20° 31' 52.700" N	85° 44' 16.705" E
112	20° 30' 30.373" N	85° 43' 6.246" E	257	20° 31' 52.450" N	85° 44' 16.484" E
113	20° 30' 30.976" N	85° 43' 6.343" E	258	20° 31' 52.357" N	85° 44' 16.615" E
114	20° 30' 31.197" N	85° 43' 5.842" E	259	20° 31' 51.188" N	85° 44' 15.778" E
115	20° 30' 31.477" N	85° 43' 4.790" E	260	20° 31' 50.300" N	85° 44' 15.107" E
116	20° 30' 32.149" N	85° 43' 5.136" E	261	20° 31' 50.140" N	85° 44' 15.315" E
117	20° 30' 33.702" N	85° 43' 6.006" E	262	20° 31' 49.231" N	85° 44' 14.494" E
118	20° 30' 36.438" N	85° 43' 6.996" E	263	20° 31' 48.068" N	85° 44' 13.385" E
119	20° 30' 37.952" N	85° 43' 7.815" E	264	20° 31' 47.221" N	85° 44' 12.626" E
120	20° 30' 41.137" N	85° 43' 8.342" E	265	20° 31' 46.400" N	85° 44' 12.055" E
121	20° 30' 43.481" N	85° 43' 8.471" E	266	20° 31' 46.673" N	85° 44' 10.379" E
122	20° 30' 44.552" N	85° 43' 8.911" E	267	20° 31' 46.206" N	85° 44' 10.271" E
123	20° 30' 44.800" N	85° 43' 9.566" E	268	20° 31' 46.381" N	85° 44' 7.581" E
124	20° 30' 45.124" N	85° 43' 9.827" E	269	20° 31' 46.233" N	85° 44' 6.091" E
125	20° 30' 45.293" N	85° 43' 9.708" E	270	20° 31' 47.367" N	85° 44' 5.858" E
126	20° 30' 45.734" N	85° 43' 9.889" E	271	20° 31' 47.649" N	85° 44' 4.269" E
127	20° 30' 45.912" N	85° 43' 9.737" E	272	20° 31' 48.279" N	85° 44' 2.352" E
128	20° 30' 46.652" N	85° 43' 10.001" E	273	20° 31' 48.629" N	85° 44' 1.258" E
129	20° 30' 47.659" N	85° 43' 9.237" E	274	20° 31' 47.788" N	85° 44' 0.918" E
130	20° 30' 48.556" N	85° 43' 8.291" E	275	20° 31' 48.314" N	85° 43' 59.112" E
131	20° 30' 49.079" N	85° 43' 7.595" E	276	20° 31' 48.804" N	85° 43' 57.556" E
132	20° 30' 48.419" N	85° 43' 6.981" E	277	20° 31' 48.900" N	85° 43' 57.282" E
133	20° 30' 48.740" N	85° 43' 6.508" E	278	20° 31' 49.317" N	85° 43' 57.452" E
134	20° 30' 49.675" N	85° 43' 4.844" E	279	20° 31' 49.577" N	85° 43' 57.584" E
135	20° 30' 50.305" N	85° 43' 3.325" E	280	20° 31' 49.923" N	85° 43' 57.792" E
136	20° 30' 50.741" N	85° 43' 2.039" E	281	20° 31' 50.233" N	85° 43' 57.996" E
137	20° 30' 50.998" N	85° 43' 1.514" E	282	20° 31' 50.773" N	85° 43' 58.406" E
138	20° 30' 51.410" N	85° 43' 1.190" E	283	20° 31' 51.019" N	85° 43' 58.600" E
139	20° 30' 51.762" N	85° 43' 0.519" E	284	20° 31' 51.290" N	85° 43' 58.819" E
140	20° 30' 52.171" N	85° 42' 59.551" E	285	20° 31' 51.600" N	85° 43' 59.078" E
141	20° 30' 52.553" N	85° 42' 58.807" E	286	20° 31' 52.359" N	85° 43' 59.758" E
142	20° 30' 53.258" N	85° 42' 57.352" E	287	20° 31' 53.286" N	85° 44' 0.598" E
143	20° 30' 54.063" N	85° 42' 55.742" E	288	20° 31' 54.820" N	85° 44' 2.036" E
144	20° 30' 55.185" N	85° 42' 54.010" E	289	20° 31' 55.970" N	85° 44' 3.056" E



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

2. INTRODUCTION OF THE PROJECT / BACKGROUND INFORMATION

2.1 Identification of the Project and Project Proponent

2.1.1 Identification of Project:

Aarti Steels Ltd. represents a fully integrated steel manufacturing company with manufacturing facilities of Carbon and Alloy Steel Rounds and Squares, Sponge Iron, Power and Ferro Alloys. The company also manufactures Spring Steel Wires and Tire Bead wire. The total products portfolios of the company are assigned to automobile, defence, bearing, heavy industry etc.

In 2005 Steel and Power Plant was set up in Odisha, Cuttack to manufacture special steel billets, power and Ferro-Alloys. In 2019, a modern bar mill was commissioned to produce SBQ rounds, squares, hexagons etc.

2.1.2 Identification of the Project Proponent

Aarti Steels Ltd. is a Public Limited company incorporated on 06 June 1979. It is classified as Non-Govt. Company and is registered at Registrar of Companies, Chandigarh. It is involved in manufacture of carbon and alloy steel, power and Ferro alloys etc.

Directors of AARTI STEELS LTD. are:



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Personnel	Experience (Years)	Age (Years)	Designation
Mr. Shiv Prasad Mittal	65	85	Director
Mr. Mahesh Mittal	40	63	Director
Mr. Rajeev Mittal	37	60	Director
Mr. Vinayak Mittal	10	36	Director
Mr. Sushen Mittal	5	31	Director

Details of the company given as below:

- Registered Office:
G.T. Road, Miller Ganj, Ludhiana – 141003, Punjab, india
Phone: 91-161-5244100
Fax: 91-161-5244150
- Works (Odisha):
Ghantikhal, P.O. Mahakalbasta, via.
Athagarh, Dist. Cuttack – 754029,
Odisha, India
Phone: 91-671-7161000
Fax: 91-671-7161150
- Works (Ludhiana):
Focal Point, Ludhiana – 1410101
Punjab, India
Phone: 91-161-5244200
Fax: 91-161-5244250

2.2 Brief Information about the Project

This is an expansion project which involves the installation of new units in the already acquired land. The project is mainly aimed at the final manufacturing of steel products through Beneficiation → Pelletization → DRI / Hot Metal → EAF/IF/EOF – CCM → Rolling Mill route. The unit also proposes the installation of a Coke Oven Plant (Non-Recovery Type), Sinter Plant, Blast Furnace, Lime-Dolo Plant, Oxygen Plant and expansion of CPP and Ferro Alloy Plant.

It is an independent project and falls under Project activity 2 – Primary Processing at Sl. No. 2(b) Mineral Beneficiation and under Project activity 3 – Materials Production at Sl.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

No. 3(a) Metallurgical Industries in category “A” as per the EIA Notification 2006 and amendments thereof and requires Environmental Clearance from MoEF&CC, New Delhi.

The unit is mainly envisaged as producing quality steel products and this is an air polluting industry with a considerable generation of solid waste and noise. Control measures will be required by the industry to meet the environmental norms.

Table 2.1: Implementation status of the Existing EC dated 13.05.2009

S.No.	Facilities	Units	As per EC dated 13/05/2009	Implementation Status	Production as per CTO
1.	Coal Washery	2 x 10,00,000 TPA	20,00,000 TPA	10,00,000 TPA (Installed and Operational)	1 x 1.0 MTPA
				10,00,000 TPA (Not Implemented)	Not Implemented
2.	Sinter Plant	1 x 36 m ²	3,43,000 TPA	Not Implemented	Not Implemented
3.	Coke Oven (Non-Recovery Type)	NRCO 4x14 Oven	2,36,000 TPA	Not Implemented	Not Implemented
4.	Power Plant	50 MW + 110 MW (2x50 MW CFBC + 1x10 MW WHRB)	160 MW	100 MW (Installed and Operational)	100 MW = (2x10 MW WHRB + 1x50 MW CFBC + 1x30 MW AFBC)
				60 MW (Not Implemented)	Not Implemented
5.	DRI Plant	4 x 1,50,000 TPA	6,00,000 TPA	3,00,000 TPA (Installed and operational)	2 x 500 TPD (3,00,000 TPA)
				3,00,000 TPA (Not Implemented)	Not Implemented
6.	SMS	-	EAF - 1x35	-	EAF - 1x35 T,



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

			T, LRF - 2x26 T, VD - 1x35 T, Billet Caster		LRF - 2x26 T, VD - 1x35 T, Billet Caster
7.	MBF (Pig Iron)	-	3,00,000 TPA	Not Implemented	Not Implemented
8.	Ferro Alloy Plant	2 x 25,000 TPA	50,000 TPA	50,000 TPA (Installed and Operational)	2x9 MVA + 1x18 MVA (50,000 TPA)
9.	Rolling Mill	-	4,99,300 TPA	2,00,000 TPA (Installed and Operational)	2,00,000 TPA
				2,99,300 TPA (Not Implemented)	Not Implemented

Note: The above units' i.e. Sinter Plant, Coke Oven (Non-Recovery Type) and MBF were not implemented due to financial constraints and market demand. However, now these facilities are proposed again with better technology & low specific power consumption and as per market demand.

2.3 Need for the Project and Its importance to the Country or Region

- Considering the recent trends in production of steel globally and in India, the National Steel Policy has projected 110 MTPA Steelmaking capacities in India by 2020. Emboldened by buoyancy of the Indian economy, Ministry of steel, Government of India, has projected a capacity of 200 MTPA by 2020. This presents the investors with adequate resources a huge opportunity for investment in steel industry with high returns. Accordingly, ASL intends to expand the production of its integrated steel plant at Ghantikhal in the District of Cuttack, Odisha. The manufacturing processes have been so selected that at each stage, there is revenue generating potential till the downstream facility is ready for operation.
- Looking at the projection of demand for steel in the present market, it can be realized that there remains a considerable gap between demand and supply of steel. To meet the demand, new capacities have to be created. Hence,



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expansion in the production capacity at Integrated Steel Plant by ASL is of great significance under present scenario.

- This increasing involvement in the local as well as in the global market with a wide-ranging business scope will definitely improve the state and country's economy.

2.4 Demands-Supply Gap

1. Iron Ore

In 2019-20, the overall mining capacity of iron ore was 250 million tonnes (MT) while the domestic consumption was only around 180 MT so the surplus was exported. The Indian steel sector has been facing an acute shortage of Iron Ore, which is a key raw material for making steel, due to lease ownership changes as well as spurt in exports.

2. Iron Ore Pellet

India's Iron Ore export basket used to comprise predominantly of Iron ore fines (almost to the tune of 80% of total Iron ore exports) largely because of the lucrative market it catered to globally and secondly as the domestic market for Iron ore fines as ready-made feed for sintering / pelletization was at a still-nascent stage.

However, over time with significant changes in the domestic iron ore market and given the increasing uncertainties in the global steel market courtesy of the slowdown in Chinese demand, India's Iron ore export has taken a hit. At the same time, the perception that Iron ore fines can be gainfully utilized by offering a ready-to-use feed material in the form of pellets whose use, in turn, leads to substantial economic gains over time and given the shortage of quality Iron ore lump (which setting up a pellet plant can well alleviate), have led to paradigm change in the domestic market.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Pelletization has emerged as an independent economic activity and is being increasingly held as a viable one as well, as a charged mix in sponge Iron making and also in blast furnaces, over time, what had started as exploration has now turned out to be nothing short of a trend. The increasing importance of pellet as key feed material in the production of Iron and steel in the domestic market has made it essential to assess the market trends in this emerging but niche segment in terms of the spread of units, level of production and capacity, employment and capital investment, among others.

3. Crude Steel

As per the data from the Ministry of Steel, India had emerged as the second-largest producer of crude steel during 2018 and 2019 from its 3 largest status in 2017. The country was also the largest producer of sponge Iron in the world and the third-largest finished steel consumer in the world after China and the US in 2019.

4. Finished Steel

India's finished steel consumption is anticipated to increase to 230 MT by 2030-31 from 98.7 MT in 2018-2019. Demand would be supported by growth in the domestic market.

Steel per capita consumption in India is expected to increase to 160 kgs by 2030-2031.

2.5 Imports vs. Indigenous Production

India steel plants mainly cater to domestic demand. Special steels that are not manufactured in the country are imported like CRGO, HSS, and Steels for defense, space, nuclear sectors, etc. where special steels in various grades and smaller quantities are required. However, due to the dumping of steel at very cheap prices by some foreign countries, low-quality steel also gets imported at prices not remunerative to domestic steel producers. The export normally consists of semi-finished steels and ordinary grades of HRC, Rebars, etc.



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2.6 Export Possibility

Production will be done to meet the growing demand for Steel in country. Priority will be given to domestic markets. However, in future export possibilities are envisaged.

2.7 Domestic / Export Markets

- India was the world's second-largest steel producer with production standing at 111.2 million tonnes (MT) in 2019. The growth in the Indian steel sector has been driven by the domestic availability of raw materials such as iron ore and cost-effective labour. Consequently, the steel sector has been a major contributor to India's manufacturing output.
- The Indian steel industry is modern with state-of-the-art steel mills. It has always strived for continuous modernization of older plants and up-gradation to higher energy efficiency levels.
- The Indian steel industry is classified into three categories – major producers, main producers and secondary producers.

Market Size

- India's finished steel consumption grew at a CAGR of 5.2% during FY16-FY20 to reach 100 MT. India's crude steel and finished steel production increased to 108.5 MT and 101.03 MT in FY20P, respectively.
- Between April 2020 and November 2020, India's cumulative production of crude steel was 62.01 MT and finished steel was 55.68 MT.
- Export and import of finished steel stood at 8.24 MT and 6.69 MT, respectively, in FY20P.
- Export and import of finished steel stood at 7.70 MT and 2.70 MT, respectively, between April 2020 and November 2020.
- The National Steel Policy, 2017 envisage 300 million tonnes of production capacity by 2030-31. The per capita consumption of steel has increased from



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

57.6 kgs to 74.1 kgs during the last five years. The government has a fixed objective of increasing rural consumption of steel from the current 19.6 kg/per capita to 38 kg/per capita by 2030-31.

- As per Indian Steel Association (ISA), steel demand will grow by 7.2% in 2019-20 and 2020-21.
- Huge scope for growth is offered by India's comparatively low per capita steel consumption and the expected rise in consumption due to increased infrastructure construction and the thriving automobile and railways sectors.

2.8 Employment Generation

Operation and maintenance of integrated iron and steel plant requires human resources in different categories like managers, engineers of different discipline like metallurgical, mechanical, electrical, electronics, computer, civil, structural, chemical, etc., highly skilled, skilled, and semi-skilled workforce in a different disciplines, commercial, accountants and financial managers, unskilled labor force, clerical, security personal, etc. The estimated manpower requirement is 6120 (direct) & 12000 (indirect).

Table 2.2: Manpower Break-up

Category	Existing	Proposed	Total
Managerial	196	166	362
Supervisory	406	221	627
Skilled	471	300	771
Semi-skilled	637	400	1037
Unskilled	823	2500	3323
Total (direct)	2533	3587	6120
Indirect	12000		



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2.9 Site Photographs



MAIN ENTRY GATE



DRI PLANT



SMS UNIT



ROLLING MILL



POWER PLANT



ADMINISTRATIVE BUILDING



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha



GET HOSTEL



GREENBELT



WASTE WATER SUMP



STP



DM WATER TANK



WATER RESERVOIR



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

3. PROJECT DESCRIPTION

3.1 Project Description with proposed configuration

It's a brownfield project for expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant 2.0 MTPA, Pellet Plant 1.2 MTPA, Sponge Iron Plant 0.3 MTPA, Sinter Plant 1.75 MTPA, Blast Furnace 1.27 MTPA, Steel Products (SMS & Rolling Mill) 1.5 MTPA, Coal Washery Plant 1.0 MTPA, Coke Oven Plant (Non-Recovery Type) 0.5 MTPA, Chrome Ore Briquetting Plant 0.3 MTPA, Ferro Alloy Plant 0.125 MTPA, Lime Dolo Plant 0.165 MTPA, Oxygen Plant 0.302 MTPA, CPP- 215 MW by Aarti Steels Ltd. at Village – Ghantikhal, Tehsil – Athagarh, Dist. – Cuttack, Odisha.

Details of project configuration and production capacities are as below:



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.1(A): Present and Proposed configuration of manufacturing units

S.No.	Plant Equipment/Facility	Existing Facilities as per EC dated 13 th May, 2009						As per latest CTO dated 21.03.2018 & 01.10.2019		Proposed Units		Final (Existing +Proposed)	
		Total (A + B)		Implemented (A)		Un-implemented (B)		Config.	Capacity	Config	Capacity	Config.	Capacity
		Config.	Capacity	Config.	Capacity	Config.	Capacity						
1.	Iron Ore Beneficiation Plant	-	-	-	-	-	-	-	-	1x20,00,000 TPA	20,00,000 TPA	1x20,00,000 TPA	20,00,000 TPA
2.	Pelletization Plant	-	-	-	-	-	-	-	-	1x12,00,000 TPA	12,00,000 TPA	1x12,00,000 TPA	12,00,000 TPA
3.	Sponge Iron Plant	4x1,50,000 TPA	6,00,000 TPA	2x1,50,000 TPA	3,00,000 TPA	2x1,50,000 TPA	3,00,000 TPA	2x500 TPD	3,00,000 TPA	-	-	2x500 TPD	3,00,000 TPA
4.	SMS Products	-	-	-	-	-	-	EAF - 1x35 T, VD - 1x35 T, LRF - 2x26 T Billet Caster	-	EOF - 3x65 T, IF - 4x20 T, LRF - 4x65 T, VOD/VD - 2x65 T, AOD - 1x45 T & 1x65 T, 2x3 Strand Billet Caster, 1x8 M Slab Caster	-	EAF - 1x35 T, VD - 1x35 T, LRF - 2x26 T, EOF - 3x65 T, IF - 4x20 T, LRF - 4x65 T, VOD/VD - 2x65 T, AOD - 1x45 T & 1x65 T, 2x3 Strand	15,51,763 TPA



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

												Billet Caster, 1x8 M Billet Caster,	
5.	Rolling Mill	-	4,99,30 0 TPA	-	2,00,00 0 TPA	-	2,99,30 0 TPA	1x2,00,0 00 TPA	2,00,00 0 TPA	-	13,00,0 00 TPA	-	15,00,0 00 TPA
6.	Captive Power Plant	2x50 MW CFBC; 1x10 MW WHRB; 50 MW	160 MW	2x10 MW - WHRB; 1x50 MW - CFBC; 1x30 MW - AFBC	100 MW	1x50 MW - CFBC; 1x10 MW - WHRB	60 MW	2x10 MW - WHRB; 1x50 MW - CFBC; 1x30 MW - AFBC	100 MW	37 MW - WHRB (Coke Oven Based) 78 MW - CFBC	115 MW	57 MW - WHRB (Coke Oven Based) 128 MW - CFBC 30 MW - AFBC	215 MW
7.	Coke Oven (Non-Recovery Type)	-	2,36,00 0 TPA	-	-	-	2,36,00 0 TPA	-	-	4x50,000 TPA & 4x75,000 TPA	5,00,00 0 TPA	4x50,00 0 TPA & 4x75,00 0 TPA	5,00,00 0 TPA
8.	Sinter Plant	-	3,43,00 0 TPA	-	-	-	3,43,00 0 TPA	-	-	1x65 m ² & 1x105 m ²	17,57,8 00 TPA	1x65 m ² & 1x105 m ²	17,57,8 00 TPA
9.	Blast Furnace	-	3,00,00 0 TPA	-	-	-	3,00,00 0 TPA	-	-	1x450 m ³ & 1x650 m ³	12,70,5 00 TPA	1x450 m ³ & 1x650 m ³	12,70,5 00 TPA
10.	Coal Washery	2x10,00, 000 TPA	20,00,0 00 TPA	1x10,00, 000 TPA	10,00,0 00 TPA	1x10,00, 000 TPA	10,00,0 00 TPA	1x10,00, 000 TPA	10,00,0 00 TPA	-	-	1x10,00, 000 TPA	10,00,0 00 TPA
11.	Ferro Alloy Plant	-	50,000 TPA	-	50,000 TPA	-	-	2x9 MVA & 1x18MV A	50,000 TPA	-	75,000 TPA	-	1,25,00 0 TPA
12.	Lime-Dolo	-	-	-	-	-	-	-	-	2x250	1,65,00	2x250	1,65,00



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Plant										TPD	0 TPA	TPD	0 TPA
13.	Oxygen Plant	-	-	-	-	-	-	-	-	1x150 TPD + 1x180 TPD + 1x300 TPD+ 1x260 TPD	3,02,50 0 TPA	1x150 TPD + 1x180 TPD + 1x300 TPD+ 1x260 TPD	3,02,50 0 TPA

Table 3.1(B): Details of Waste Recovery Plant

S.No.	Facilities	Existing as per CTO dtd. 21.03.2018 & 01.10.2019		Proposed		Total		Remarks
		Config.	Capacity	Config.	Capacity	Config.	Capacity	
1.	Chrome Ore Briquetting Plant	1 x 25 TPH	1,50,000 TPA	1 x 25 TPH	1,50,000 TPA	2 x 25 TPH	3,00,000 TPA	Waste Recovery Plants
2.	Fe-Cr Metal Recovery Plant	-	-	1 x 25 TPH	2,07,000 TPA	1 x 25 TPH	2,07,000 TPA	



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

3.2 Type of Project including interlinked and interdependent projects, if any:

There are no interlinked or interdependent projects. Only production enhancement is envisaged by the expansion of the existing project.

3.3 Details of alternate site considered and the basis of selecting the proposed site, particularly the environmental considerations gone into should be highlighted.

No alternate site has been considered as it is an expansion project.

Table 3.2: Industries in the vicinity

SI No	Name of Industry	Product	Distance (km)	Direction	Co-ordinates
1	Shree Cement Ltd.	Cement	0.77	N	20°31'46.91"N 85°43'28.59"E
2	JK Lakshmi Cement Ltd.	Cement	1.00	NE	20°32'3.50"N 85°44'20.65"E
3	Bhubaneswar Power Pvt. Ltd.	Power	3.30	SSE	20°28'43.15"N 85°44'49.87"E
4	TS Alloys Limited	Ferrochrome	3.96	SSE	20°28'25.26"N 85°45'2.64"E
5	Omfed Plant, Radhamohanpur	Dairy Products	4.00	NNE	20°33'30.26"N 85°45'9.67"E
6	Maheswari Ispat Ltd.	Iron & Steel	4.55	N	20°34'5.79"N 85°44'24.23"E
7	Grid Steel & Alloys Ltd.	Iron & Steel	5.60	ENE	20°32'41.75"N 85°46'58.19"E
8	Ultratech Cement Ltd.	Cement	6.55	NE	20°34'3.57"N 85°46'43.60"E
9	Sri Hardev Steel	Iron & Steel	7.26	E	20°31'49.80"N 85°48'6.42"E



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

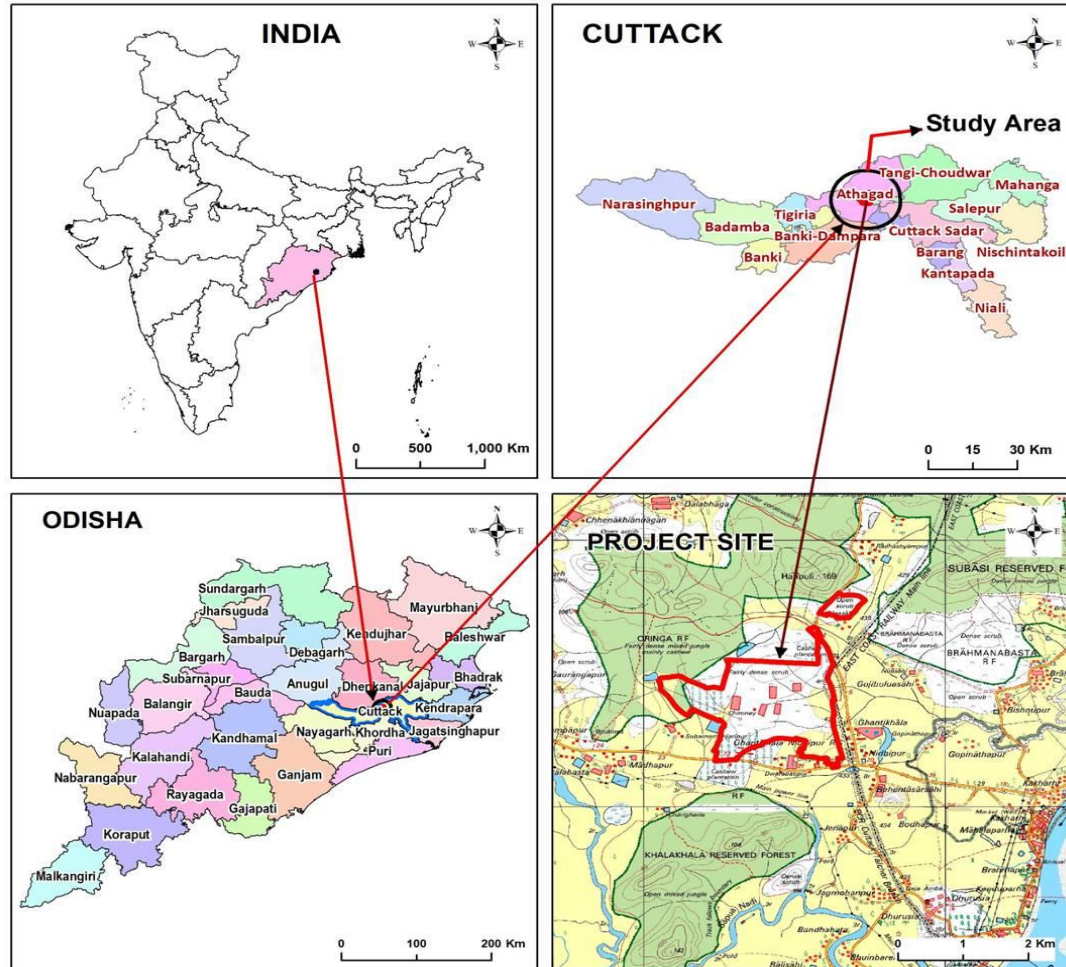
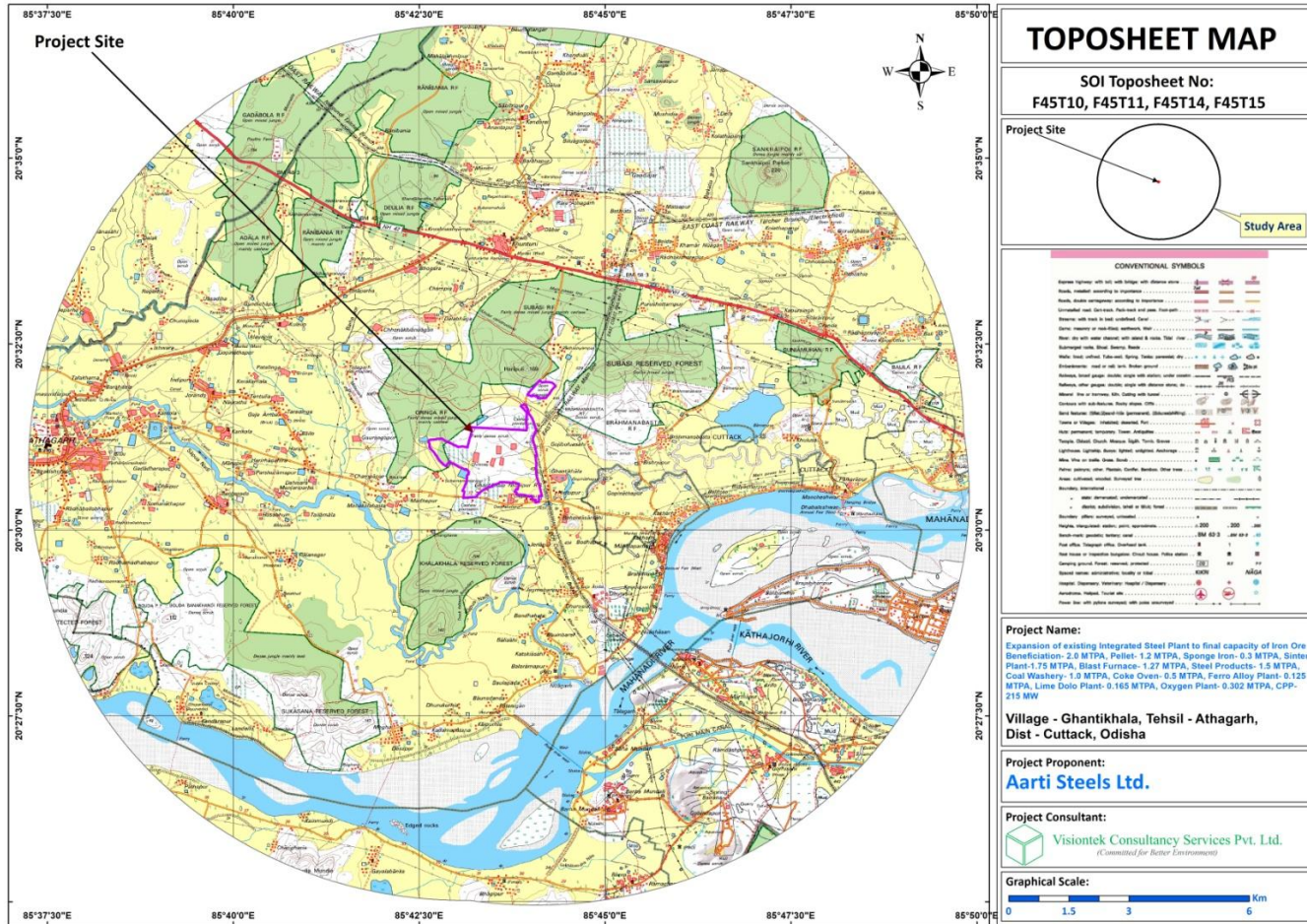


Fig 3.1: Location Map of the Project



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha



Source: Survey of India (2009)

Fig 3.2: Toposheet Map of the Project



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

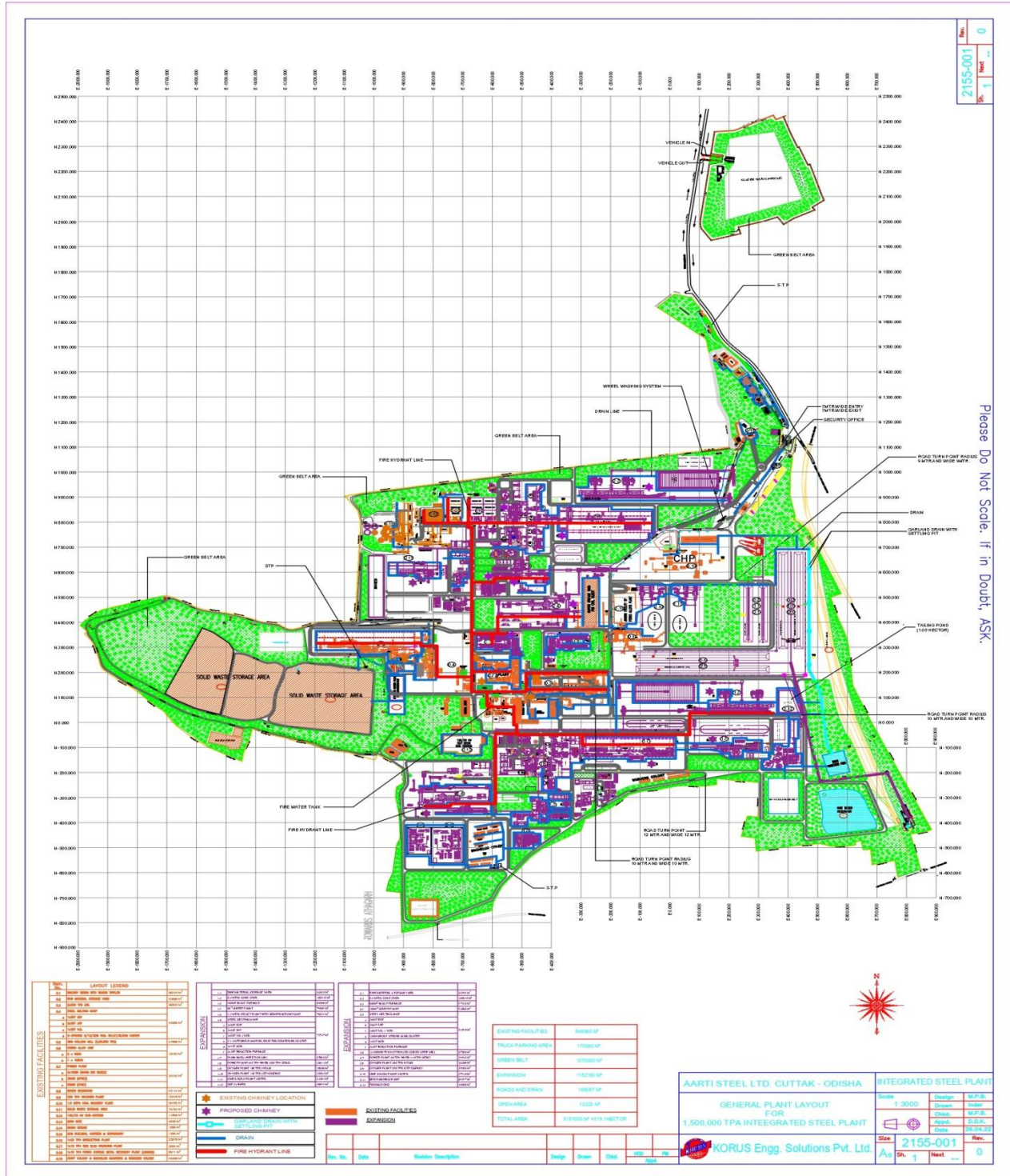


Fig 3.3: Plant Layout



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

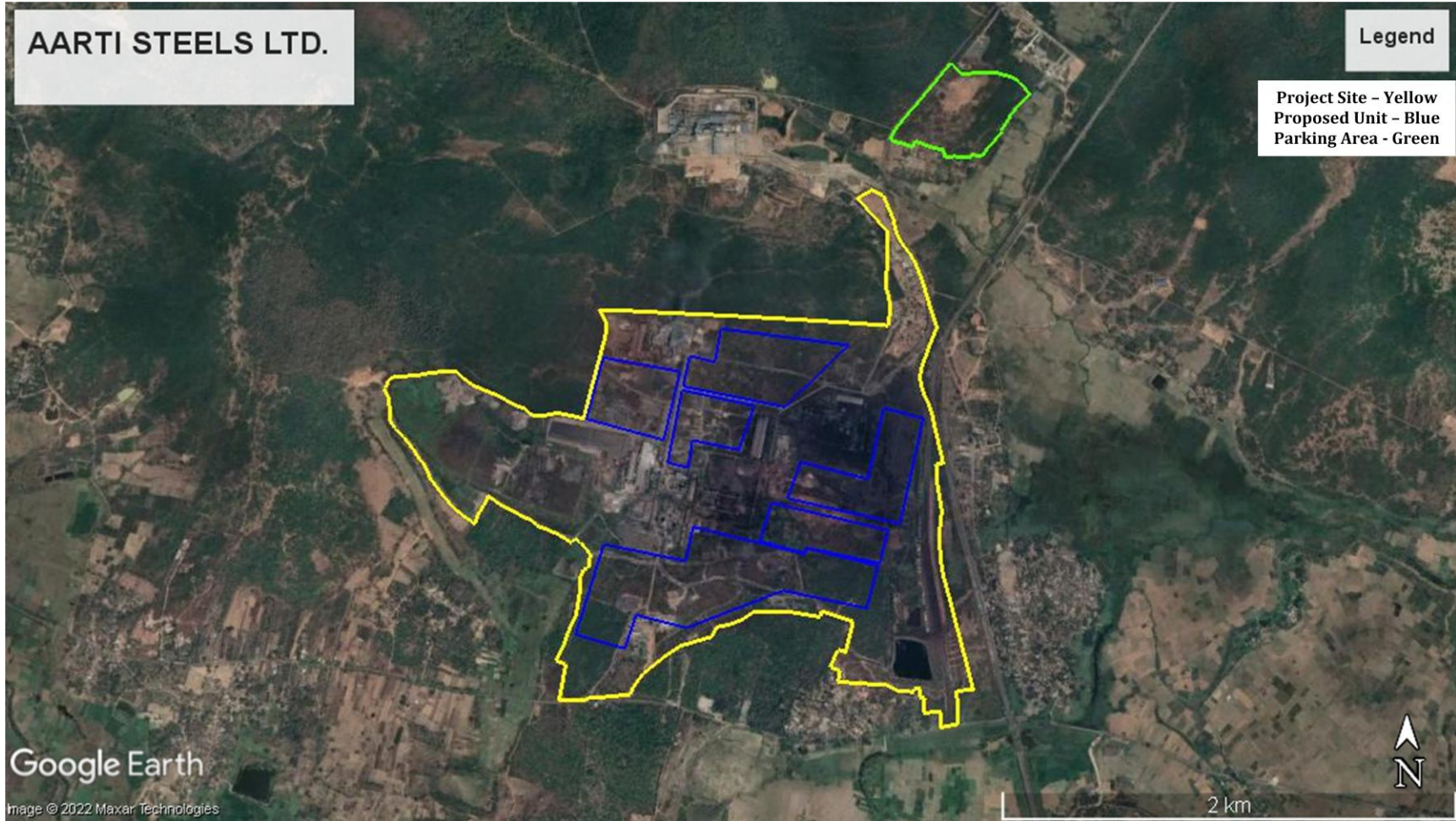


Fig 3.4: Google Earth Image of the Project



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

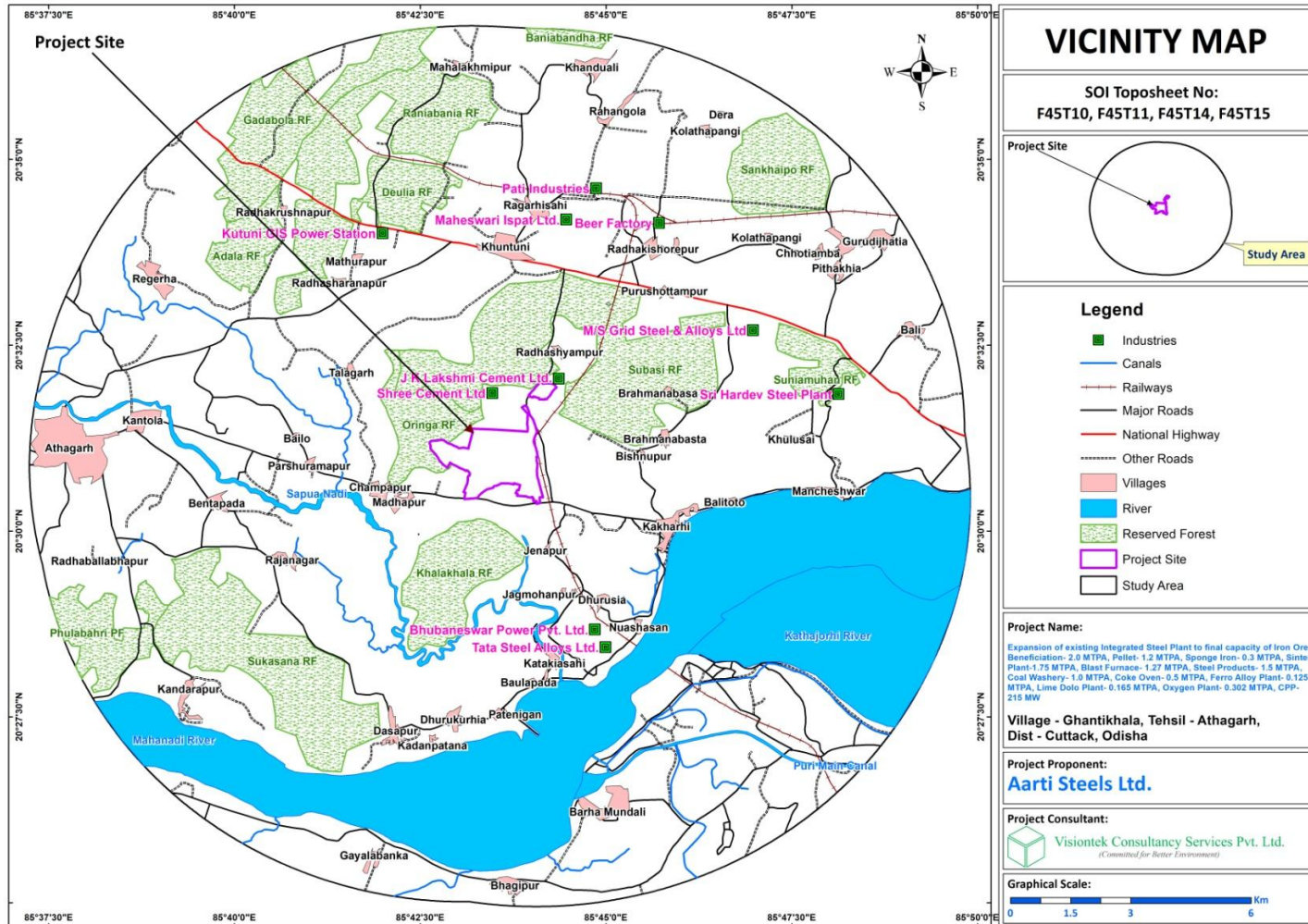


Fig 3.5: Vicinity Map



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

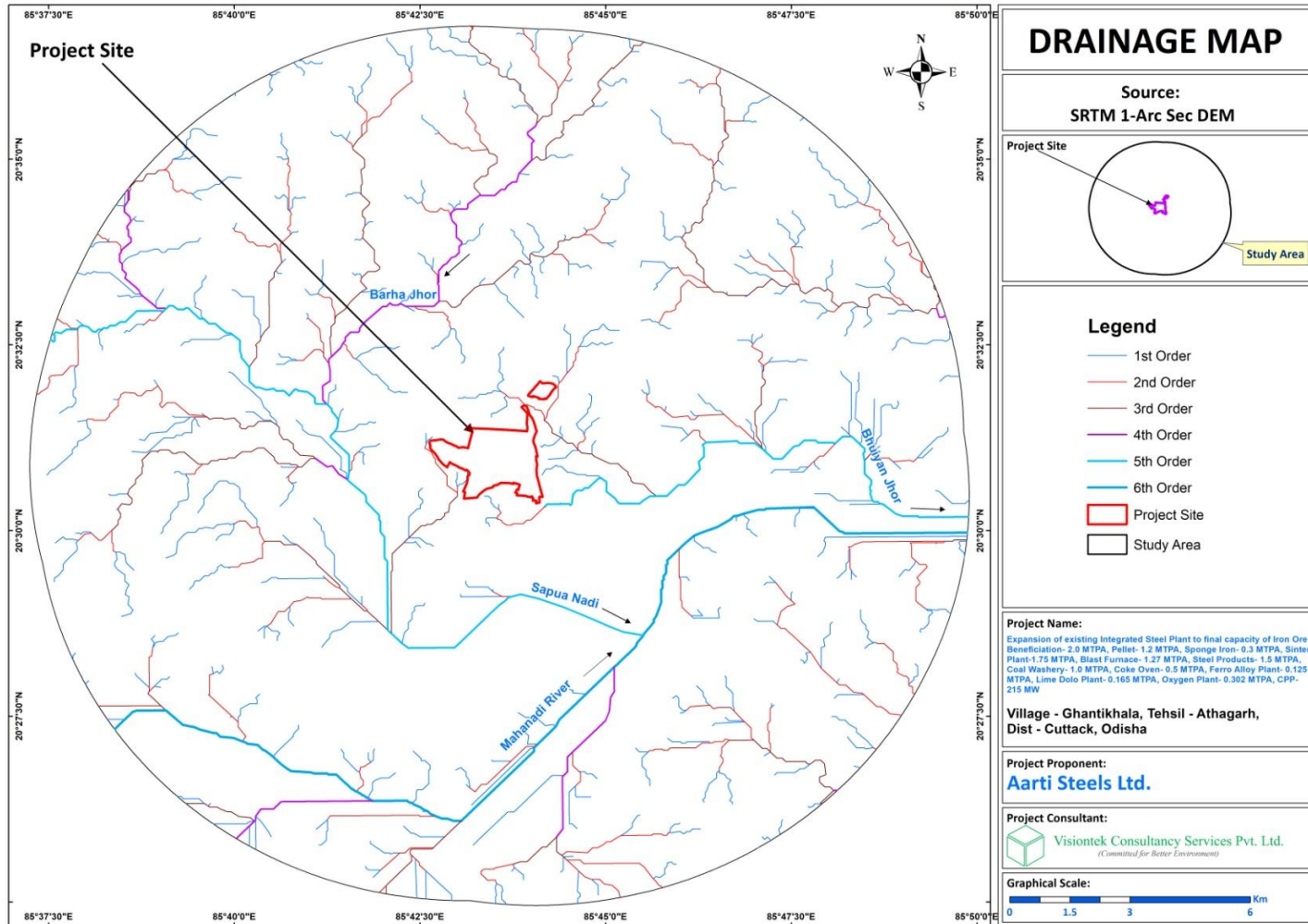


Fig 3.6: Drainage Map



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

3.4 Size or Magnitude of Operation

As per EIA Notification dated 14th Sept. 2006 as amended from time to time, this project falls under S. No. 2 (Primary Processing), Project Activity '2(b)' Mineral Beneficiation and S. No. 3 (Material Production), Project Activity '3(a)' Metallurgical Industries. The total cost of the project is estimated to be Rs. 6112 Crores.

Existing capacity of Sponge Iron Plant- 0.3 MTPA, Steel Products (SMS & Rolling Mill)- 0.2 MTPA, Coal Washery Plant- 1.0 MTPA, Chrome Ore Briquetting Plant- 0.15 MTPA, Ferro Alloy Plant- 0.05 MTPA, CPP- 100 MW to Proposed final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant- 1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill)- 1.5 MTPA, Coal Washery Plant- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW has been proposed at Village – Ghantikhal, Tehsil - Athagarh, Dist. – Cuttack, Odisha, by Aarti Steels Limited, over a land area of 315.1 Ha.

Table 3.3: Details of above ground buildings along with area coverage

S.No.	Above Ground Building	Area (Ha.)
1	Proposed Units and Machinery	98.22
2	Roads and parking area construction	-
3	Ponds, Reservoir and Water Treatment units construction	-
4	Dump Yard & Storage Yard construction	10.54
5	Fire Station and Emergency control room, test laboratory, Admin Office construction, Env. Health safety room	-

- Foundations for proposed units, buildings, and administrative offices will be excavated upto 4 meters below the ground level.
- Also, reservoir the treatment plant will be constructed upto 5 meters below the ground level.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

3.5 Process Description

- **Process Description – Iron Ore Beneficiation**

Magnitude of Operation:

Production of Iron Ore Beneficiation: 20,00,000 TPA (Throughput) and the final output will be 18,06,000 TPA (No. of working days/annum – 330, working hours/day in 3-shift operation – 24 hrs)

12,12,000 TPA will be used in Pellet Plant, 1,06,722 TPA will be used in Blast Furnace & rest 4,87,278 TPA will be used in Sinter Plant.

The beneficiation process of ore results in a more concentrated form of the product. It will be used for the preparation of iron ore fines for pelletization. The Raw iron ore fines of the grade 58% Fe from various mines will be beneficiated to obtain the product with 62.6% Fe for use in the in-house pellet plant and sinter plant.

The major technological processes involved in Iron Ore Beneficiation are:

- Size reduction,
- Size separation or classification,
- Iron Ore up-gradation as beneficiation,
- Thickening of slurry and pumping of slurry
- Residual /Slime disposal

Size Reduction: The Iron Ore in the form of fines (99% passing 10 mm size) are grounded to the size 80% < 45 micron. Grinding of Iron Ore will be done by Wet grinding process.

- **Wet Grinding Process:** Wet Grinding Mill is used to grind iron ore. The ground product in the form of slurry is pumped to the slurry storage tank fitted with agitating mechanism. Water and finely ground raw materials are separated by filters to obtain filter cakes. In the present context, wet grinding is preferred as there will be low emissions and losses. High Fe grains are liberated from the



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

gangue materials by grinding. Since the downstream of the grinding process, like beneficiation and concentration, are carried out with wet process, wet grinding process is considered to be most suitable instead of dry grinding.

Size Separation: Size classification is done using hydro-cyclone and vibratory screen. This is done to obtain the uniformity in the further feed for efficient concentration of ore.

Beneficiation: To achieve the desired Fe level of Concentrate, the ground and classified material is upgraded by removing the gangue materials. High Gradient Magnetic separators (HGMS) are suitable equipment for the beneficiation of Hematite Iron Ore.

Slime Disposal: The generation of slime quantity from the Beneficiation Plant will vary from 0.19 – 0.20 MTPA depending on the Fe content/quality of Iron ore feed. Chemical Composition of Residuals / Slimes Fe: < 40%, SiO₂: 10-14%, Al₂O₃: 8-10%. Particle size: 100 % < 75-micron Pressure Filters will be installed to dewater the Slimes and dry slimes of a maximum of 10-15% moisture would be conveyed through a conveyor to designated Slime storage area within the plant boundaries.

Manufacturing Process: Fe content of lean iron ore is improved by the Beneficiation process. The required green ball strength of pellets is obtained by using quality materials. The ore is grounded to obtain the fineness of the required quality. Characteristics of ore fines govern the degree of fineness and it has been observed that under Indian conditions, grinding of ore to size 60-80% passing through 325 mesh (- 0.044 mm) is necessary for the production of high strength green pellets.

The overall plant yield would be average 90-91% depending on the feed quality of the incoming iron ore. Rejects may vary from 9-10%. Iron Ore feed fines are proposed to be used in beneficiation plant from various mines and the range of its chemical composition is envisaged as Fe%: 58.0, SiO₂: 1.7 to 3.8, Al₂O₃: 2.50 to 3.9 & Moisture: 8.0 to 10%.

The physical characteristics of the iron ore fines considered or designing the plant and associated facilities are as given below:



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- Top size: 10 mm
- Specific Gravity of solids: 4.5 - 4.6
- Bulk Density: 2.4 -2.6 Tons/cum
- Bond Work index: 12 kWh/Ton
- Angle of repose: 35°
- Moisture Content: 8-10%

Process:

Aarti Steels Ltd. Will be purchasing ore of -10 mm nominal size of average Fe 58.0% from nearby mines and shall jack up the Fe level to 62.6% for Pellet making and Sinter making. Total 2.0 million ton Beneficiation Plant will be installed and following sizes and figures of product will be generated.

Equipment for Beneficiation

Following facilities will be installed:

Table 3.4: Equipment details

Equipment	Throughput (MTPA)	Capacity (TPH)	Equipment Capacity (TPH)	No. of Equipments (Nos.)
Scrubber/Desliming	2000000	417	417	1
Vibrating Screen	2000000	417	417	1
Ball Mill	1520000	212	212	1
Stack Sizer Ball Mill Output	1520000	212	50	5
Stack Sizer for -1 mm	1650000	230	50	5
HGMS	900000	125	30	5
MCC	612000	85	3	29
Filter Conc.	1970000	274	60	5
Filter Tailing	450000	63	30	3



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.5: Material Balance of Proposed Beneficiation Plant (20,00,000 TPA)

Input			Output		
Raw Material	Specific Consumption	Quantity (TPA)	Product	Specific Generation	Quantity (TPA)
Iron Ore Fines (Fe% 58)	1.000	20,00,000	Concentrate (Fe% 62.6)	0.903	18,06,000
			Tailings (Fe% < 40)	0.097	1,94,000
TOTAL	1.000	20,00,000	TOTAL	1.000	20,00,000

Table 3.6: Detailed Material Balance of Beneficiation Output

Product Size	%	Capacity (TPA)	Sinter (TPA)	Pellet (TPA)	Blast Furnace (TPA)	Tailings (TPA)
+10 mm	5.37	1,06,722	-	-	1,06,722	-
+1 to -10 mm	57.86	11,57,278	4,87,278	6,70,000	-	-
+ 45 µ to -1 mm	13.10	2,62,000	-	2,62,000	-	-
- 45 µ Conc	14.00	2,80,000	-	2,80,000	-	-
- 45 µ Tailing	9.70	1,94,000	-	-	-	1,94,000



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Tailings Management:

Type of Waste	Source Name	Quantity (TPA)			Treatment before disposal	Mode of disposal
		Existing	Proposed	Total		
Tailings/ Slime	Beneficiation	-	1,94,000	1,94,000	Dewatered and stored in slime/tailing storage area & the collected water will be recycled in process.	Disposed to construction contractors for road & construction fillings.

Calculation:

Tailing Generation per Annum = 1,94,000 T

We'll store maximum 90 days tailing, i.e. = $\frac{1,94,000}{330} \times 90 = 52,910$ Tonnes/ 90 days

Density of Iron ore Tailings = 2.60 T/m³

Volume of Tailings = 52,910 / 2.6 = 20,350 m³

Height of Tailings = 2 m. (maximum)

Area required for Tailing Storage = 20,350 / 2 = 10,175 m² = 1.012 Ha.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

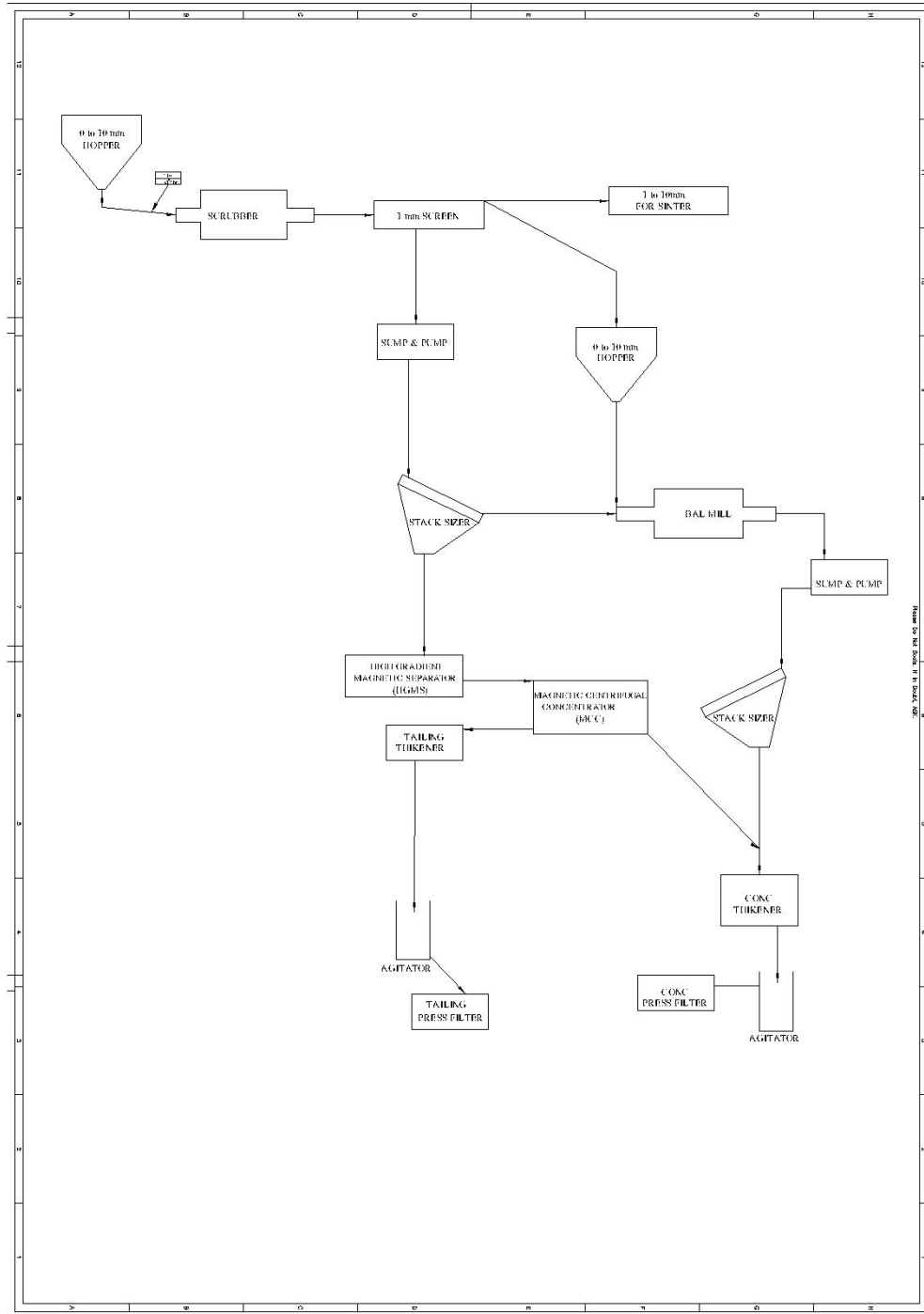


Fig 3.7: Process Flow Chart – Beneficiation Plant



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description - Pelletization**

Magnitude of Operation:

Utilization of in-house Iron Ore Concentrate of 12,12,000 TPA for Production of 12,00,000 TPA Pellet (No. of working days/annum – 330, working hours/day in 3-shift operation – 24 hrs)

4,50,000 TPA Pellet will be used in DRI (In-house consumption), 3,81,150 TPA Pellet will be used in Blast Furnace (In-house consumption) & rest 3,68,850 TPA will be sold in market.

Pelletizing is a process that involves mixing of very finely ground particles of iron ore concentrate having a size which is less than 45 mesh with additives like bentonite, coke and then shaping them into near-spherical balls having a size in the range of 9 mm to 16 mm in diameter by a pelletizer and hardening the balls by firing with a fuel. It is an agglomerating process of converting iron ore fines into 'uniformed sized iron ore pellets which can be charged directly into the rotary kiln, used for the production of direct reduced iron (DRI).

There are four stages involved in the production of iron ore pellets. These stages consist of

- Raw material preparation,
- Grinding section, proportioning and mixing section
- Formation of green balls or pellets
- Indurations of the pellets, and
- Cooling, storage, and transport of pellets.

i) Raw material preparation

Incoming raw materials Iron ore concentrate, Bentonite, Dolomite, Coke, Coal & LDO will be stored under a covered yard inside the plant premises. Bentonite will be received in powder form & stored in the proportionate buildings.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Coke will be stored in a covered shed & transported to the proportionate building by front end loader. Coal fines will be stored in a covered shed & transported to coal ground hopper by dumper for further processing. LDO will be stored in a closed tank nearby Rotary Kiln.

Iron Ore Concentration Filtration process

Iron Ore concentrate will be stored in thickness and from there it will be pumped through an iron ore concentrate transfer pump to a filtration building where water separation takes place from an iron ore concentrate. Filter cake discharged to bottom carrying conveyor to filter cake storage yard. Separated water will be recycled back to thickener.

ii) Formation of green balls or pellets

Green pellets with a size range of 6 mm to 16 mm will be prepared in a balling drum or a disc pelletizer. Disc pelletizer is preferred for the production of quality green pellets since in the disc pelletizer it is easy to control the operation with a minimum of foot space. The disc pelletizer is an inclined pan having around 6 meters (m) diameter. It rotates at around 8 RPM. The inclination of the disc is around 45°.

In the disc, the material is coagulated and due to the continuous rotary motion gets formed into pellets. Ore concentrate is lifted upwards until the friction is overcome by gravity and the material rolls down to the bottom of the disc. This rolling action first forms small granules called seeds. Growth occurs in the subsequent revolutions of the disc by the addition of more fresh feeds and by a collision between small pellets. As the pellets grow in size, they migrate to the periphery and the top of the bed in the discs, until they overflow the rim. Pellet growth is controlled by the small amount of water sprayed in the disc and the adjustment in the disc rotational speed. These pellets are called green pellets as they do not have the required strength. The green pellets are then screened in a roller screen and the required size material is fed to the traveling grate of a pelletizing machine.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

iii) Induration

During the induration, heat hardening of green pellets is carried out. Indurations of green pellets consists of three main steps namely

- Drying of green pellets,
- The firing of pellets and
- Cooling of hot pellets before discharging

During drying (temperature range of 180°C to 350°C), the moisture content of the green pellet gets evaporated. Surface and interstitial moisture evaporate at lower temperatures whereas chemically combined water or any hydrate or hydroxide combinations lose their water at a slightly higher temperature.

During the pre-heating stage (temperature range of 500°C to 1100°C), decomposition of carbonates and hydrates, gasification of solid fuels like coal or coke and conversion of iron oxides takes place. Commencement of solid oxide bonding and grain growth are the important steps of this stage.

During the firing stage (temperature range of 1250°C to 1340°C), the temperature will be below the melting temperature of the major oxide phase but within the reactivity range of gangue components and additives. The formation of oxides and slag bonds is decisive of this stage. The induration treatment causes certain chemical reactions to occur which change the specific metallurgical properties of the pellets. These reactions can include the oxidation of magnetite and dehydration of earthy hematite.

iv) Pellet cooling and handling

The pellets are cooled and screened after the induration. The oversized pellets will be crushed and sent along with the undersized to the stock house bins where they will be reprocessed. Cooled pellets will be sent to the storage for their transport to the downstream plants for further processing.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Pelletizing Process:

The pelletizing processes / technologies which are available for the production of the pellets, Grate Kiln technology will be used by Aarti Steels Ltd.

Steps involved in pelletization process are as follows:

- Lime stone is ground together with Iron ore in a ball mill and wet grinding process is adopted which economizes energy consumption.
- Bentonite is purchased in the powder form and used directly.
- Iron ore concentrate from beneficiation plant is passed through pressure filters to obtain filter cakes. They are collected on a belt conveyor and fed into filter cake bin.
- Pre-weighed portions of filter cake, coke breeze and bentonite are mixed in mixer, enabling intensive mixing of above materials.
- The above mixture is conveyed to a bin directly above pelletizing discs
- The green ball formation is done through disc pelletizers.
- The green balls are fed to an indurating machine wherein pellets are produced. Green balls (green pellets) will be indurated on a traveling grate which consists of an endless chain of pellet cars moving on tracks.
- To strengthen the green pellets for further indurating in the grate hearth furnace, they are initially heated in the straight grade as the dried green balls do not have the strength necessary to survive the direct feeding impact to the rotary kiln and need to be semi-indurated. For this acceptable semi-induration, it is necessary for the green balls to be substantially heated.
- At the discharge end of the rotary kiln is a single burner, which utilizes the hot recuperated (secondary) air from the annular cooler for combustion. The burner can be designed to fire a single fuel or a combination of fuels. Oil, pulverised coal or coal gas can be used singly or in varying mixtures. Because of the single burner, controlling of the induration process is a simple temperature loop.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

APCD Facilities:

Electrostatic Precipitator (ESP): Indurating process off-gasses from updraft drying hood exhaust and wind box exhaust will be cleaned using Electrostatic Precipitators (ESP). The outlet dust concentration will be limited to 100 mg/Nm^3 . The clean gas will be sent to Pellet Plant. Fugitive dust from the machine discharge area and extraction area will be collected using suction ducts and cleaned in Bag Filters. Fugitive dust generated from Raw Material Handling, Bentonite Grinding, Lime and Coal Grinding, and Bentonite Transfer points will be collected using suction ducts and cleaned in Bag Houses. Dust collected from the bentonite and limestone systems and other systems will be returned to their respective storage bins. The emissions from the Pellet Plant will be treated in a high-efficiency ESP and discharged into the atmosphere through a stack.

Number of ESP: Proposed 1, Height of the Stack: 75 m.

Bag Filter:

Bag filters will be installed in Cooler discharge end, crushing unit & vibrating screen, transfer point of conveyor & kiln discharge end. It will be designed for concentrations below 100 mg/Nm^3

Number of Bag Filter proposed: 4, Height of the Stack: 30 m (minimum),



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.7: Material Balance for Proposed Pellet Plant (12,00,000 TPA)

Input			Output		
Raw Material	Specific Consumption	Quantity (TPA)	Product	Specific Generation	Quantity (TPA)
Iron Ore Fines	1.01	12,12,000	Pellets	1.00	12,00,000
Coal	0.04	48,000	Dust	0.021	25,200
Limestone	0.025	30,000	LOI	0.09775	1,17,300
Bentonite	0.007	8,400			
Dust	0.021	25,200			
Bag Filter Dust from DRI	0.00375	4,500			
LDO	0.012	14,400			
TOTAL	1.11875	13,42,500	TOTAL	1.11875	13,42,500



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

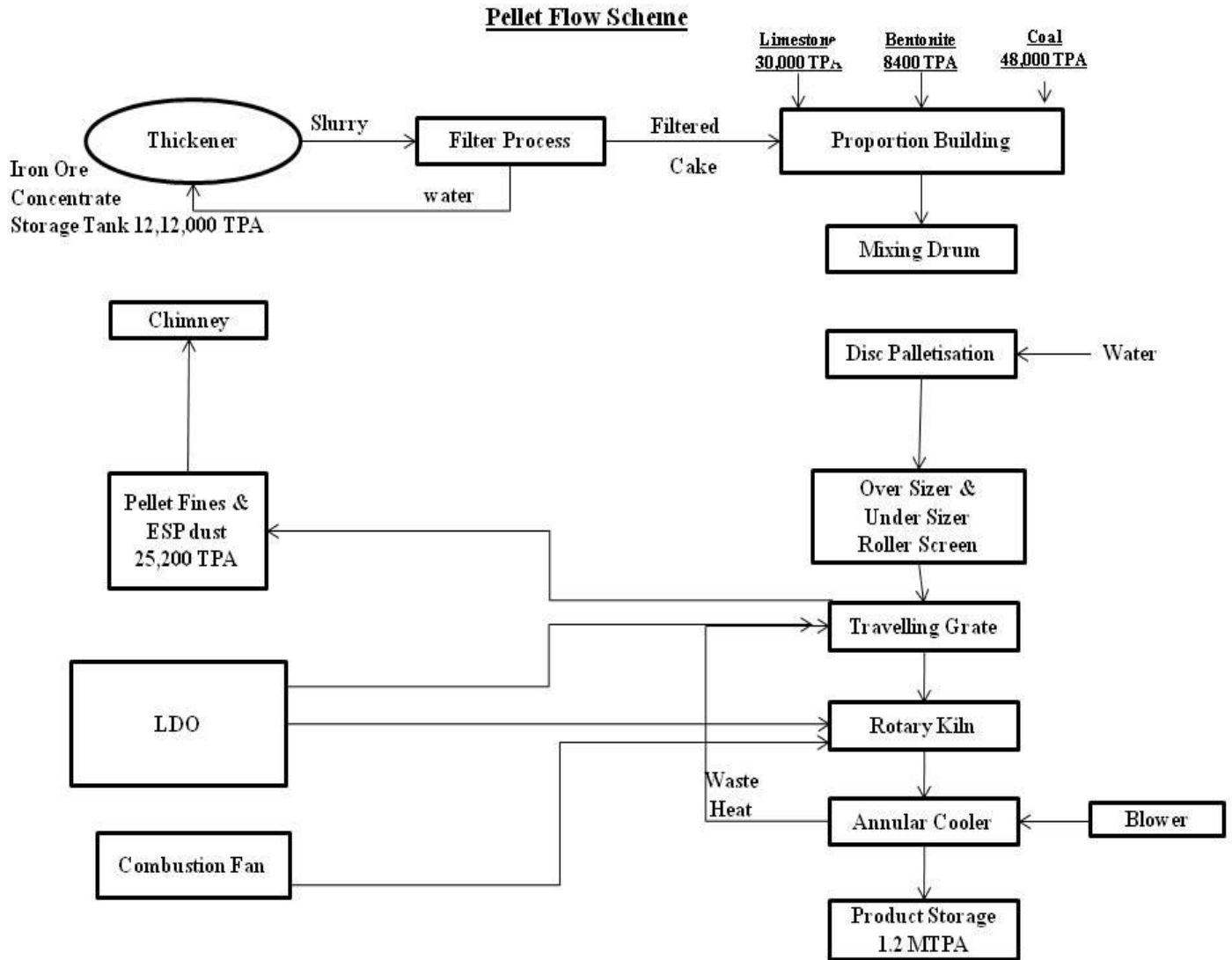


Fig 3.8: Process Flow Chart - Pelletization



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description – DRI Plant**

Magnitude of Operation

Utilization of in-house pellets – 4,50,000 TPA for Production of 3,00,000 TPA Sponge Iron (2x500 TPD) (No. of working days/annum – 300; working hours/day in 3-shift operation – 24 hr)

3,00,000 TPA Sponge iron used in SMS (100% In-house consumption).

Direct reduced iron (DRI) is also known as sponge iron. It is produced by the reduction of iron ore by non-coking coal. The reducing gas can also be produced by the gasification of coal. Sponge Iron produced through DRI process is an ideal feed material in electric arc furnaces, Induction furnaces, BOF, and cupolas. DRI is more than a substitute for scrap. Direct reduced iron is a high purity material without tramp elements, permits easy handling and storage as well as continuous charging to the melting vessel with a corresponding increase in productivity of the melting shop, predictable cost structure, and consistent productivity.

The process in DRI occurs in the following steps:

- Raising the temperature of raw materials to the optimum reaction temperature
- Production of reductant gases
- Adsorption of gases on the surface of ore to the reaction interface.
- The reaction of gases with the oxide and release of products of a reaction.
- Desorption of gaseous products from the reacted interface.
- All of the above steps result in the travel of the reaction interface towards the core.

The ores are fed into an inclined rotary kiln, together with the reductant and desulfurizing agent, heated counter-current by the hot kiln gases, and metalized to DRI.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

The Kiln heated from the discharge end in a deficiency of air. Over its entire length, the kiln shell accommodates tuyeres permitting air to be blown into the kiln. It is introduced axially in the direction of the gas flow and serves mainly to burn the carbon monoxide evolving during reduction and also part of the volatile matter in the coal. Thus a temperature profile of 750°C – 1020°C can be maintained in the bed over the length of the kiln.

The kiln is provided with a centralized burner mounted through the discharge end housing. The burner is fired with fuel oil and is used to heat the refractories in the Kiln before commencing the processing of iron ore. The burner is withdrawn when the coal is introduced and solid fuel processing takes over.

Following heat up, iron ore and coal are introduced into the Kiln at controlled rates through a feed pipe mounted through the feed end housing. Because the Kiln is inclined from the feed end to the discharge end, its rotation causes the iron and coal to mix and traverse through the system.

The rotational speed of the Kiln is adjusted to permit the desired loading of the feed material and provide the required time to complete the reduction of the iron ore. Carbon monoxide, from coal, chemically reacts with the iron ore to remove oxygen thereby converting iron ore (Iron oxide) to metallic iron.

The quantity of coal fed is adjusted to get the acceptable degree of reduction and to sustain the process. Adjustment of coal is done from both the sides of the Kiln; feed end as well as discharge end. A fraction of the discharge end coal is again adjusted to ensure distribution of coal along the length of the kiln as per requirement and optimize coal consumption without in any way affecting the quality of the product. Rather this adjustment helps to get consistently good quality material.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Once the coal goes into the Kiln, it releases combustibles. These gases are combusted with the addition of a controlled amount of air. This combustion provides the heat to maintain the iron ore at processing temperature.

The air is supplied through the air tubers from the fans mounted on the Kiln. The iron ore is converted to metallic iron as it travels along the length of the kiln.

Hot product discharges from the Kiln through a transition chute to the rotary drum cooler. Water is sprayed along its outside surface to cool the product as it moves from the feed end to the point of discharge of the cooler.

The product and char that come out of the cooler then go to screen where the fines and lumps are separated into three fractions. All these fractions then pass through individual magnetic separators to separate magnetic sponge iron from non - magnetic char. The sponge iron lumps and fines together are led to the designated product bin/silos.

- a) Waste gas stream: Bag filters made of filter glass fabric are designed to withstand a temperature of 250-300°C. While installing bag filters care should be taken to operate the preceding waste gas cooler reliably to avoid damages to filters due to high temperature. During interruption to the process, the kiln is taken on hold whereby temperatures are lowered to safeguard the kiln.
- b) Dust collection during material transportation: In coal-based sponge iron plants there is considerable dust generation during conveying of raw materials and products, as well as in certain regions of kiln inlet and cooler outlet areas have to be included in the pollution control system plan.

DRI Plant shall comprise of:

- a) Raw Material Storage & Feed System
- b) Rotary Kiln System



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- c) Rotary Cooler System
- d) Product Separation System
- e) Waste Heat Recovery Boiler
- f) Waste Gas Cleaning System
- g) In-plant De-dusting System
- h) Industrial Water System
- i) Plant & Instrumentation Air System
- j) Fuel Oil System for heating during starting
- k) Electrical Supply & Distribution System
- l) Emergency D.G. Power Supply System

Main raw materials for DRI Plant are:-

- Calibrated Iron Ore Lumps or Pellets
- Feed Coal & Injection Coal Lumps
- Injection Coal Fines
- Dolomite

Typical DRI Product Analysis (Average)

Physical Size	
Lump 3-20 mm	75%
Fines < 3 mm	20%
Oversize > 75 mm	5%
Total	100%
Avg. Composition	~70-75%
Fe (M)	78%
Fe (t)	91%
Metallization	86%
FeO	16.7%



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

C	0.1-0.15%
S	0.05% Maximum
P	0.10% Minimum

Production of Dolochar

Depending on quality of coal, production of dolochar is ~250 kg/t of DRI. Dolochar is mixed with the coal fines and used in AFBC Boilers. It has a calorific value of about 1800-2200 Kcal/kg. Coal fines get engaged during coal processing.

Waste Heat Recovery Boiler & Power Plant

The steam generation depends on coal quality. The average power production is as follows:

- ✓ 2 x 500 TPD Kiln : 2 x 10 MW

The plant shall have two (2) sets of WHR Boiler, ESP, an ID Fan and a Chimney.

Particulate Matter in Exhaust Gases is < 100 mg/Nm³.

APCD Details:

Number of ESP: Existing ESP - 2 Nos, Height of the Stack: 60 m.

Number of Bag Filter: Existing BF – 4 nos,

1. Product House (35 m)
2. Stock House (30 m)
3. I-Bin, Product House, Transfer house, Cooler Discharge (35 m)
4. Coal Injection Point (20 m)



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.8: Material Balance of Existing DRI Plant (3,00,000 TPA)

Input			Output		
Raw Material	Specific Consumption	Quantity (TPA)	Product	Specific Generation	Quantity (TPA)
Pellet	1.50	4,50,000	Sponge Iron (DRI)	1.00	3,00,000
Coal	1.30	3,90,000	Char	0.25	75,000
Dolomite	0.06	18,000	ESP Dust	0.047	14,100
			Bag Filter Dust	0.015	4,500
			Kiln Accretion	0.004	1,200
			LOI	1.544	4,63,200
TOTAL	2.86	8,58,000	TOTAL	2.86	8,58,000



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

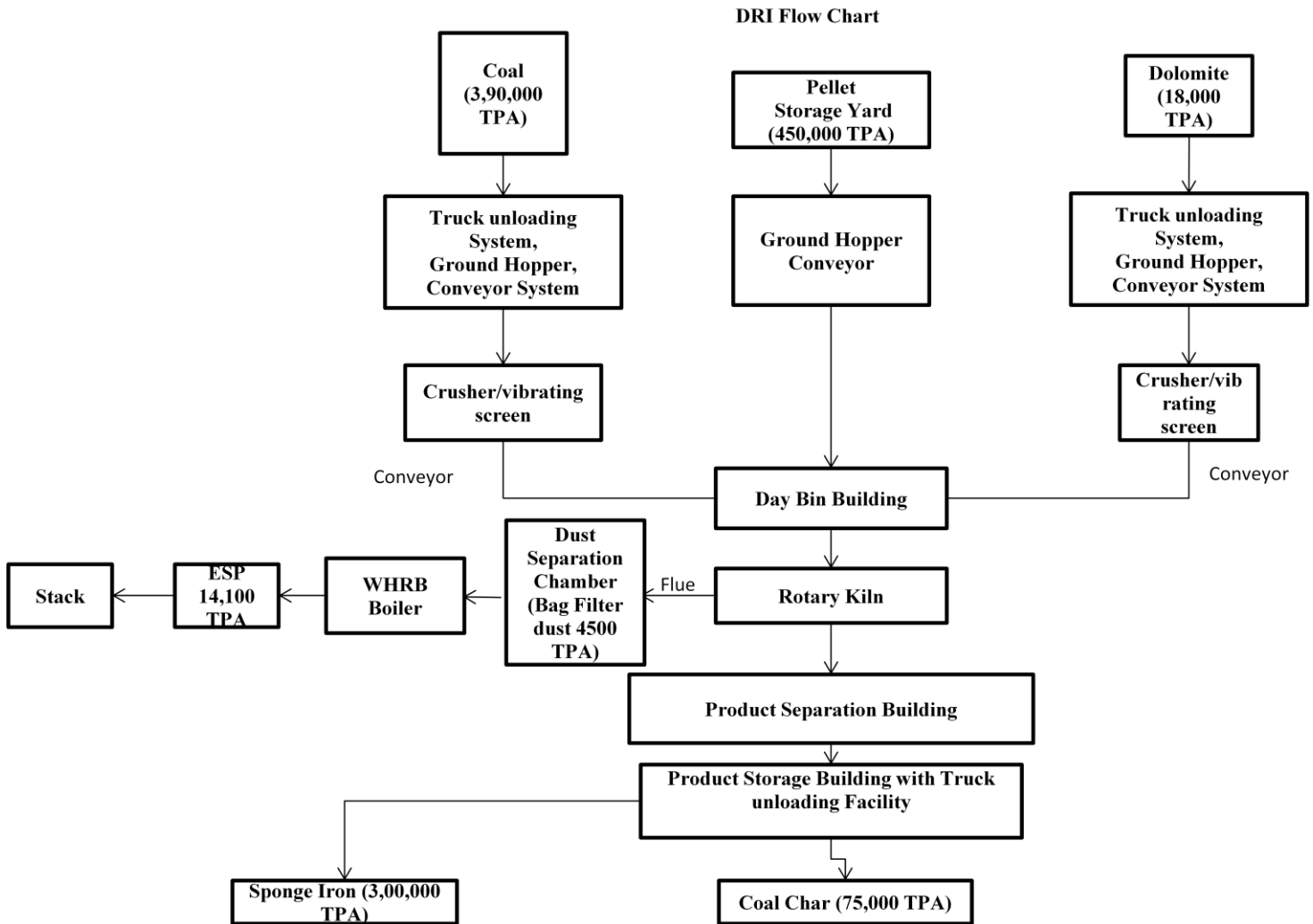


Fig 3.9: Process Flow Chart – DRI Plant



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description – Sinter Plant**

Magnitude & Operation: Utilization of Iron ore Concentrate of 11,95,288 TPA (4,87,278 TPA from In-house beneficiation & Additional 7,08,010 TPA Iron ore fines will be Purchased from local market) for gross production of 17,57,880 TPA Sinter. (No. of working days/hr – 330, Working hours/day in 3-shift operation – 24 hrs)

14,94,110 TPA Sinter will be used in Blast Furnace (100% in house consumption). Rest 2,63,770 TPA In-Plant Return Fines will be reused in the process.

Proposed Plant Capacity: 1 x 65 m² & 1 x 105 m²

Table 3.9: Configuration details

Description	Unit	Configuration
Sinter Plant	Nos.	2
Size	m ²	65 & 105
Working Days	Days/annum	330
Working hours	Hours/day	24
Production (Net)/Unit	TPA	14,94,110
Production (Gross)/Unit	TPA	17,57,880

Sinter plants agglomerate iron ore fines (dust) with other fine materials at high temperature, to create a product that can be used in a blast furnace. The final product, a sinter, is a small, irregular nodule of iron mixed with small amounts of other minerals. The process, called sintering, causes the constituent materials to fuse to make a single porous mass with little change in the chemical properties of the ingredients. The purposes of sinter are to be used converting iron into steel. Sinter plants, in combination with blast furnaces, are also used in non-ferrous smelting.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Flux and fuel crushing & screening section**

Limestone, dolomite, coke will be stored in storage bins of adequate capacity. The materials will be crushed in crushing and grinding section and will be screened and transported by conveyor to proportioning bins.

- **Proportioning System**

For various types of input materials, adequate number of proportioning bins mounted on load cells to ascertain material level in each bin and electronic weigh feeders under each bin shall be provided to draw materials of required proportions.

- **Mixing & Nodulizing Drum**

A combined mixing and nodulizing drum with water proportioning system and calcined lime addition facilities will be provided for the sinter machine. The drum will facilitate stage-wise intimate mixing and rolling of sinter mix with approximate amount of water and required calcined lime will be added.

- **Sinter Machine Section**

Sinter machine will be complete with hearth layer feeding system, raw mix feeding system comprising anti segregation filling method at the top of raw mix feed bin and drum feeder, ignition furnace, sinter breaker, crash deck, segregation chute and the sinter strand proper comprising lifting wheel assembly, support structure, sliding bars, thermal compensation device, wind boxes with compensators, spillage chute, SG iron pallet assembly with spring loaded sealing and high chrome grate bar, lubrication system etc. Sintering will be performed during the movement of the bed from ignition furnace to the discharge end. Suitable sinter breaker will break hot sinter cake to about 200 mm size. One elevator will be provided in sinter machine building.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

▪ **Sinter Cooler Section**

A suitable forced draft type circular cooler comprising of adequate number of fans, drives, cooler troughs, sealing etc will be installed so that temperature of the sinter at discharge point is 100°C (maximum). The cooler discharge hopper shall be load cell mounted. One magnet shall be provided on the product sinter conveyor after cooler to remove iron bearing material. Waste heat recovery system from cooler for ignition furnace combustion system will be optional for sinter machine.

▪ **Sinter Stabilizing Section**

Cooled sinter from sinter machine will be fed to a double roll crusher via a suitably designed separation chute. Crushed sinter of minus 50 mm size will be screened for separation of hearth layer material and plant return fines.

Sinter Plant shall comprise of:

- a) Raw Material Storage & Handling System
- b) Raw Material Crushing & Screening System
- c) Raw Material Proportioning System
- d) Coke Quenching System
- e) Mixing and Nodulizing System
- f) Sintering Unit
- g) Sinter Cooling System
- h) Sinter Screening System
- i) In-plant De-dusting System
- j) Industrial Water System
- k) Plant & Instrumentation Air System
- l) Fuel Oil System for heating during starting
- m) Electrical Supply & Distribution System
- n) Emergency D.G Power Supply System



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Particulate Matter in exhaust gases is $< 100 \text{ mg/m}^3$.

Table 3.10: Analysis of Iron Ore Fines

FeT	62.00%
SiO ₂	5.50%
Al ₂ O ₃	2.75%
CaO	0.20%
MgO	0.10%
P	0.07%
Moisture	5.00%
LOI	2.50%

Table 3.11: Sinter Analysis (Average)

Size	5-50 mm
FeT	51.91%
CaO	12.79%
MgO	2.15%
SiO ₂	6.05%
Al ₂ O ₃	2.62%
P	0.06%
CaO/SiO ₂	2.11%

APCD Details:

Process Waste Gas Dedusting System:

Two dry type electrostatic precipitator (ESP) will be provided of 85 m height for de-dusting of waste gases before entering the main exhausters. The unit will have high efficiency (min. 99.5%) to ensure less than 100 mg/Nm^3 of dust in the exhaust gas from the stack.

Plant/material handling Dedusting system:

2 no. of de-dusting ESP will be used for plant de-dusting and de-dusted clean air will be let out into the atmosphere through a stack height of 45 m.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.12: Material Balance of Proposed Sinter Plant

(Gross Production: 14,94,110 TPA + 2,63,770 TPA = 17,57,880 TPA)

Input			Output		
Raw Material	Specific Consumption	Quantity (TPA)	Product	Specific Generation	Quantity (TPA)
Iron Ore Fines	0.800	11,95,288	Sinter (Net Charged in BF)	1.000	14,94,110
Coke Breeze	0.065	97,117	Sinter de-dusting fines removed	0.010	14,941
Limestone	0.110	1,64,352	LOI	0.132014	1,97,244
Dolomite	0.090	1,34,470	In-Plant Return Fines	0.1765	2,63,770
Burnt Lime	0.020	29,882			
Mill Scale	0.0300078	44,835			
Dust removed from primary dust catches & BF gas cleaning	0.0170068	25,410			
Sinter de-dusting fines	0.010	14,941			
In-Plant Return Fines	0.1765	2,63,770			
TOTAL	1.3185146	19,70,065	TOTAL	1.3185146	19,70,065



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

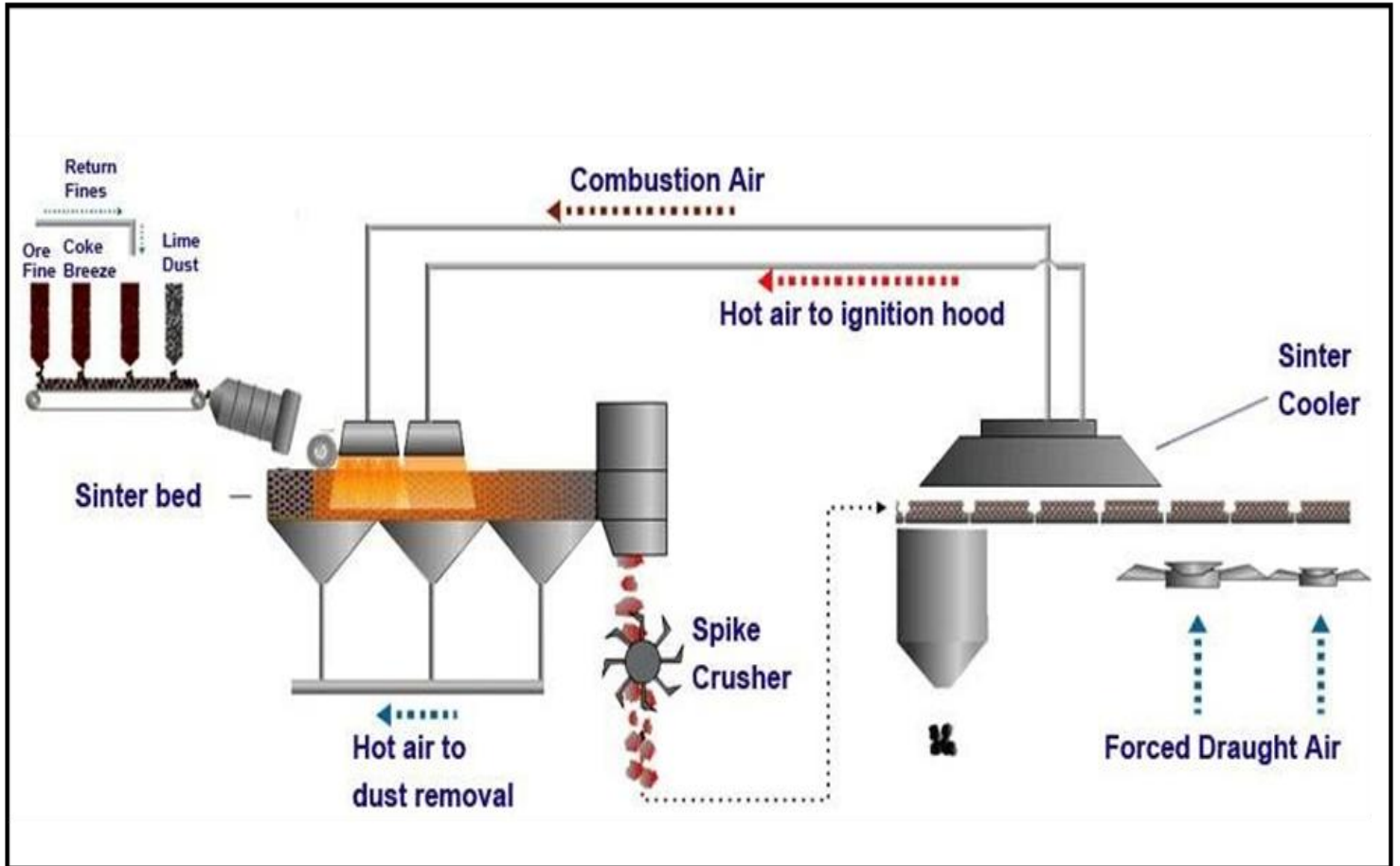


Fig 3.10: Pictorial representation of sinter making process



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

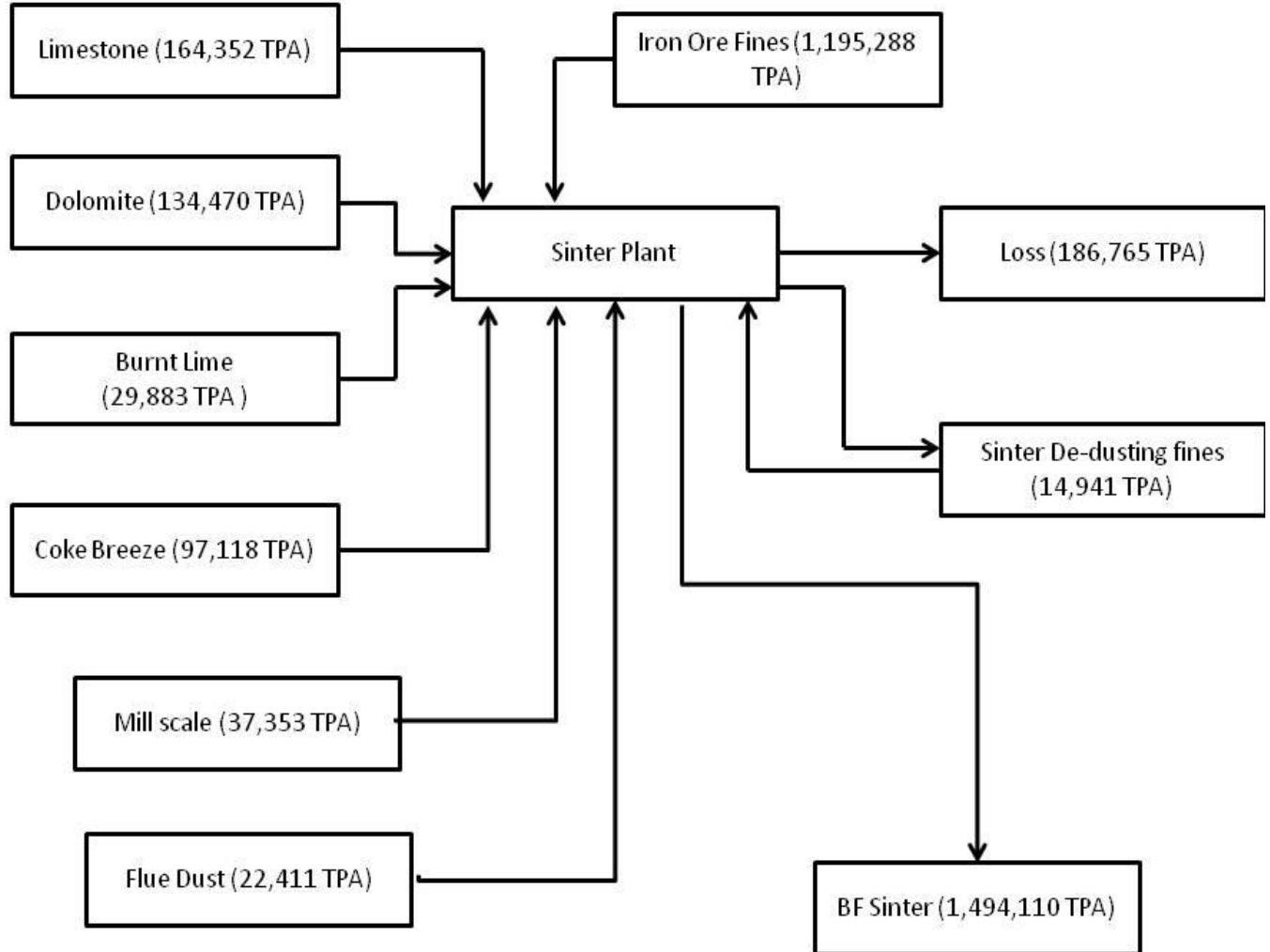


Fig 3.11: Process Flow Chart – Sinter Plant



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

• **Process Description – Blast Furnace**

The magnitude of operation:

Utilization of in-house Sinter of 14,94,110 TPA & 3,81,150 TPA Pellet for production of 12,70,500 TPA Hot Metal (No. of working days/hr – 350, Working hours/day in 3-shift operation – 24 hrs)

12,70,500 TPA Hot Metal will be used in SMS (100% In-house utilization) for Production of Billets.

Proposed plant capacity: 1 x 450 m³ & 1 x 650 m³

Table 3.13: Proposed Blast Furnace Configuration

	Configuration
Capacity	1 x 450 m ³ 1 x 650 m ³
Coke rate	≤ 380 Kg/thm
Coal rate	≈150 Kg/thm
Ore grade TFe	62-63%
Sinter Usage	70%
Blast Temperature	> 1100°
Slag Volume	~ 380 Kg/thm
Oxygen enrichment rate	3-5%
Annual working days	350
Annual output of Hot Metal	519,750 T 750,750 T
Annual output of BF Gas	858 x 10 ⁶ Nm ³ 1.24 x 10 ⁹ Nm ³

The in-house produced main raw material i.e., Sinter and Coke will be charged to the Blast Furnace (BF) to produce Pig Iron popularly called Hot Metal (HM).



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Blast Furnace consists of a vertical big vessel, raw material charged from top and the slag & hot metal are discharged from the bottom. Since more than 200 years, Blast Furnaces have been the most popular means of converting raw materials to pig iron which is further refined to steel. BF has been constantly improved & modernized. Today's BF is a fully automatic, highly efficient furnace for production of hot metal.

Manufacturing Process and Facilities

The purpose of a blast furnace is to chemically reduce and physically convert iron oxides into liquid iron called "hot metal". The blast furnace is a huge, steel lined with refractory brick, where iron ore, coke and limestone are charged into the top, and preheated air is blown from the bottom. The raw materials require 6 to 8 hours to descend to the bottom of the furnace where they become the final product of liquid iron and reject of liquid slag. Both of these are drained from the furnace at regular intervals. The hot air that was blown from the bottom of the furnace ascends to the top in 6 to 8 seconds after going through numerous chemical reactions. The air is blown through tuyers in the bottom portion and liquid iron is tapped from the tap hole. The blast furnace complex will consist of one blast furnace and one pig casting machines along with the requisite support facilities, namely the stock house, coal injection system, cast house, gas cleaning plant, de-dusting facilities, slag granulation unit etc.

BF gas is cleaned in Gas Cleaning Plant and utilized for stove of blast furnace and other plant uses such as reheating furnaces. Unutilised gas shall be flared. Surplus gas, if available, is combusted in a boiler to produce steam for the generation of power.

▪ Stock House

The sinter, sized ore, fluxes, coke, etc., from the Sinter plant & raw material storage yard, are transferred to the stock house and placed in respective bins by shuttle conveyors. The raw material will be screened before charging into the blast furnace. The stock house will be provided with a de-dusting system (bag filters) for collection of



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

dust arising from all material transfer points, vibratory feeder screens, weigh hoppers, etc.

▪ **Furnace**

The blast furnace will be self-supporting free standing design complete with shell, refractory, cooling system, top charging equipment, bustle main, tuyeres/ tuyere stocks etc. The blast furnace top equipment and the platform at various levels around the furnace are supported by an independent tower structure.

▪ **Hot Blast Stoves**

The furnaces will be provided with stoves for supply of hot blast more than 1100°C. The stoves will be of regenerative type and fired with blast furnace gas. Two fans, one working and one stand by will be provided for supply of combustion air to the stove burners. A chimney will be provided for the stoves. The different zones of the stoves will be lined with suitable quality of Alumina/Fireclay refractories depending on the temperature prevailing in the respective zones. The stove valves will be electrically/hydraulically actuated, and the stove-changing operations will be automatic and remotely controlled from the control room.

▪ **Cast House**

A cast house will be provided for handling the tapping operations and the hot metal/slag. The furnace will have one tap hole. The main hot metal trough will be fixed type fabricated steel construction. The hot metal runner from the trough will discharge the metal into hot metal ladle kept on cast house floor. For opening and closing of the tap-hole, a hydraulically operated mud gun and a pneumatically operated tap-hole drilling machine will be provided. The skimmed slag from the main trough will normally be led to the slag granulation trough. Under emergency conditions, the slag can also be diverted to the dry slag pit. The cast house will be served by an EOT crane in the hot metal bay,



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for transferring the filled up hot metal ladle on to a ladle car for transfer to the steel melt shop. The crane will be used also for handling hot metal ladles to and from Pig Casting Machine (PCM) and ladle maintenance.

▪ **Slag Granulation**

The cast house will be served by a slag granulation unit. The slag / water slurry after granulation will be led to storage area and the water will be allowed to drain off. The granulated slag will be reclaimed by a pay loader and sent to the storage yard. From the storage yard, trucks will transport the granulated slag. The water for granulation will be routed through a water re-circulation system. The granulation units will be designed to granulate 100% of slag production. The granulated slag will be used in the cement industry.

Blast Furnace Charge-Mix:

- Sinter : 70%
- Pellets : 25%
- Iron Ore Lumps : 5%
- Coke Rate : 380 kg/thm
- PCI Rate : 150 kg/thm

Table 3.14: Chemical composition of Iron Ore, Pellets and Sinter

Material	Chemical Composition								Particle Size (mm)
	TFe	FeO	SiO ₂	Al ₂ O ₃	CaO	MgO	P	Basicity	
Iron Ore Lump	61-63%	-	3.25-3.75%	2.0-2.5%	-	-	0.085	-	10-40
Pellets	>62.37%	<0.8%	6.29%	2.95%	0.81%	0.40%	0.085	~0.13	9-16
Sinter	51.91%	-	6.05%	2.62%	12.79%	2.15%	0.06%	2.11	5-50



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.15: Chemical composition of Coke

Ash	Fixed Carbon	Moisture	Sulphur
≤12.5%	86.5%	4-6%	≤0.6%

Table 3.16: Physical Properties of Coke

Drum Strength	M40 > 80%; M10 < 8%
Particle Size	+20 to -60 mm
	+ 60 mm < 5%
	-20 mm < 5%

Table 3.17: Composition of Pig Iron (Typical)

C	3.5 – 4.5%
Si	< 0.8%
Mn	0.5 – 1.0%
S	< 0.05%
P	< 0.01%

Table 3.18: Composition of Slag (Typical)

SiO ₂	36.4%
Al ₂ O ₃	18.6%
CaO	33.7%
MgO	6.3%

Table 3.19: Composition of BF gas (Typical)

SiO ₂	55%
Al ₂ O ₃	22%
CaO	20%
MgO	3%



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.20: Material Balance of Proposed Blast Furnace (12,70,500 TPA)

Input			Output		
Raw Material	Specific Consumption T/T of Product	Quantity (TPA)	Products	Specific Consumption T/T of Product	Quantity (TPA)
Sinter	1.176	14,94,108	Hot Metal	1.000	12,70,500
Pellet	0.30	3,81,150	Slag	0.350	4,44,675
Iron Ore	0.084	1,06,722	Dust removed from primary dust catches & BF gas cleaning	0.020	25,410
Coke	0.38	4,82,790	BF Gas	2.115	26,87,108
PCI Coal	0.15	1,90,575	Losses	0.05	64,796
Air Blast (O ₂ Enriched)	1.446	18,37,143			
Total	3.536	44,92,488	Total	3.536	44,92,488



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.21: Blast Furnace Gas Balance

S.No.	Product	Fuel Supply / Consumption (Nm ³ /hr)
		BF Gas
	GENERATION	
1.	Blast Furnace	2,50,000
	CONSUMPTION	
1.	Blast Furnace Plant Stoves	1,50,000
2.	Sinter Plant	30,000
3.	Reheating Furnace	67,000
4.	Flare Stack	3,000
	TOTAL CONSUMPTION	2,50,000

BF Gas Cleaning System

Primary gas cleaning stage

Primary gas cleaning is based on the gravity separation principle and is used for the removal of large particles of the dust. It is the dry separation of dust particles in the blast furnace top gas before further cleaning, it is done by a gravity dust catcher or most recently by large diameter cyclones. In this stage all the coarser particles are removed. The objective is to remove as much dust as possible in a dry condition for reuse and recycling.

Secondary gas cleaning stage

BF gas after primary cleaning in the dust catcher, where the majority of heavy particles are removed, moves towards secondary cleaning stage through Bag Filters where the dust collected is dry type and reused in sinter plant. The cleaned BF Gas will be taken



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

into Gas network of plant. Dry gas cleaning has the following advantages over the wet gas cleaning using scrubbers and Venturi tubes:

- Absence of water in the cleaning process that eliminates or reduces the construction scope of a number of blast furnace waterworks facilities: sludge pumping station of gas cleaning system, sludge settling tanks and flocculators, pump station for slurry transfer, circulating pump station of turnaround cycle of gas cleaning, etc.;
- The temperature of gas after cleaning is 100-120°C, which is 50-70°C higher than in the wet gas cleaning; the humidity of gas is reduced by 50-60 g/m³, which together is equal to an increase in caloric content of blast furnace gas by 50-60 kcal/m³. This allows to increase the temperature of heating blast air in the hot stoves;
- Reduction in the dust content in blast furnace gas to 1-2 mg/m³ that improves the service life of hot blast stoves and also enhances the performance of gas recovery compressor less turbines by 30% and the service of the turbine vanes up to 1 year;
- Environmental improvement in the plant due to a better gas cleaning from dust and elimination of sludge handling facilities

Water Supply System

The following water re-circulation systems and distribution networks are envisaged for meeting cooling water requirements of different consumers of BF complex,

- Circulating soft water pumping station of BF including emergency overhead tank and filters.
- Circulating water (Industrial) pumping station for Slag Granulation Plant (SGP).
- Circulating water (Industrial) pumping station for Pig Casting Machine (PCM)
- Interplant pipelines comprising the following spread over the complete plant
- Fire water and drinking water network in BF complex within battery limit
- Circulating water pipelines for BF, SGP, PCM



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- In shop piping network for industrial, fire water, drinking water and other miscellaneous water lines in various buildings, galleries, junction houses within battery limit.

BF Cooling Water System:

The cooling water system for the blast furnace complex including stoves are essentially a closed loop cooling system using soft water as cooling media. Heat transferred from the blast furnace complex will be ultimately dissipated into the heat exchangers. An Emergency overhead tank shall be provided to cater to the emergency water requirement of the blast furnace during electric power failure to ensure emergency water supply to top most cooling element. Emergency overhead tank shall be floating on the water circuit. In general, there will be two cooling water circuits for Blast Furnace Proper. (i) Tuyere & tuyere cooler, under hearth and tap hole and stoves

(ii) Furnace shell stave cooling Cold water pumps shall be provided for BF cooling system at the circulating water pumping station. One supply header shall be provided from the pumping station up to the blast furnace for furnace cooling.

Separate feeder lines are considered for supply of cooling of hot blast valves of stoves and under hearth cooling. 1 Nos. spray header rings shall be provided at top of the blast furnace for shell spray. The tuyere zone has cooling elements namely tuyere & tuyere cooler. Each of these elements for 08 Nos. of tuyeres is fed by separate tapings from the ring main/manifold. The end connection for the piping near the assembly is through flexible hose. Slag Granulation Plant: Hot molten slag from each of the cast house will flow to the blowing box provided below the end of slag runner. In the blowing box slag will be cooled and granulated by the direct impinging action of the water jets. The resultant granulated slag and the water will flow through the cold runner and will fall into the granulated slag tank having filter bed for easy drainage & required perforation by blowing compressed air. The hot water will be led to the settling tank for settlement of



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suspended material and also for natural cooling, from where the cold water will return to the cold-water sump in SGP pump house. The cold water will be pumped through pipe up to the blowing box by cold water pumps. Piping network connecting consumers, granulation pit, settling tank and pumping system shall be laid partly underground and partly above ground.

APCD Details:

Stove waste gas chimney 2 no., height 45 m.

Flare stack: 1 no. height 45 m.

Bag Filter:

Dust extraction system with Bag filter at Stock House 2 no., height 40 m.

Dust extraction system with Bag filter at Cast House 2 no., height 40 m.

Heat Recovery:

Heat will be recovered from Waste heat of stove through exchanger and the same heat will be utilized to heat the combustions air of stove and preheating the coke.



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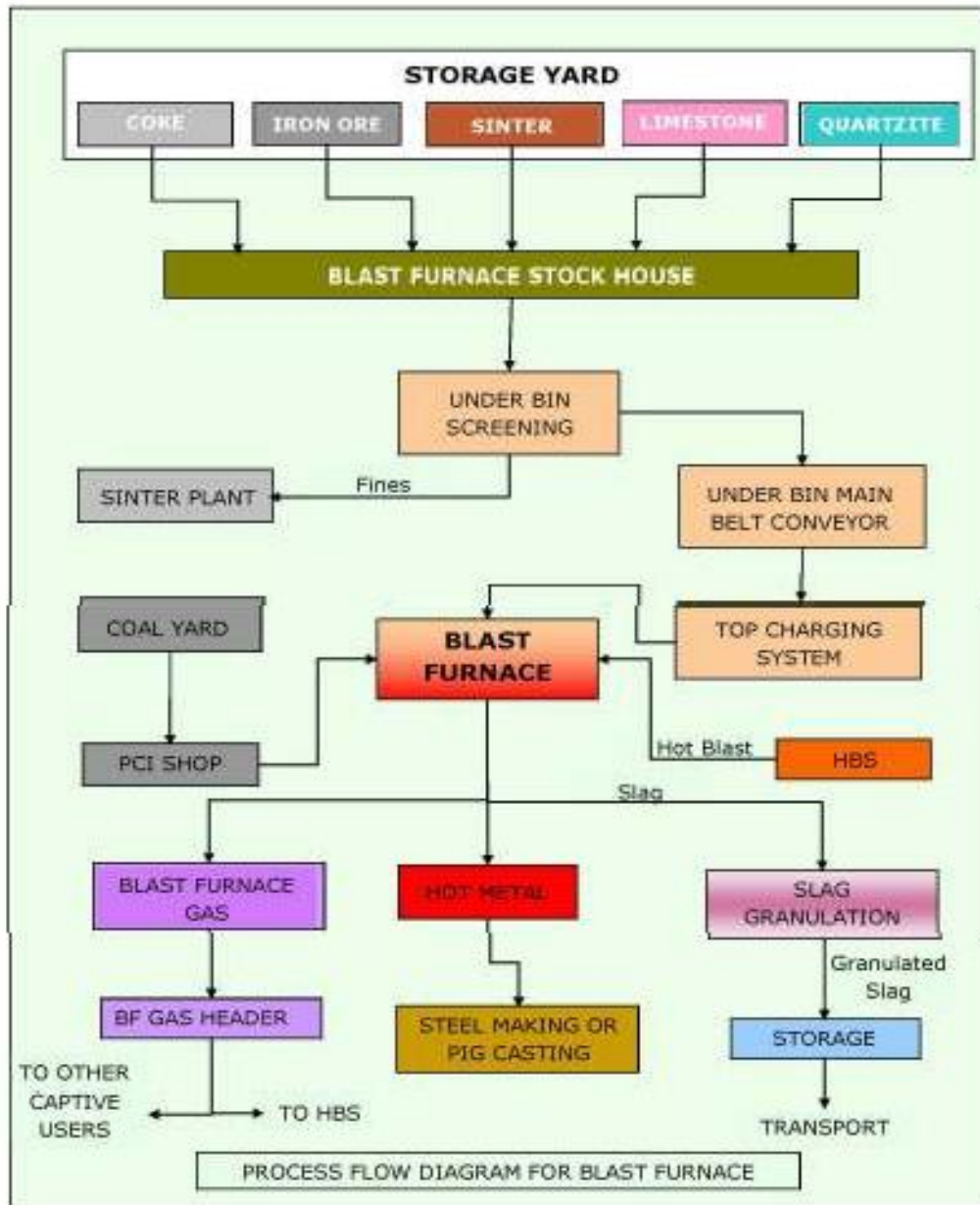


Fig 3.12(A): Process Flow – Blast Furnace



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

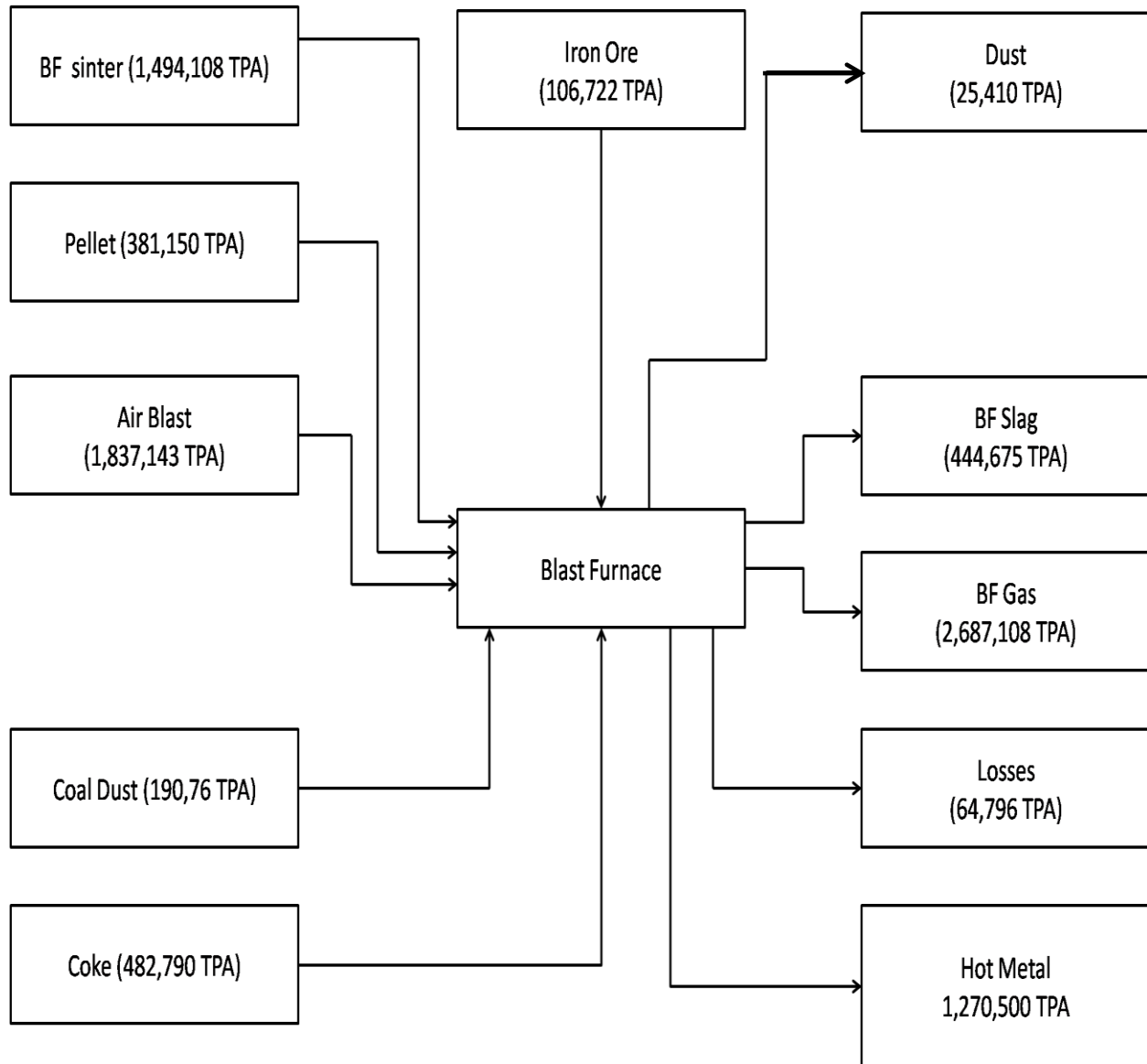


Fig 3.12(B): Process Flow Chart – Blast Furnace



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description – Steel Melting Shop (SMS)**

Magnitude of Operation:

Total Billet production: 15,51,763 TPA

Existing configuration – 1x35T EAF, 2x26T LRF, 1x35T VD, Billet Caster

Total Billet required for Rolling Mill – 2,08,333 TPA (Existing);

Proposed configuration – 3x65T EOF, 4x65T LRF, 4x20T IF, 2x65 T VOD/VD, 1x45T & 1x65T AOD, 2x3 Strand Billet Caster, 1x8 M Slab Caster

(No. of working days/annum – 330 and working hours/day in 3-shift operation – 24 hr)

Utilization of 3,00,000 TPA Sponge Iron, 12,70,500 TPA of Hot Metal & 1,30,000 TPA of Scrap for Production of 15,51,763 TPA Billet.

100% in-house consumption for production of 15,00,000 TPA Rolled Products.

Electric Arc Furnace

Electric arc is generated between electrodes which heats the metallic charge. In the furnace, the melted contents separate into liquid metal and slag. The slag is removed and considered as waste. The liquid metal is sent to the secondary refining facilities comprising Ladle Refining Furnaces and Vacuum Degassing Unit. The refined liquid steel is sent to the continuous casting machine (CCM) where semi-finished product is made. The electric arc furnace (EAF) is particularly well suited to the production of the full range of alloy steel grades. In the case of the basic oxygen steel making processes, on the other hand, the danger arises that the expensive alloying elements will be absorbed at least in part by the slag.

LRF Process Description

- The Molten Steel Ladle shall be transferred to a Ladle Car for carrying out secondary refining in the Ladle Furnace.



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- The Ladle has a porous refractory plug at the bottom to purge Argon gas to keep the molten metal in vertical stirring movement.
- The Ladle is covered by a water cooled roof which has openings for three graphite electrodes, a fume outlet connected to FES system and a door for charging fluxes & alloying elements. Electric heating is done by arcing under the reducing slag.
- Lime is used as flux for refining the steel.
- Ferro Alloys are added to achieve de-oxidation and required composition of steel.
- Aluminium & Calcium Silicide is added through a wire feeder.
- Fumes generated during the process are sucked through a collection hood are sucked through a cyclone-cum-spark arrestor and LF fumes sucked through its roof outlet enter a pulse-jet type bag filter to remove the dust particles. ID Fans installed after the bag filter are used for suction of fumes and discharge the clean gas into atmosphere through a stack.

Vacuum Degassing (VD)

The ladle is placed in a vacuum tank and stirred with an inert gas while the tank is evacuated. Alternatively, the ladle may have a sealing arrangement on its periphery for a lid to be fitted which forms the vacuum chamber. Liquid steel can be treated in a tank degasser without arc reheating. This can be done with two different stirring systems namely (i) an inductively stirring of the liquid steel bath, and (ii) the bath stirring by bubbling Ar through a porous plug located in the ladle bottom.

Ladle is provided with a porous plug at its bottom to purge Ar gas. The ladle is placed in a vacuum chamber. The vacuum chamber is equipped with a hopper so as to make additions of elements as and when it is needed. Stirring gas is introduced either from top through the roof by a submerged refractory tube or through the porous plug fitted at the bottom of the ladle. For effective degassing of fully killed steel, it is better to purge Air through the bottom of the ladle. Stirring the bath enhances rate of gas removal. Vigorous removal of gases also causes splashing of liquid steel. Hence ladle is not filled



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completely and around 25 % of its height is kept as freeboard to accommodate the splashed droplets of liquid steel. Pressure is maintained in between 1 mm Hg to 10 mm Hg for effective degassing. During degassing additions are made for deoxidation and alloying. In certain cases ladle is heated to compensate for the loss of heat during degassing. For the effectiveness of degassing, it is necessary that carry over slag from primary steelmaking furnace is to be as low as possible. Carry over slag contains FeO and since O₂ content of steel is in equilibrium with FeO content of slag, O₂ content of steel increases.

The fundamental requirements for the ladle degassing process include (i) sufficient freeboard in the ladle to contain the vacuum induced slag and steel boil, (ii) an inert gas percolating through the steel bath for stirring, inclusion separation, and enhancement of vacuum degassing performance, (iii) sufficient superheat in the steel to avoid skull formation, and (iv) means to deliver additives while the ladle is inside the vacuum tank. The Air connection to the ladle is established when the ladle is set in place inside the vacuum tank. The vacuum tank is evacuated to the required operating pressures by a vacuum pumping system. Emissions are evacuated through the vacuum pumping system and are collected prior to the pumps or they are discharged under water contained within a weir wall-equipped concrete hot well. The process gases, including those entrained in the inter-condenser discharge water, are exhausted from the hot well via a motor driven fan to a vent stack equipped with a flare burner. Hot well water is pumped to a cooling tower of the contact water system.

Continuous Casting Machine

Continuous casting is the process to solidify molten steel into a semi finished billet, bloom, or slab for subsequent processing. Prior to introduction of the continuous casting practice in 1950s, steel was poured into stationary molds to form ingots. But continuous casting has substantially added to improved yield, quality, productivity and cost efficiency.



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Steel from the EAF/EOF-LRF-VD/VOD is tapped into a ladle and taken to the continuous casting machine. The ladle is raised onto a turret that rotates the ladle into the casting position above the tundish. Liquid steel flows out of the ladle into the tundish and then into water-cooled copper mold. Solidification begins in the mold, and continues through the first zone and strand guide. In this configuration, the strand is straightened, torchcut and then discharged for intermediate storage or hot charged for finished rolling. The melting /casting/ rolling processes are linked while casting a shape that substantially conforms to the finished product. The complete chain from liquid metal to finished rolling can be achieved within two hours. End-use dictates quality, grade and shape of the cast product (billet, bloom, slab, beam blank, and/or round).

To start a cast, the mold bottom is sealed with a dummy bar head attached to dummy bar. The dummy bar is held in place hydraulically by Straightener Withdrawal units. This head prevents liquid steel from flowing out of the mold. The steel poured into the mold is partially solidified, producing a steel strand with a solid outer shell and a liquid core. In this primary cooling area, once the steel shell has sufficient thickness, about 10–20 mm, the straightener withdrawal units are started. The moving dummy bar starts to withdraw the partially solidified strand out of the mold along with the dummy bar. Liquid steel continues to pour into mold to replenish the withdrawn steel at an equal rate. The withdrawal rate depends upon the cross-section, grade and quality of steel being produced, and may vary widely depending upon section, quality and machine design parameters. Casting times are typically matched with the EAF/EOF tap-to-tap time. Upon exiting the mold, the strand enters a roller containment section and secondary cooling chamber in which the solidifying strand is sprayed with water to promote solidification. This area preserves cast shape integrity and product quality. Larger cross-sections require extended roller containment. Once the strand is fully solidified and passed through the straightener withdrawal units, the dummy bar is disconnected, removed and stored. Following the Straightener, the strand is cut into individual pieces of required length and discharged for further processing.



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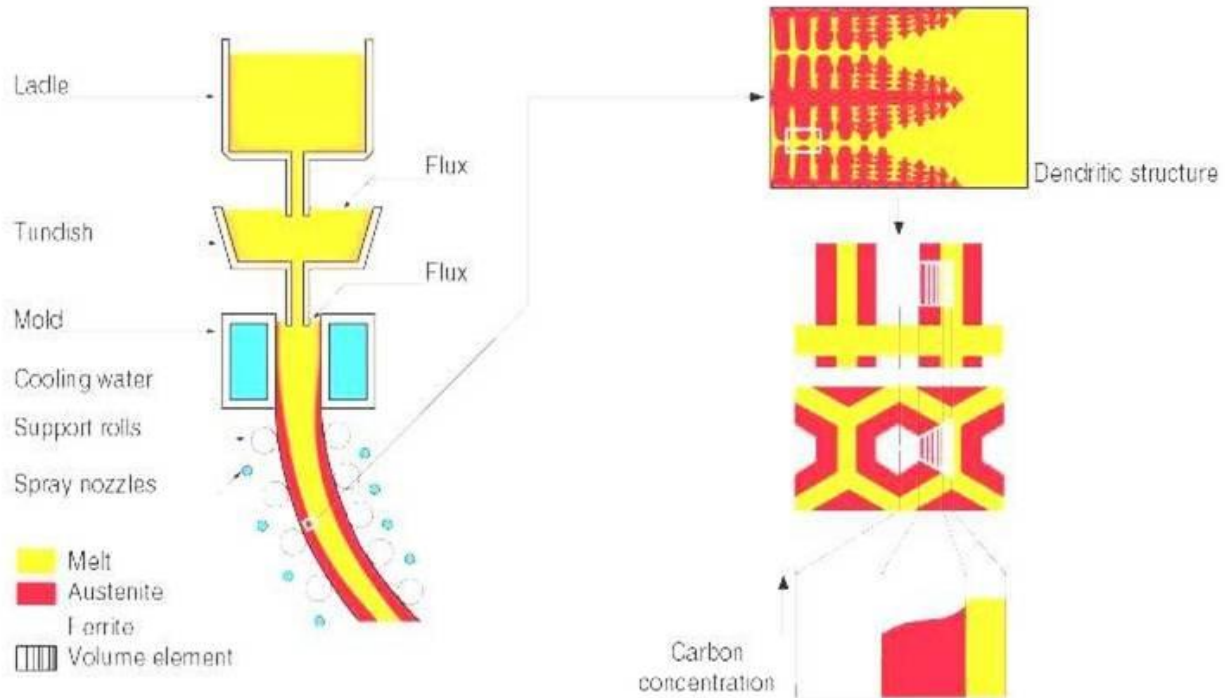


Fig 3.13: Simulation of Solidification and Segregation in Continuous Casting of Steel

Energy Optimizing Furnace

The EOF proper consists of 2-units of shuttle-type Bottom cars. One bottom car supports the EOF furnace in operation and the other one supports a second bottom at one or another side for relining. Both cars are equipped with roll collar tracks to tilt the furnace for tapping or de slagging. Tilting is performed by high-speed hydraulic cylinders, allowing slag-free tapping.

Furnace is equipped with refractory lined bottom, split water cooled shell, water cooled roof and sealing between the furnace and Scrap Pre-heater, hot metal launder, steel tapping launder, submerged tuyeres, atmosphere injectors and supersonic lance for oxygen blowing, air-fuel burners for heating-up new bottom.



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Scrap Preheaters are placed immediately above the furnace, provided with water-cooled tilting fingers to support the solid metallic charge which is heated by the furnace off-gas. At the moment of charging, the fingers tilt, releasing the preheated scrap onto the bottom of the EOF.

EOF is also provided with water-cooled inclined pipe placed below the fingers for additions into the furnace; air injectors for post-combustion of carbon monoxide; water sprays to control the off-gas temperature before the scrap layer, off-gas uptake, water cooled sliding door and scrap charging system, both placed at the Scrap Preheater top. Submerged tuyeres are designed for optimizing oxygen flow rates to ensure effective bath agitation and optimum reaction with carbon in the bath while avoiding ejection of hot metal from the furnace. In a special design of tuyeres, three concentric pipes, enable optimum cooling of the end section projecting into the furnace. In this way, tuyeres burn off is limited to less than 2.5 mm per heat. Design and arrangement of scrap Preheater enables efficient preheating up to 850°C and allows rapid furnace charging without stopping with no dust exhaust to the building atmosphere and little noise. Water cooled roof and walls above bath reduce refractory consumption.

Advantages of EOF

- No use of electrical energy for melting.
- Industrially proven high plant productivity and availability,
- Excellent metallurgical properties, especially with regard to de-phosphorisation and de-carbonisation.
- Energy savings, due to:
 - High post combustion rate (95 %)
 - Good transfer rate of post combustion heat to the bath (30 %)
 - Scrap preheating up to 850°C
 - High operational efficiency
- Constructive features, which are industrially proven for more than 20 years:



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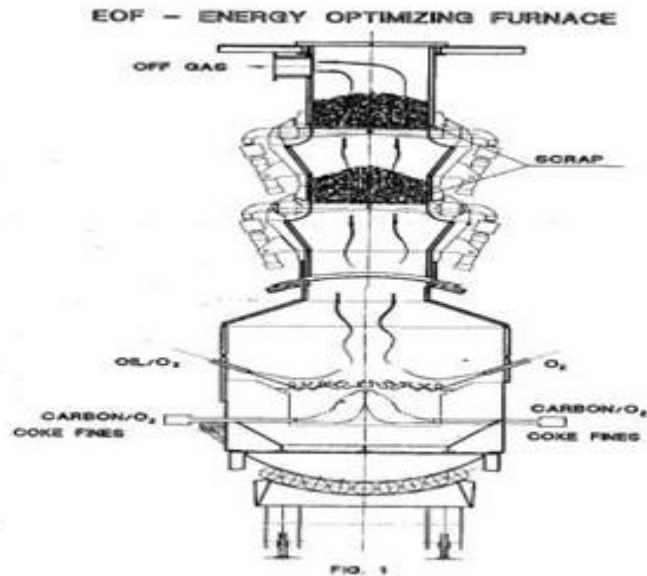


Fig 3.14: Process Flow Sheet of EOF

Induction Furnace Melting

The principle of melting in IF is that a high voltage electrical source from a primary coil induces a low voltage, high current in the metal or secondary coil. IF uses the heat produced by the eddy currents generated by a high-frequency alternating field. The alternating magnetic field produced by the high-frequency current induces powerful eddy currents in the charge resulting in very fast heating.

- An Induction Furnace requires an electric coil to produce the charge.
- The crucible in which the metal is placed is made of stronger materials that can resist the required heat, and the electric coil itself cooled by a water system so that it does not overheat or melt.

Operation of Induction Furnace

- **Charge Preparation and Charging**



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The raw materials are weighed and kept near the furnace on the furnace charging floor before starting the melting. The charge is to be free from all the foreign materials including sand, dirt and oil/grease. Rusty scrap not only takes more time to melt but also contains less metal per charging. For every 1 % slag formed at 1500 deg C, the energy loss is 10 kWh/t. The scrap is to be clean. Exact weight of the ferro-alloys is to be kept ready, since the ferroalloys are very expensive and their proper handling not only reduces wastage but also reduces the time lost in their addition.

The maximum size of single piece of metal/scrap is not to be more than one-third of the diameter of the furnace crucible. It avoids problem of bridging. Moreover, each charge is to be around 10 % of the crucible volume. Also, there are not to be any sharp edges, particularly in case of heavy and bulky scrap, as this can damage the refractory lining of the furnace. Further, the furnace is not to be charged beyond the coil level, i.e. charging the furnace to its capacity. It is to be understood that as furnace lining wears out, the charging can slightly increase.

Proper charge sequence is to be followed. Bigger size metal is to be charged first followed by charging the smaller size and gaps are to be filled by turnings and boring. The use of baled steel scrap and loose borings (machining chips) is to be controlled. Charge driers and pre-heaters are to be used to remove moisture, pre- heat the charge, and remove any oil or grease. Introduction of wet or damp scrap in the melt is to be avoided as this can cause explosion.

- **Melting and making ready the heat**

It is essential that the furnace is always run with full power. This not only reduces batch duration but also improves energy efficiency. By the use of furnace cover, the radiation heat loss can be reduced substantially. The build-up of slag on furnace walls (Fig 3.11) is to be avoided. Typical slag build-up takes place near the neck, above coil level where agitation effect is less. Quantity of flux used for slag removal is important. Typically flux



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consumption is to less than 1 kg per ton of steel. Proper tools are to be used for de-slagging. Tools with flat head are to be used instead of rod or bar for de-slagging. They are more effective and take very less time. Process control through melt processor leads to fewer interruptions. Typically process control reduces interruptions by 2 minutes to 4 minutes. Spectral testing laboratory is to be located near to steel melting shop to avoid waiting time for the chemical analysis of the heat and slag samples. Un-necessary super-heating of the liquid steel is to be avoided. Superheating by 50 deg C can increase furnace specific energy consumption by 25 kWh/t.

▪ **Tapping of Heat**

The plant layout plays an important role in determining the distance travelled by the liquid steel in the ladle and the temperature drop. The ladle size is to be optimized to minimize the heat losses and to empty the furnace in the shortest possible time. The melting is needed to be synchronized with the casting of the liquid steel. Liquid steel is not to wait in the furnace. The ladle pre-heater is to be used to avoid a drop of the temperature. Use of liquid steel to pre-heat the ladle is quite energy intensive and expensive. The quantity of liquid steel left in the ladle is to be as low as possible. Ladle covering compound is to be used to minimize the temperature drop due to the radiation losses from the ladle top.

▪ **Production of Mild Steel by Induction Furnace**

A large tonnage of mild steel is made globally through IF route. While producing this steel, the chemistry of end product is controlled. The chemical analysis of all the input materials is to be done to have a decision on the charge mix. After completing 50 % charging of the input materials, a bath sample is analyzed for chemical composition. Based on the chemical analysis of the bath sample at this stage, calculations are made for further additions of the metallics. If the bath sample at this stage shows high percentage of carbon, sulphur and phosphorus, then the sponge iron content of the



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charge is to be increased. Final bath sample is taken when 80 % melting is completed. Based on the analysis of this sample, there is another adjustment made in the charge. The lower content of carbon in the sample is corrected by increasing the quantity of pig iron/charge iron in the charge. Silicon and manganese in the metal is oxidized by the iron oxide of the sponge iron. Sulphur and phosphorus is also diluted by the sponge iron. Because of the use of sponge iron, the trace elements in the steel made in the IF remains under control.

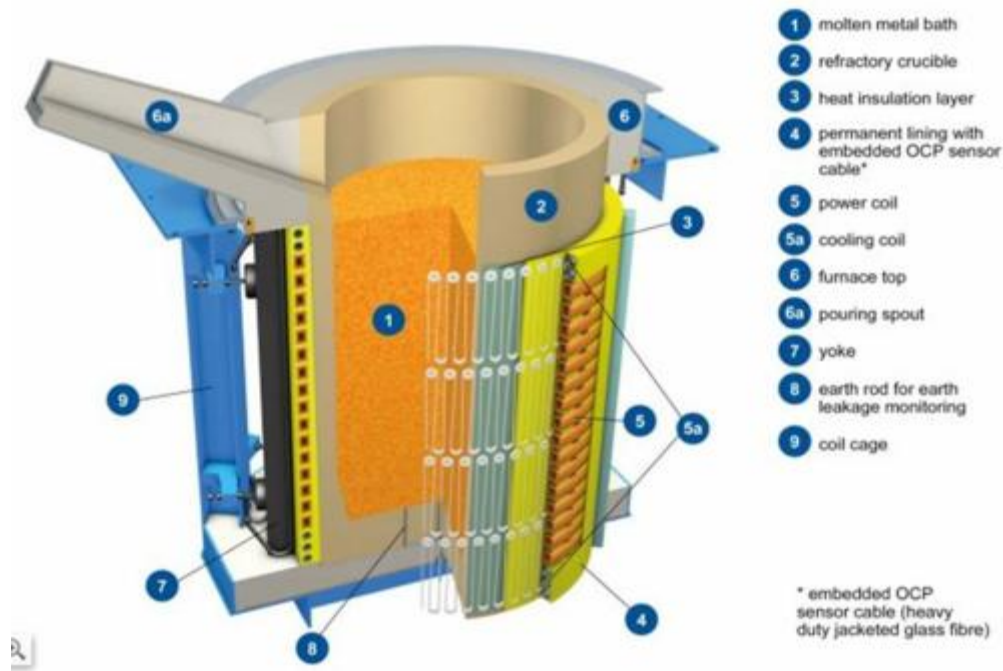


Fig 3.15: Induction Furnace

Vacuum Oxygen De-carburization (VOD) Process

VOD process is a tank degassing unit which is additionally equipped with an O₂ blowing lance. This additional supply of O can be used for the production of extra low C stainless steel grade (forced decarburization) or for chemical heating of the liquid steel in conjunction with Al/Si (silicon) additions (VD-OB process). The vacuum pump is designed accordingly, having a higher capacity in order to cope with the increased off-



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gas volume. VOD process is considered to be an important vacuum process for production of stainless steel. It is mainly suitable for special stainless steels which require the very low value of C, N₂, and H₂ levels. In this process, the ladle is placed in vacuum chamber and there is a provision for O₂ lancing through vacuum tight gland and alloying additions. Basically, the process involves preferential oxidation of carbon over Cr leading to minimum losses of Cr.

Because of reduced freeboard available in the ladle, the initial C content of the liquid steel is to be as low as 1 %. Here, O₂ injection is carried out at 100 mm Hg to 250 mm Hg. Si is oxidized followed by C. De-carburization occurs through start of co bubbling determined by initial temperature and Si content of the liquid steel. Constant rate of decarburization occurs depending on the O₂ flow rate. The CO/CO₂ ratio is monitored and at a bath C content of 0.08 %, it increases rapidly. Beyond this limiting C percentage, de-carburization rate falls independent of O₂ flow rate with simultaneous Cr oxidation. O₂ lancing is ceased and the vessel pressure is reduced and Ar stirring is carried out further to the reaction between the dissolved O and the remaining C. It has been reported that through vigorous stirring C can be reduced to levels of 0.005 % and total C + N₂ less than 0.015 % are achieved. The refining sequence in general is controlled by combination of variation in O flow rate, the lance tip – bath surface distance, control of vacuum pressure and the Air flow rate. Addition of sufficient amount of lime and Al helps in excellent de-sulphurisation of the liquid steel.

AOD Converter

AOD process is carried out in a refractory lined convertor similar to BOF but with two to four Argon Oxygen tuyers installed in the lower side wall or bottom. The tuyers consists of two concentric steel tubes with the inert gas flowing in the outer annular and Oxygen in the inner tube, The converter has tilting and emission control equipment similar to BOF. The lining of the converter is basic and lasts 60-80 heats because of long refining



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

time and high temperature ~ 1700°C, that is necessary for improving the chromium yield.

The opening chemistry of the steel bath is carbon 2.0-2.5%, chromium 18-19% and 8-9% nickel for autenitic stainless steel. The blow starts with high Oxygen gas 80% and 20% argon, because there is plenty of carbon initially which Oxygen prefers to combine. As the carbon level drops, the gas mixer is gradually changed into one rich in argon. In the end blowing 20% Oxygen and 80% argon is reached. The final carbon of 0.015% with only 1.5-2.0% chromium loss in the bath.

The steel is de-oxidized by Ferro-silicon, Ferro-aluminum and desulphurised with burnt lime. To minimize cost, Argon is sometimes replaced by nitrogen or dry air in the beginning of process, but finally Argon is blown for better mixing and removal of hydrogen and nitrogen.

Features and benefits:-

- Is more economical process than VOD.
- Developed for the production of Stainless steel, but is capable of producing low alloys.
- AOD are side blown through Tuyers, away from tapping side. Now top lance is also added for the faster decarburization and tubers are placed in bottom.
- It oxidizes carbon in the melt without the loss of costly Ferro-alloys.
- Rate of decarburization is dependent on the rate of Oxygen injection.
- Oxygen to Argon ratio starts with 4:1 and gradually reduced to 1:4 thus lowers the carbon content to as low as 0.015%.
- L.M. in an AOD vessel is subjected to quite vigorous motion.
- Submerged gases rise and expand owing to rise of temperature of fall of pressure, thereby generating extreme turbulence.
- Direct substitute of nitrogen for Argon throughout stage (4:1) and (3:1). Ratio of Oxygen: Argon is achieved.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- Most of the nitrogen picked up is removed at the end by Argon flushing.
- Lime is added to produce slag with Basicity (V ratio), above 1.5-2.0 which results in sulphur levels below 0.025%.

APCD Details:

Fume Extraction system with Bag filter 4 no., height 35 m.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.22: Material Balance for Existing Steel Melting Shop (2,08,333 TPA)

Input			Output		
Raw Material	Specific Consumption T/T of Product	Quantity (TPA)	Products	Specific Consumption T/T of Product	Quantity (TPA)
Purchased Scrap	0.521	1,08,541	Billet	1.00	2,08,333
DRI	0.640	1,33,333	Slag	0.18	37,500
Lime	0.110	22,917	Scale	0.02	4,167
Ferro Alloys	0.029	6,042	Losses	0.10	20,833
Total	1.30	2,70,833	Total	1.30	2,70,833

Table 3.23: Material Balance for Total Steel Melting Shop (15,51,763 TPA)

Input			Output		
Raw Material	Specific Consumption T/T of Product	Quantity (TPA)	Products	Specific Consumption T/T of Product	Quantity (TPA)
Hot Metal	0.820	12,70,500	Billet	1	15,51,763
DRI	0.190	3,00,000	Slag	0.18	2,79,317
Purchased Scrap	0.080	92,037	Mill Scale	0.02	31,035
Scrap (End Cuts)	0.024	37,963	Losses	0.03	48,386
Lime	0.110	1,65,000			
Ferro Alloys	0.029	45,001			
Total	1.23	19,10,501	Total	1.23	19,10,501



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Continuous Casting Machine (6x11 M, 3 Strands)

In the continuous casting, molten steel is poured from the tundish in the water-cooled mould, and partially solidified Billets (hereafter called strand) is withdrawn from the bottom of the mould and hot Billets are directly charged to the Rolling Mill.

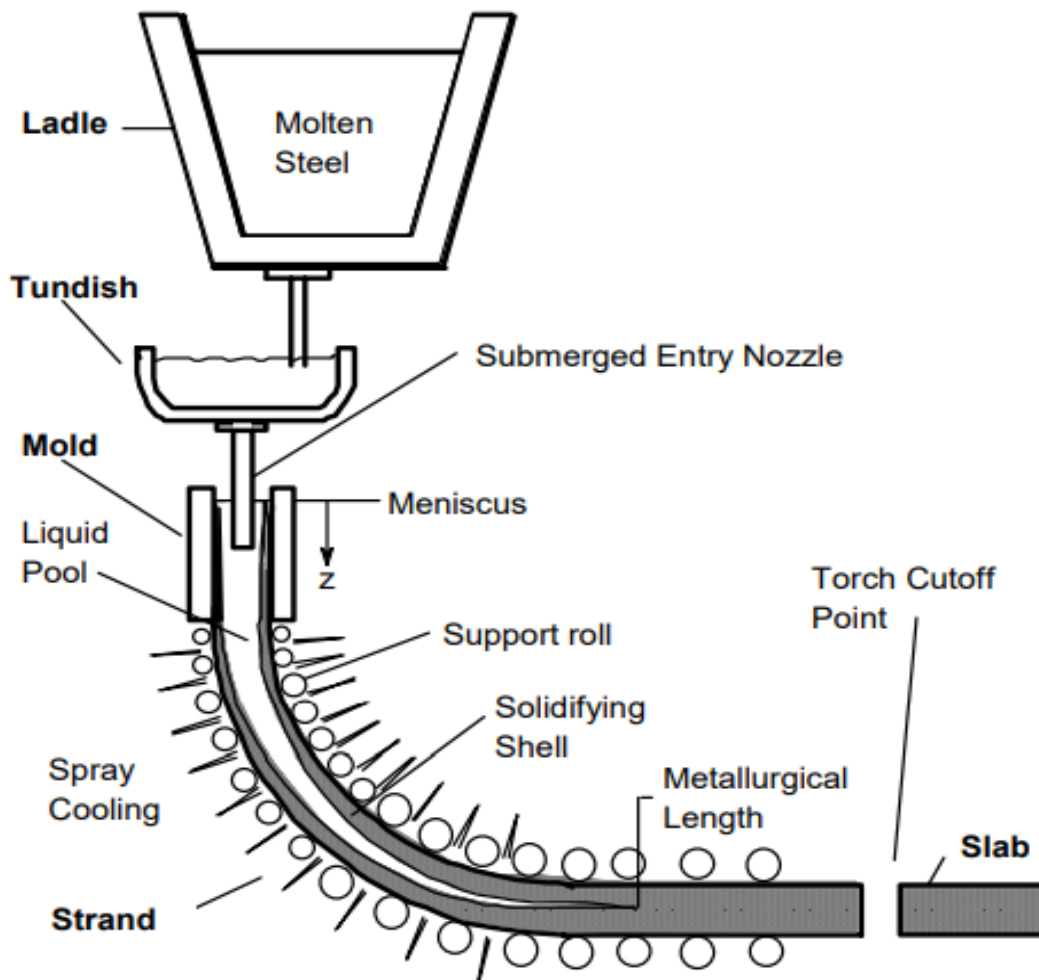


Fig 3.16: Continuous Casting Machine

Working Principle

In the continuous casting process, molten steel flows from a ladle, through a tundish into the mould. It should be protected from exposure to air by a slag cover over each



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

vessel and by ceramic nozzles between vessels. Once in the mould, the molten steel freezes against the water-cooled copper mould walls to form a solid shell. Drive rolls lower in the machine continuously withdraw the shell from the mould at a rate or “casting speed” that matches the flow of incoming metal, so the process ideally runs in a steady-state. Below the mould exit, the solidifying steel shell acts as a container to support the remaining liquid. Rolls support the steel to minimize bulging due to the ferrostatic pressure. Water and air mist spray cool the surface of the strand between rolls to maintain its surface temperature until the molten core is solid. After the center is completely solid (at the “metallurgical length”) the strand can be torch cut into slabs.

Transfer of Liquid Steel:

There are two steps involved in transfer (or demand) from the ladle to the moulds.

- The steel must be transferred (or teemed) from the ladle to the tundish.
- The steel is transferred from the tundish to the moulds.

a) Tundish

Tundish is a refractory-lined vessel. Liquid steel is usually tapped from the ladle into the tundish. The stream is shrouded as it enters from ladle to tundish. The functions of the tundish are:

- The reservoir of molten steel
- Distributor
- Inclusion removal

(i) The reservoir of molten steel:

Tundish acts as a reservoir for molten steel. It supplies molten steel in presence of a slag cover to all continuous casting moulds constantly and continuously at a constant steel flow rate. The flow rate is maintained constant by maintaining a constant steel bath height in the tundish through teeming of molten steel from the ladle. The number of moulds is 2 strands for Billets casting machines. During sequence casting and ladle change over periods, the tundish supplies molten steel to the moulds.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

(ii) Distributor:

Tundish distributes molten steel to different moulds of the continuous casting machine at constant flow rate and superheats which is required for stand similarly concerning solidification microstructure. Control of superheat is required in all the moulds to reduce break-out. The location of the ladles stream in the tundish is symmetric to the center of the tundish which is depending on the number of moulds. For 2 strands of tundishes, a ladle stream is at the center of the tundish.

(iii) Inclusion removal:

Tundish helps to remove inclusions during the process of continuous casting. The whole idea is to utilize the residence time available before steel leaves the tundish. During the average residence time., inclusion removal can be exercised. For this purpose, flow of steel melt in the tundish has to be modified to accelerate the inclusion removal. The Inclusion removal is a two-step unit operation, namely floatation and absorption by a flux added on the surface of the tundish.

b) Mould:

Mould is the heart of continuous casting. In the water-cooled mould, the molten stream enters from the tundish into a mould in presence of flux through the submerged nozzle immersed in the liquid steel. The solidification of steel begins in the mould. The casting powder is added onto the top of molten steel in the mould. It melts and penetrates between the surface of the mould and the solidifying strand to minimize friction. Control of the height of molten steel in the mould is crucial for the success of the continuous casting machine. The solidification begins from the meniscus of steel level in the mould. Mould level sensors are used to control the meniscus level in the mould.

The flux melts and enters into the gap between the mould surface and solidified strand. Moulds are made of copper alloys. Small amounts of alloying elements are added to increase the strength. Mould is tapered to reduce the air gap formation. Taper is typically 1% of the mould length. The mould is oscillated up and down to withdraw the partially solidified strand. The oscillated frequency can be varied. Steel level in the



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

mould is controlled, that is the meniscus for smooth caster operation. Sensors are used to control the meniscus level.

The functions of mould flux are.

- Inclusion absorption capability.
- Prevention of oxidation.
- Minimization of heat losses.
- Flux on melting enters into the air gap and provides lubrication.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

SPONGE IRON (993,128 TPA),
HOT METAL (808,469 TPA)
LIME (165,000 TPA)
FERRO ALLOYS (45,000 TPA)

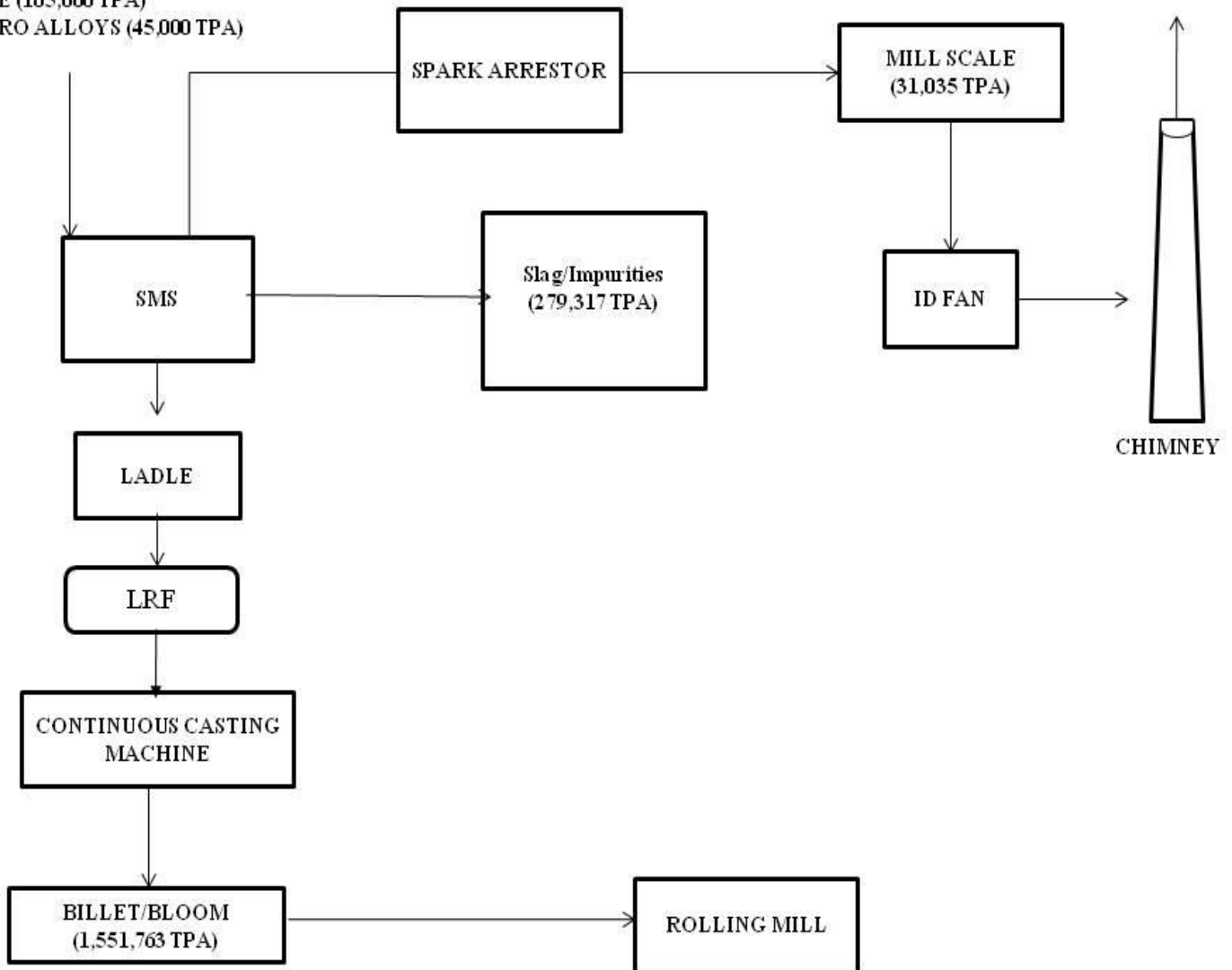


Fig 3.17: Process flow chart of SMS



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description – Rolling Mill**

Magnitude of Operation

Existing capacity of Rolling Mill – 2,00,000 TPA & Proposed capacity of Rolling Mill – 13,00,000 TPA

Total capacity of Rolling Mill – 15,00,000 TPA (No. of working days/annum – 330 and working hours/day – 20 hrs)

Utilisation of 15,51,763 TPA Billet for production of 15,00,000 TPA Rolled Products.

15,00,000 TPA (100%) Rolled products will be sold in market.

There is one existing Reheating furnace of 40 TPH. And two reheating furnace of 50 TPH & 150 TPH has been proposed in the expansion.

Rolling is the process of plastically deforming metal by passing it between rolls. It is the process of reducing the thickness or changing the cross-section of a long work piece by compressive forces applied through a set of rolls rotating in the opposite direction. The rolling operation takes a solid piece of metal and breaks it down successively in several steps into different shapes such as flats, rounds, and sections etc. During rolling, metal is subjected to high compressive stresses as a result of the friction between the roll and the metal surface. The billets charging will pass through mechanical pusher type and be pushed into the rolling mill.

Rolling Mill process involves:

- **Hot Charging**

As part of a continuous effort to reduce costs, increasing the ratio for direct and indirect slabs hot charging is an important process. This process consists of charging casted slabs in the rolling mill's reheating furnaces while they are still hot, which allows for substantial energy savings as well as reduced inventory and slab handling costs.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

▪ **Roughing Strand**

The steel roughing rolling mill stands are used to reduce the thickness of the steel while at the same time extending the overall length. Steel Roughing rolling mill stand is an important part of a work stand, a rolling bearing chock and roller adjustment device is installed on the frame. Mill stand bears rolling force, must have sufficient strength and rigidity.

▪ **Intermediate Strand**

Intermediate rolling mill between a roughing mill and a finishing mill is which can further roll billet into finished products or provide billet for finishing rolling. The intermediate rolling mill consists of a roll, a rolling mill arch, a bearing package, a bearing, a work table, a rolling guide, a rail seat, a roll adjusting device, an upper roll balancing device, and a roll changing device. This unit is a high stiffness short stress line mill. The roll body processes multiple passes and changes new passes according to the wear of passes. When the rolling mill is running, the clamping cylinder clamps the moving rail base, and after opening the clamping cylinder, the moving cylinder pushes the moving rail base to the outermost side. After opening the hydraulic coupling pin, it can be hoisted out to replace the roll system.

▪ **Water Box**

A water box is used to cool hot rolled products in a rolling mill. The water box includes a base structure supporting a removable manifold, and a plurality of nozzles removable mounted on and in fluid communication with the manifold. The nozzles are lined with inserts which may be replaced when worn. The manifold is reversible end to end, as are the nozzles, thus enabling the water box to be used on rolling lines.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

▪ **Cooling Bed**

The finished product is moved into Twin Channel with an automatic cooling bed. The finished product is evacuated from the cooling bed with the help of Run out Conveyors and then cut into the required length with the help of a cold shearing machine.

▪ **Shear Cutter**

Used in hot steel rolling mill plants for cutting off the end of the angle, the processed curving edge can be trimmed by the square roller from the top and bottom at the same time, the straight line can also be trimmed by the linear gauge from the top and bottom at the same time with fine brightness and smoothness.

The casing is pre-stressed to prevent separation of casing parting surfaces on load during the milliseconds when the cut is executed. The cutter ends are involutes profiled at ends. The cutters engage before the bar touches the cutting edge, eliminating the possibility of erroneous blade overlap.

▪ **Inspection & Dispatch**

The product is finally moved to the Finished Product Storage area with the help of an overhead crane. During rolling, inspection will be carried out for dimensional accuracy of the finished product. Gauges will be made for different sections and sizes. There will be a go-no-go gauge for online checking. After final inspection material will be ready for dispatch.

▪ **Reheating Furnace**

Reheating furnaces are used in hot rolling mills to heat the Billets to the rolling temperatures of around 1200°C which is suitable for plastic deformation of steel and hence for rolling in the mill. The heating process in a reheating furnace is a continuous process where the steel stock is charged at the furnace entrance, heated in the furnace,



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

and discharged at the furnace exit. Heat is transferred to the steel stock during its traverse through the furnace mainly using convection and radiation from the burner gases and the furnace walls.

A reheating furnace, fired by Furnace Oil/ Blast furnace gas at 67,000 Nm³ will be used for breakdown of Hot charging system.

APCD Details (Rolling Mill & Reheating Furnace):

- Existing: 1 No. Stack attached to top and bottom of Oil fired furnace, Height: 65 m
- Proposed: 2 No. Stack attached to reheating furnace of 50 TPH & 150 TPH, Height: 65 m each



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.24: Material Balance for Existing Rolling Mill (2,00,000 TPA)

Input			Output		
Raw Material	Specific Consumption T/T of Product	Quantity (TPA)	Products	Specific Consumption T/T of Product	Quantity (TPA)
Semi Finished Product from EAF	1.042	2,08,333	Steel Products	1.000	2,00,000
			Scrap (End Cuts)	0.031	6,160
			Mill Scale	0.011	2,173
Total	1.042	2,08,333	Total	1.042	2,08,333

Table 3.25: Material Balance for Total Rolling Mill (15,00,000 TPA)

Input			Output		
Raw Material	Specific Consumption T/T of Product	Quantity (TPA)	Products	Specific Consumption T/T of Product	Quantity (TPA)
Semi Finished Product from EAF & EOF	1.034	15,51,763	Steel Products	1.000	15,00,000
			Scrap (End Cuts)	0.025	37,963
			Mill Scale	0.009	13,800
Total	1.034	15,51,763	Total	1.034	15,51,763



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

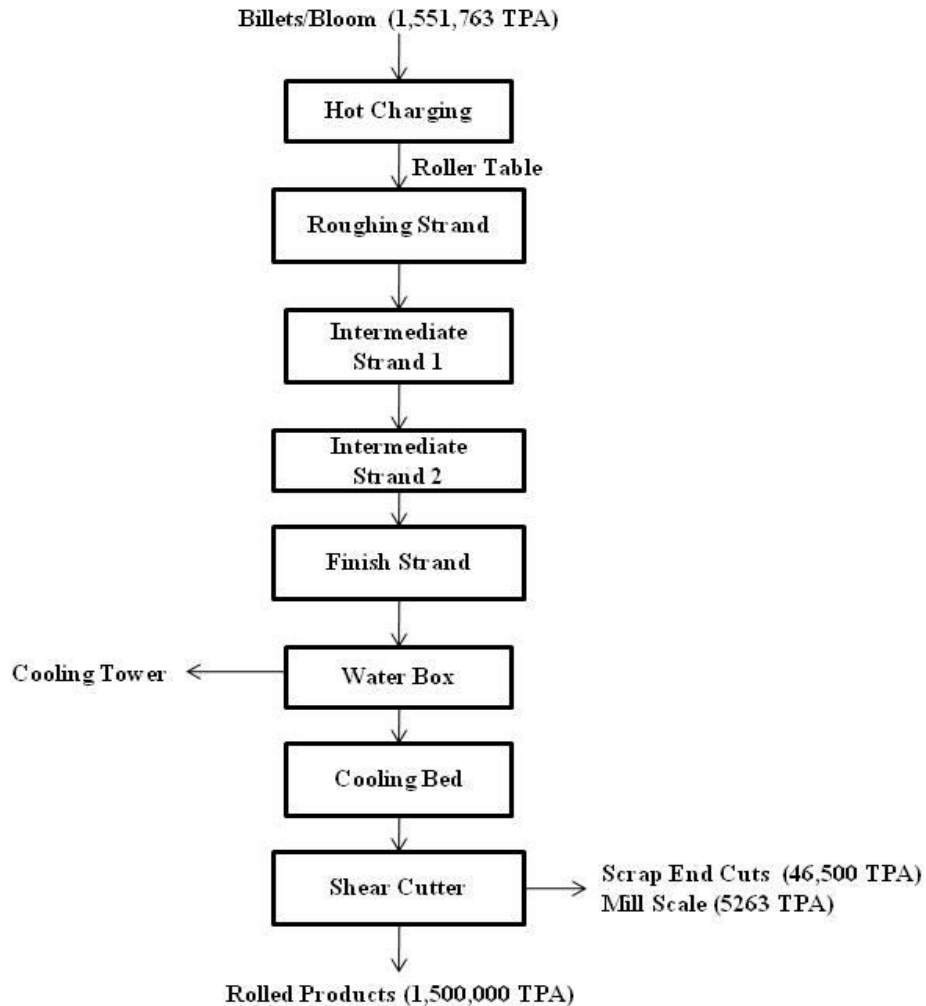


Fig 3.18: Process Flow Chart – Rolling Mill



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description – Coal Washery**

Magnitude of Operation

Existing production of Coal Washery – 1.0 MTPA (throughput); Output - 0.92 MTPA (0.42 MTPA concentrate & 0.5 MTPA middlings)

0.39 MTPA clean coal for DRI Plant, 0.03 MTPA clean coal for Pellet & 0.5 MTPA middlings for feeding into Power Plant along with 0.08 MTPA waste comprising shale.

Additional coal to be purchased: 8,29,860 TPA (6,12,285 TPA coal for Boiler, 1,90,575 TPA coal for Blast Furnace, 18,000 TPA coal for Pellet, & 9,000 TPA coal for Ferro Alloy Plant).

Coal Washing is a process of separation mainly based on difference in specific gravity of coal and associated impurities like shale, sand and stones etc so that we get relatively pure coal with lower ash content required for DRI Kilns. Coal washing separates noncombustible material from useful combustible material. Coal washing uses gravity separation, flotation and a technology, which uses dense media. ASL has already installed Coal washery of 1.0 million ton per annum capacity.

The coal available from Talcher area has substantial fraction of Near Gravity Material in addition to high ash content and therefore washery technology should be such that it provides finer cut of washing at desired ash level with minimum misplacement. Accordingly, heavy media separation technology has been adopted. The technology offers flexibility in the sense that clean coal of any ash percentage can be achieved by varying the media density. Also the process gives better yield compared to other processes.

Process Description



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Coal preparation conventionally involves the cleaning of coal by the separation of coal-rich from mineral-matter-rich particles in different size ranges. Typically, the processes employed include:

- **Raw Coal Pre-Treatment**

Run-of-Mine (ROM) coal, characteristically, is of variable size, moisture and ash content, with differing amounts and types of other contamination from the mining operation. Raw coal pre-treatment has focused on ROM screening for dry fines extraction and application of improved crushing technology.

- **Coal Cleaning & Sizing**

For coal cleaning, two main separating principles pre-dominate:

- I. Separation based on differences in relative density (RD) between coal and associated mineral matter; pure coal has an RD of ~1.3 and associated mineral matter commonly has an RD of > 2.2
- II. Separation based on differences in surface properties between coal and associated mineral matter; coal is hydrophobic, whilst associated mineral matter is generally hydrophilic.

Coal cleaning methods are often categorized by the coal size range for which they are designed, i.e. coarse coal, small coal, fine coal, and ultrafine coal.

- **Coal Dewatering**

The HM cyclone pump shall pump the raw coal (20 - 1) mm along with the heavy media to the HM cyclone for beneficiation. The HM cyclone shall separate the coal into 2 products i.e. clean coal and pumping.

The clean coal (20-1) mm shall be fed to the de-pulping & rinsing screen [with aperture of 1mm for de-pulping & rinsing] for cleans through sieve bends. The overflow of the de-



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

pulping & rinsing screen (20 – 1) mm shall be fed to the vibrating screen basket centrifuge for final dewatering & shall finally fed to the outgoing clean coal belt conveyor.

The underflow from the 1st compartment of the de-pulping & rinsing screen shall be fed to the HM cyclone sump and the underflow from the 2nd compartment of the de-pulping & rinsing screen shall be fed to the dilute media sump.

The middling (20-1) mm shall be fed to the de-pulping & rinsing screen for middling through sieve bends. The overflow of the de-pulping & rinsing screen (20 – 1) mm shall be fed to the vibrating screen basket centrifuge for final dewatering & shall finally fed to the outgoing middling transfer belt conveyor for onward processing.

The underflow of 1st & 2nd compartments of middling de-pulping & rinsing screen shall be fed back to the HM cyclone sump & DM sump respectively. Process water from thickener in a required quantity shall be added in the clean coal & middling screen.

Water from the coal washery is not being discharged outside. The entire floor cleaning materials of the coal washery is collected in the ground floor sump in the form of slurry. The slurry is pumped back in the prime reject screen from where coal and magnetite is separated. Thus, close circuit system has been adopted.

Surface run-off water from coal washery will go to surface run-off treatment system and the treated water will be again reused back in the system.

Surface Pit coal fines shall be collected & reutilized back in the process after drying.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.26: Material Balance of Existing Coal Washery (10,00,000 TPA)

Input			Output		
Raw Material	Specific Consumption T/T of Product	Quantity (TPA)	Products	Specific Consumption T/T of Product	Quantity (TPA)
Coal	1.08	10,00,000	Clean Coal	0.45	4,20,000
			Middlings	0.55	5,00,000
			Waste	0.08	80,000
Total	1.08	10,00,000	Total	1.08	10,00,000



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

• **Process Description – Coke Oven Plant (Non-Recovery Type)**

Proposed Plant Capacity: 1 x 0.2 MTPA & 1 x 0.3 MTPA; Total – 0.5 MTPA;

Utilization of 6,75,000 TPA Coking Coal for Production of 5,00,000 TPA Coke.

4,82,790 TPA coke will be used in Blast Furnace and rest 17,210 TPA coke will be used in Ferro Alloy Plant.

Additional 14,290 TPA Coke will be purchased for use in Ferro Alloy Plant.

Table 3.27: Configuration Details

Description	Unit	Configuration
Coke Oven Batteries	Nos.	4 x 50,000 TPA
		4 x 75,000 TPA
Working days	Days/annum	365
Working hours	Hours/day	24
Production	TPA	2,00,000
		3,00,000
		Total 5,00,000

Coke Oven Plants

The coke making process involves carbonization of coal to high temperatures (1100°C) in an oxygen deficient atmosphere in order to concentrate the carbon. There are two commercial coke making processes- a) By-product Coke making b) Non-Recovery/Heat Recovery Coke making.

By-product coke production

Majority of coke production in the world is from by-product coke oven batteries. The coke making operation comprises the following steps:

- Coal from different mines is blended, pulverised and oiled. The blended coal is charged into a number of slot type ovens.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- Coal carbonized in reducing atmosphere and the off-gas is collected and sent to the by-product plant.

Non-recovery coke oven technology:

Non-recovery coke plants, originally referred to as beehive ovens, have large oven chambers. The carbonization process takes place from the top by radiant heat transfer and from the bottom by conduction.

Primary air for combustion is introduced into the oven chamber through several ports located above the charge level in both pusher and coke side doors of the oven. Combusted gases exit through common tunnel via a stack which creates natural draft. Since by-products are not recovered, the process is called Non-Recovery Coke making.

The waste gas is fed into a waste heat recovery boiler to convert waste heat into steam for power generation; hence, the process is also called Heat Recovery Coke making.

The non-recovery coke ovens are considered eco-friendly in comparison to recovery type. It is less capital intensive and has short construction periods. Main features are:

- Energy of carbonization is supplied by burning the gaseous volatile products released from the coal charge during carbonization.
- Heat generated by the combustion of the volatile matter, produces high temperature zone in the free space above the coal charge. This radiates back into the coal charge downwards.
- The products of combustion are drawn through the various points in the oven arch and passed through side wall off-take flues into a series of sole flues located below the oven floor.
- Application of heat takes place from above, sides and below the charge. Temperature at the point where burning gases are drawn into the side off take ports is of the order of 1200°C.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Manufacturing Process

Raw coal will be crushed in a crusher into powdered form and charged in the oven for carbonization. The volatile matter in raw coal gets released in the form of gas and gets burnt in the oven as well as in the flues. After the completion of the carbonization process, raw coal gets converted to coke within 36 to 38 hours. The coke is then pushed out from the oven and quenched by water. Coke will be utilized in BF and sinter plant.

The hot quenching water is continuously collected into a settling tank & the coke particles are also being carried out upto the settling tank with water. These particles are allowed to be settled below the settling tank and then the water almost free from suspended is allowed to be again used for the purpose of quenching of hot coke mass. Time to time the settled particles are reclaimed and these have the large demand in mini cement plants, briquetting plants etc.

Non-recovery type coke ovens

The proposed non-recovery coke ovens have been specially developed based on the imported coking coal with a volatile matter content in the range of 20%-24%. Moisture control of coal is important as it has direct bearing on the carbonization rate & bulk density of coal.

Non-recovery coke ovens are capable of producing coke of large size, strong, dense & abrasion resistant, the coarse mosaic micro-structure, low porosity during carbonization and development of minor crack result in low reactivity, strength in high temperature, stability and superior post reaction strength.

The ovens are unique in that, no external heat source is required. All the energy in carbonization is supplied by burning the gaseous volatile products released from the coal charge during carbonization.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Advantages of Non-Recovery Coke Oven

- Low Capital cost; low operating and maintenance cost; and hence low cost per ton of coke conversion.
- High coke yield and flexibility of operation; No external heating required
- Heat transfer is in vertical direction against horizontal as in case of by-product or recovery type oven design
- Exhaust flue gas can be utilized for power generation.
- No effluent discharge, all volatiles are fully burnt resulting in clean flue gas with minimal environmental impact.
- Ovens of non-recovery type are being operated under negative pressure to avoid any explosion during operation and to prevent pollution.
- Extensive flue system ensuring complete combustion of all hydrocarbons leaving a clean stack gas within permissible limit.

Non-Recovery Coke Oven Plant shall comprise of:

- a) Coal Storage & Handling System
- b) Coal Proportioning & Blending System
- c) Coal Crushing System
- d) Coal Stamping System
- e) Coke Oven Batteries
- f) Coke Quenching System
- g) Product Screening System
- h) Waste Heat Recovery Boiler
- i) In-plant De-dusting System
- j) Industrial Water System
- k) Plant & Instrumentation Air System
- l) Fuel Oil System for heating during starting
- m) Electrical Supply & Distribution System
- n) Emergency D.G. Power Supply System



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Based on requirement, the raw materials required are:

- Hard Coking Coal
- Semi Hard Coal
- Semi Soft Coal

Table 3.28: Coke Product Analysis (Typical)

	25-75 mm
Ash Content	≤12.5%
Volatile Matter	≤1%
Moisture	4-6%
S	≤0.6%
CSR	≥58%
CRI	≤25%
Tumbler Index	
M ₄₀	≥85%
M ₁₀	≤7%
Size -	
> 70 mm	20%
20-70 mm	70%
10-20 mm	4%
< 10 mm	6%

Waste Heat Recovery Boiler & Power Plant

The average power production is as follows:

- ✓ 0.2 MTPA COP : 15 MW
- ✓ 0.3 MTPA COP : 22 MW

The plant shall have two (2) sets of WHR Boiler, an ID Fan and a Chimney.

Particulate Matter in exhaust gases is < 50 mg/Nm³.

APCD Details:

Flare stack 1 no., height 45 m.

Chimney 1 no., height 45 m.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

**Table 3.29: Material Balance of Proposed Coke Oven Plant (Non-Recovery Type)
(5,00,000 TPA)**

Input			Output		
Raw Material	Specific Consumption	Quantity (TPA)	Product	Specific Generation	Quantity (TPA)
Coking Coal	1.35	6,75,000	Coke	1.00	5,00,000
			Ignition Losses	0.35	1,75,000
TOTAL	1.35	6,75,000	TOTAL	1.35	6,75,000



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

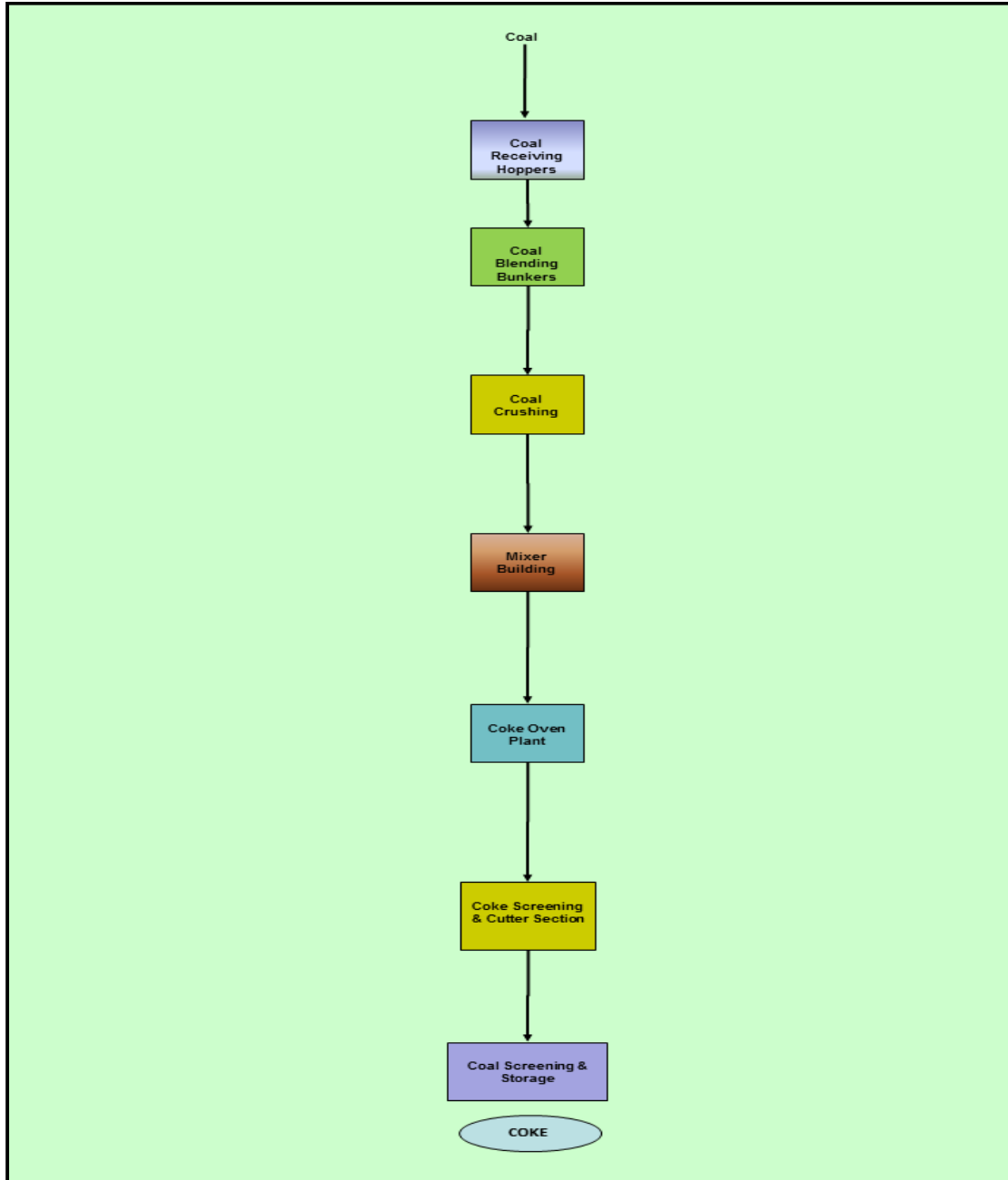


Fig 3.19: Process Flow Chart – Coke Oven Plant (Non-Recovery Type)



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description – Chrome Ore Briquetting Plant**

Magnitude of Operation:

To utilize ore fines, 1 No. 25 TPH Briquette Plant is already installed and one additional plant of identical capacity is proposed to be added. (No. of working days/annum – 330 and working hours/day in 3-shift operation – 18 to 19 Hrs in average).

Utilization of Chrome ore for production of 3,00,000 TPA Briquettes.

3,00,000 TPA Briquettes will be used (100% in-house consumption) in Ferro Alloy Plant

Most of the ores are available in the shape of fines. Chrome ore being friable, it is compulsory to process it into briquettes before charging to the furnaces.

Briquetting Process

Briquettes are made in the Briquetting Press mixed with suitable binder (generally molasses) & lime powder so that optimum and efficient use of the Furnace capacity can be achieved.

Ore fines are fed into the Ground Hopper by a grab bucket/Mobile equipment. Vibrating Feeder with Slide Gate is used below the Ground Hopper for smooth flowing of the material. Then the material goes to the Double Deck Vibrating Screen through a Belt Conveyor. The Oversize Material after screening is deposited in a separate space by a Discharge Chute and the desired size material goes to the Dryer after weighing by Weigh Feeder. The wet material is dried and the moisture comes down below 2%. Then the dry material is stored in the day bin through a belt Conveyor. In the Lime section, the lime is stored in a bin through another belt Conveyor. The lime and ore fines are fed into a common conveyor and the mixed material are put into the Mixer through a conveyor. The Molasses which comes from Agitator Tank and Water Molasses Mixed Tank are also put into the same Mixer. Molasses and water are used as binder. The



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

mixed material is put into the Briquetting Press through a gravity chute where the briquettes form and the same go to the Vibrating Screen for Screening. The desired size briquettes are stored in the finished product yard by using a Tripper type Stack and the under sized materials are recycled through a Belt Conveyor.

APCD Details:

Existing: 1 no. common stack attached to bag filter connected in dryer (Height: 30m)

Proposed: 1 no. common stack attached to bag filter connected in dryer (Height: 30m)



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.30: Material Balance for Existing Briquetting Plant (1,50,000 TPA)

Input			Output		
Raw Material	Specific Consumption	Quantity (TPA)	Product	Specific Consumption	Quantity (TPA)
Chrome Ore fines	0.94	1,41,000	Briquettes	1	1,50,000
Limestone	0.03	4,500	LOI	0.065	9,750
Molasses	0.06	9,000			
Bag Filter Dust from Chrome Plant	0.025	3,750			
Flue gas cleaning residue	0.01	1,500			
Total	1.065	1,59,750	Total	1.065	1,59,750

Table 3.31: Material Balance for Total Briquetting Plant (3,00,000 TPA)

Input			Output		
Raw Material	Specific Consumption	Quantity (TPA)	Product	Specific Consumption	Quantity (TPA)
Chrome Ore fines	0.94	2,82,000	Briquettes	1	3,00,000
Limestone	0.03	9,000	LOI	0.065	19,500
Molasses	0.06	18,000			
Bag Filter Dust from Chrome Plant	0.025	7,500			
Flue gas cleaning residue	0.01	3,000			
Total	1.065	3,19,500	Total	1.065	3,19,500



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

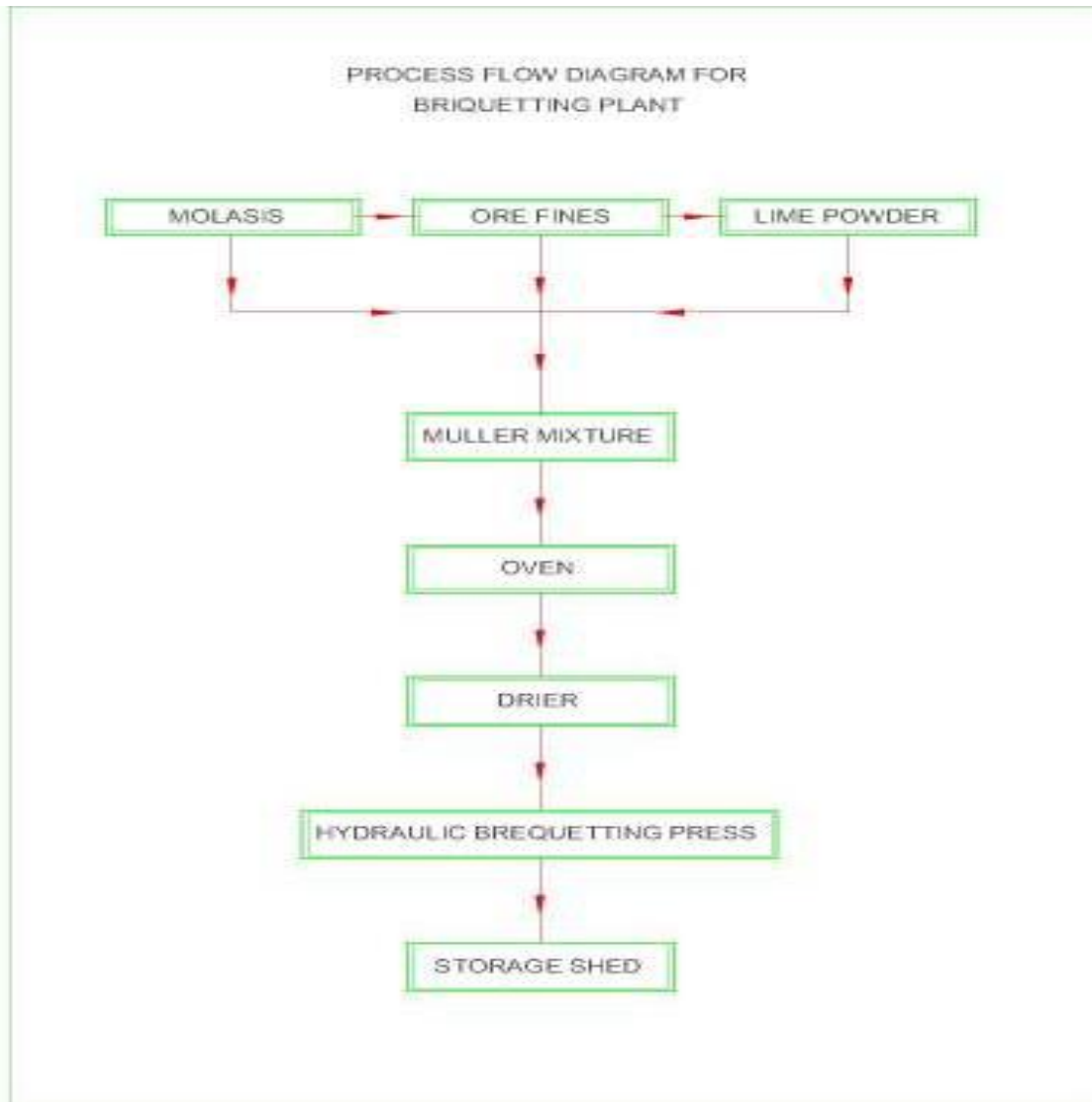


Fig 3.20: Process Flow Diagram for Briquetting Plant



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description – Ferro Alloy Plant**

Magnitude & Operation:

Utilization of 3,00,000 TPA briquettes & 50,000 TPA Chrome ore lumps for production of 1,25,000 TPA Ferro Chrome.

45,000 TPA Ferro alloy will be used in Steel Melting Shop & rest 80,000 TPA will be sold in market.

Table 3.32: Configuration details

Description	Unit	Existing Configuration	Proposed Configuration
Sub-merged Arc Furnace (SAF)	MVA	2 x 9	2 x 18
	MVA	1 x 18	
No. of working days	Days/annum	330	345
No. of working hours	Hours/day	24	24
Production	TPA	50,000	75,000
Total Production	TPA	1,25,000	

SAF Unit shall comprise of:

- **Furnace Shell**

Cylindrical casing and bottom are constructed from thick plates and rolled steel sections. Heavy stiffener rings and flats are provided to ensure the maintenance of the shell shape during operation and in spite of high thermal and mechanical stresses. Two spouts at the hearth level are attached to the shell for tapping purpose.

- **Furnace Roof**

The roof is hexagonal with side panels and 6 doors. The inside delta section is in stainless steel and should be adjustable for changing over to Fe-Mn production, while the outer panels are Mild Steel. The roof is hung with round hangers from floor beams.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

▪ **Furnace Stack**

Connecting ducts with a chimney is provided for the furnace gas to the pollution control system. The chimney shall be designed as required by the pollution control authority's rules & regulations. Chimney is completely insulated from the furnace hood.

▪ **Upper Electrode Column**

i) Electrode Slipping Mechanism

Electrode slipping device is provided for each electrode. This facilitates slipping the electrode downwards when the length of electrode is reduced due to consumption in operation. The slipping mechanism is two-ring type and operates on hydraulic force.

ii) Electrode Lifting

The electrodes are regulated by means of hydraulic cylinders. Synchronized motion between the two hydraulic cylinders per electrode will regulate the electrode in upward and downward motion for optimum penetration in the charge. The position of the electrode stroke is recorded through a sensor and monitored from control desk in the furnace control room.

iii) Electrode Slipping & Clamping

This consists of the upper ring and lower ring electrode slipping device with special friction bands which provide efficient grip on to the electrode casing.

Clamping is done by virtue of specially designed double spring's while slipping action is controlled by double acting hydraulic cylinders. Two such clamping rings are mounted on each electrode. The gripping force is uniform and prevents deformation of the casing.

De-clamping of pads is done by single acting hydraulic cylinders. The entire slipping sequence is monitored and automated from the main control desk. In an unlikely



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

occurrence of failure of hoisting cylinders, the electrodes will stay clamped with these specially designed always-clamped springs.

iv) Suspension Frame

Three sets of fabricated suspension mantle are duly assembled for provision of mantle cooling blowers. The frame houses the support for the hoisting cylinders for electrode regulation.

v) Suspension Mantle

Suspension mantle is in 2 parts. The upper and lower mantle is in MS material while a small section of the lower half is fabricated with SS 304 - which surrounds the electrode. The bottom flange of the mantle holds contact shoes. The clamps and brackets required for the SS risers are fitted on the mantle.

APCD Details:

Existing: 2 No. Stack attached to GCP of FAP (Height: 40 m)

Proposed: 2 No. Stack attached to GCP of FAP (Height: 40 m)



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.33: Material Balance of Existing FAP (50,000 TPA)

Input			Output		
Raw Material	Specific Consumption	Quantity (TPA)	Product	Specific Generation	Quantity (TPA)
Chrome Ore Lumps	0.40	20,000	Fe-Cr	1.00	50,000
Briquettes	2.40	1,20,000	Slag	1.30	65,000
Met Coke	0.42	21,000	Bag Filter Dust from Chrome Plant	0.05	2,500
Coal	0.12	6,000	Flue Gas cleaning residue	0.02	1,000
Quartzite	0.22	11,000	LOI	1.19	59,500
TOTAL	3.56	1,78,000	TOTAL	3.56	1,78,000

Table 3.34: Material Balance of Total FAP (1,25,000 TPA)

Input			Output		
Raw Material	Specific Consumption	Quantity (TPA)	Product	Specific Generation	Quantity (TPA)
Chrome Ore Lumps	0.40	50,000	Fe-Cr	1.00	1,25,000
Briquettes	2.40	3,00,000	Slag	1.30	1,62,500
Met Coke	0.42	52,500	Bag Filter Dust from Chrome Plant	0.05	6,250
Coal	0.12	15,000	Flue Gas cleaning residue	0.02	2,500
Quartzite	0.22	27,500	LOI	1.19	1,48,750
TOTAL	3.56	4,45,000	TOTAL	3.56	4,45,000



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description – Captive Power Plant**

Magnitude of Operation

Power Plant	Existing Configuration	Proposed Configuration
WHRB (DRI Based)	2 x 10 MW	-
WHRB (Coke Oven Based)	-	1 x 15 MW 1 x 22 MW
CFBC	1 x 50 MW	1 x 50 MW 1 x 28 MW
AFBC	1 x 30 MW	-
No. of working days/annum	330	330
No. of working hours/day	24	24
Sub-Total	100 MW	115 MW
Total	215 MW	

Captive Power Plant

Integrated steel plants usually provide a part of their electric power requirements with their own generating equipment, the power being produced using by-product fuels. Due to the large amount of power required by the mills and the concentration of this load, electrical power may be furnished by plant generation, by purchase from outside utilities or by a combination of the two.

In integrated steels plant, from DRI both hot flue gases with temp 900 to 1000 Deg C having high heat value and Char having GCV 1500-2500 Kcal/Kg are generated as by products. The high heat value of by product flue gases are utilised for steam generation in waste heat recovery Boilers and By product Char generated is utilised as partial fuel in AFBC/CFBC Boiler for generation of steam. Steam generated from WHRB and AFBC/CFBC Boiler are fed to Steam Turbo Generator for electric power generation which is distributed in plants for operation of equipments.

The selection of Boilers and turbo generators are selected / designed as per the availability of waste or by product fuels and the required electric power demand.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Existing DRI capacity is 2 X 500 TPD i.e a sum of 1000 TPD. From the 1000 TPD DRI by product waste hot flue gases, approximately 106.5 TPH steam can be generated in WHRB.

Existing DRI capacity is 2 X 500 TPD i.e a sum of 1000 TPD. From the 1000 TPD DRI , approximately 9.47 TPH by product Char having GCV 1500 to 2500 Kcal/Kg may be generated which can be used as partial fuel in AFBC/CFBC Boiler to generate steam.

For utilization of waste heat of hot flue gases and waste by product char from existing 2 X 500 TPD (500 TPD + 500 TPD) DRI, 02 nos. of WHRB, 02 nos. of AFBC Boilers and 02 nos. of Steam Turbo Generators has been installed. Details are as follows,

Table 3.35: STG (Existing and Proposed)

STG Existing					STG Proposed			
Sl. No.	Capacity in MW	WHRB (MW)	CFBC (MW)	AFBC (MW)	Sl. No.	Capacity in MW	WHRB (MW)	CFBC (MW)
STG - 1	50		50		STG -3	50		50
STG - 2	40	2x10		1x30	STG -4	15	15	
					STG -5	38		28 from CFBC + 10 from existing Boilers
					STG -6	22	22	
Total	90 MW				125 MW			

Table 3.36: Boilers in TPH

Sl. No.	Boiler Existing			Boiler Proposed		
	Capacity in TPH	WHRB TPH	CFBC/AFBC TPH	Capacity in TPH	WHRB (TPH)	CFBC (TPH)
1	252	52	200	200		200
2	169.5	54.5	115	63	63	



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

3			118		118
4			92	92	
Total	421.5 TPH		473 TPH		

S. No.	Description	Unit	Remarks	
A	General			
1.	Type of Boiler		CFBC Boiler	
2.	Type of circulation		Natural Circulation	
4.	No. of Boilers		One	
5.	Boiler design code		IBR 1950 with its latest amendments	
B	Boiler Predicted Performance			
1.	Boiler Capacity (MCR)	kg/hr	200,000	118,000
3.	Steam temperature at superheater outlet	°C	540 ± 5	540 ± 5
4.	Steam pressure at super heater outlet	Kg/cm ² (g)	98	98
5.	Feed water temperature at De- aerator outlet / Economiser inlet	°C	125	125
6.	Excess air	%	20	20
7.	Boiler efficiency based on G.C.V (Boiler will be designed to cater upto 35% char)	%	80±1% : 65% Indian coal	80±1% : 65% Indian coal
8.	Dust handling system ESP	Mg/ Nm ³	30	30



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Considering the availability of waste heat from coke oven of 4 x 50,000 TPA & 4 x 75,000 TPA, steam generation will be approx. 63 TPH & 92 TPH and the power generation will be 15 MW & 22 MW (two nos steam turbo generator from WHRB) respectively and based on plant electricity requirement two nos. CFBC Boilers and two nos. steam turbo generator having following specification are proposed.

STEAM GENERATOR:

Circulating Fluidised Bed Combustion Boiler:-

Table 3.37: CFBC Boiler details

Parameter	Unit	CFBC #3	CFBC # 4
Maximum continuous rating	TPH	200	118
Steam Pressure at main steam Stop valve outlet	kg/cm ² (G)	98	98
Steam temperature at main steam Stop valve outlet.	Deg C	540 +/-5	540 +/-5
Feed water temperature at Deaerator outlet / economizer inlet	Deg C	125	125
Flue gas temperature at Air heater outlet	Deg C	140±5	140±5

Waste Heat Recovery Boiler

S. No.	Description	Unit	WHRB # 3	WHRB # 4
01	No. and ratings	Nos.		One (1)
02	Type of Boiler			Waste Heat Recovery Boiler (WHRB)
03	Boiler Capacity (MCR)	kg/hr	63,000	92,000



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

04	Peak Capacity of Boiler for 30 mins in 8 hours	%	110	110
05	Steam temperature at superheater outlet	°C	540 ± 5	540 ± 5
06	Steam pressure at super heater outlet	Kg/cm ² (g)	98	98
07	Feed water temperature at De-aerator outlet / Economiser inlet	°C	125	125
08	Dust handling system ESP (Coke oven based WHRB)	mg/ Nm ³	<50	<50

STEAM TURBO GENERATOR :

Table 3.38: Turbine details

Turbine Type	Steam Turbo Generator					
	40 MW	50 MW	38 MW	15 MW	50 MW	22 MW
Turbine Capacity	40 MW	50 MW	38 MW	15 MW	50 MW	22 MW
Inlet Steam Flow	169.5 TPH	252 TPH	118 TPH	63 TPH	200 TPH	92 TPH
Inlet steam pressure kg/Cm ²	87	94	87	87	87	87
Inlet steam temperature °C	510 +/- 5	535 +/- 5	510 +/- 5	510 +/- 5	510 +/- 5	510 +/- 5
a) Synchronous Generator:						
- output	40 MW	50 MW	38 MW	15 MW	50 MW	22 MW
Voltage, KV	11	11	11	11	11	11
- frequency	50	50	50	50	50	50
- phase	3	3	3	3	3	3



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Condenser cooling Type	Water Cooled	Water Cooled	Water Cooled	Water Cooled	Water Cooled	Water Cooled
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*Note: For generating 38 MW power, 42 TPH steam will be transferred from existing 252 TPH Boiler and finally it will be added to the outlet of 118 TPH Boiler.

Process Description:

Coal fines will be generated while processing ROM coal along with char from the Rotary Kiln. Hence to utilize the coal fines and char generated in the plant, power through CFBC Boilers is conceived. A total power requirement of 46 MW/Hour is proposed from CFBC. To feed to the boilers additional coal fines shall also be purchased from the open market.

This Process consists of:

- Boiler
- Air System
- Combustion Chamber
- Fuel and Ash Handling system
- Flue Gas System
- Water and Steam Circuit
- Coal Handling
- Turbine House
- DM Plant
- Utility
- Ash Silo
- Ash Handling



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

1. Waste Heat Recovery Boiler

Waste Heat Recovery Boiler is a system which recovers various kinds of waste heat generated from the production process of steel convert such recovered heat into useful and effective thermal energy.

Conditions of the origin of waste heat depend upon each kind of facility that discharges waste heat. Conditions like gas temperature, pressure, corrosiveness, dust content, etc vary depending on the conditions of each case. Therefore, the design and fabrication of waste heat recovery boiler require rich experience and technical capability.

2. AFBC Boiler:

When air or gas is passed through an inert bed of solid particles such as sand supported on a fine mesh or grid, the air initially will seek a path of least resistance and pass upward through the sand. With further increase in the velocity, the air bubbles through the bed and the particles attain a state of high turbulence. Under such conditions, the bed assumes the appearance of a fluid and exhibits the properties associated with a fluid and hence the name "Fluidised Bed".

Mechanism Of Fluidised Bed Combustion

If the bed material, in a fluidized state, is heated to the ignition temperature of the fuel and the fuel is injected continuously into the bed, the fuel will burn rapidly and the bed attains a uniform temperature due to effective mixing. This, in short is fluidized bed combustion.

While it is essential that temperature of bed should be at least equal to ignition temperature of fuel and it should never be allowed to approach ash fusion temperature (1050°C TO 1150°C) to avoid melting of ash. This is achieved by extracting heat from the bed by conductive and convective heat transfer through tubes immersed in the bed. If velocity is too low, fluidization will not occur and if the gas velocity becomes too high, the particles will be entrained in the gas stream and lost. Hence to sustain stable



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operation of the bed, it must be ensured that gas velocity is maintained between minimum fluidization velocity and particle entrainment velocity.

The "**AFBC Boiler**" is a fluidised bed boiler with the following features.

- a) Compartmentalized combustion chamber
- b) Under bed fuel feeding system
- c) Single drum water tube type.

The boiler is designed for **COAL and Char as** main fuel with a total capacity of **633TPH** at MCR.

3. Air System:

This system starts with FD fan to supply the required combustion air and impart energy for fluidization. FD fan is a centrifugal type, direct coupled fan. Ambient air from fan outlet is heated in air heater and heated air is distributed evenly to combustion chamber. Through compartmentalized air box. A part of combustion air is tapped from air heater outlet and further pressurized by a PA fan for pneumatic fuel feeding. PA fan is also of Centrifugal type, direct coupled fan. Air flow is measured using aerofoil meter.

4. Combustion Chamber:

The distributor plate is the heart of FBC system. It is made up of carbon steel base plate with air nozzles to distribute the fluidizing air from air box uniformly over the entire bed. Bed coils are immersed in the bed to maintain the bed temperature of 850-900°C by absorbing the heat through them. Sufficient free board volume is available above the bed to ensure complete combustion of fuel.

5. Fuel And Ash Handling System:

The fuel from bunker is fed pneumatically into the bed by drag chain feeder and mixing nozzles located below the bunker. The speed of fuel feeder can be adjusted with



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Variable frequency drive panel. The ash generated is collected at bed, economizer and air pre-heater zones.

6. Flue Gas System:

The hot flue gas generated from the combustion chamber is cooled by, passing through Water wall, radiant super heater, convection super heater, economizer and air heater. Balance draft is maintained by FD and ID fans. Flue gas is finally let into the atmosphere through the chimney.

7. Water and Steam Circuit:

The de-aerated water is stored in the de-aerator storage tank. The de-aerated water at 126°C is fed to the boiler feed pump where it is pressurized to the required boiler pressure. The feed water from feed pump passes through economizer and fed to steam drum. From steam drum the hot water enters into the bed coils, through down comers and further heated up. The steam water mixture then rises through the water wall panel tubes and enters into the steam drum through riser tubes.

From the steam drum, saturated steam enters into the convection super heater, and radiant super heater gets superheated. A de-super heater is provided in between the convection super heater and radiant super heater to control the steam outlet temperature. The de-super heater is of spray type. Steam outlet from main steam stop valve is taken to the turbine.

8. Coal Handling:

Coal unloading activity involves unloading coal from dumpers and trucks in a coal yard. Coal is fed to the coal bunker with the help of a conveyor belt, screen, and crusher.

9. Turbine House:

High temperature, high-pressure steam enters the turbine where heat energy is converted into kinetic energy. The turbine is directly coupled to an alternator where



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electricity is generated by the electromotive force produced. Steam is extracted for the process and heating water before feeding in a boiler from various extraction points in the turbine.

10. DM Plant:

Makeup water for the power cycle is Demineralised (DM) water. Make-up water is also added to the Deaerator. Feedwater to the Boilers is fed to one Boiler's MCR requirement) which shall take the suction from the Deaerator. The boilers are connected to the chimney.

Water Treatment: Regeneration water from DM Plant will be sent to neutralization pit where, it neutralized by adding acid/alkalis and the same is used in ash quenching after treatment.

Table 3.39: Water Quality Requirement For Single Drum Boilers Drum Operating Pressure (Kg/Cm²(G)) Above 60 Feed Water:

SPECIFIC ELECTRICAL CONDUCTIVITY AT 25°C		
MEASURED AFTER CATION EXCHANGER IN THE H+ FORM	ms/cm	0.5
AND AFTER CO ₂ REMOVAL.	ppm	0.01
TOTAL IRON	ppm	0.01
TOTAL COPPER	ppm	0.02
TOTAL SILICA	ppm	0.007
OXYGEN	ppm	0.01 - 0.02
HYDRAZINE RESIDUAL	ppm	8.8 - 9.2



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pH AT 25°C (COPPER ALLOY PRE-BOILER SYSTEM)	ppm	9.0 - 9.4
pH AT 25°C (COPPER FREE PRE-BOILER SYSTEM)		
PERMANGANATE	ppm	NIL
HARDNESS	ppm	NIL
TOTAL CO2	ppm	NIL
OIL		NOT ALLOWED
TOTAL DISSOLVED SOLIDS	Ppm	NOT MORE THAN 100
SPECIFIC ELECTRICAL CONDUCTIVITY AT 25°C	ms/cm	NOT MORE THAN 200
PHOSPHATE RESIDUAL	ppm	15 - 25
pH AT 25°C	ppm	9.8 - 10.2
SILICA		Silica level less than 0.02 ppm in steam leaving the drum

11. Utility:

Instrument air compressors are installed for the requirement of air at various control valves. A cooling tower with well-designed water distribution systems for removing heat from condenser, alternator, oil coolers, and at various fan bearing locations are



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provided. There will be a raw water reservoir for catering to raw water requirements.

12. Ash Silo:

In a typical fly ash handling system, the material that is generated as a result of combustion is captured by an electrostatic precipitator (ESP). In each ESP, there is an Ash hopper at the bottom of ESP which keeps storage of 16-24 hrs. For the different ash hopper, ash is conveyed to Ash Silo pneumatically or by compressed air. Ash silo is made up of cement with a storage capacity of 24 hrs. (2 number of silos used of capacity 200 Ton)

Ash is dispatched in 2 modes,

- 1) Dry fly ash generally goes to the cement industry and
- 2) Moist mode

For this ash, the conditioner is fitted at the bottom of the silo where generally ash is moist to 8-10 % and dispatched to fly ash for disposal or reuse.

13. Ash Handling:

The ash handling system envisages dry extraction and disposal of bottom ash and dry extraction for fly ash. The fly ash shall be extracted from the electrostatic precipitator hoppers and transported to the storage silo as a measure for promoting fly ash utilization. Closed ash silos will be provided with sufficient storage capacity so that handling is not an issue. Ash in silos will be unloaded to Browsers for further utilization by brick/cement industries.

Technical detail of captive power plant

Boiler Pressure Parts

The complete system of boiler pressure parts covers:

- Steam & water drums
- Furnace water wall & other circulating system components



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- Boiler bank system
- Superheated system
- Economizer system

Bed Material Specification:

Maximum particle size :	2.36 mm
Particles to pass through sieve No. :	8
Minimum particle size :	0.85 mm
Particles to stay on sieve No. :	20
Particle density :	2000 Kg/m3
Bulk density :	1000 to 1100 Kg/m3
Chemical composition	
Alumina:	45% to 35%
Silica:	55% to 65%
Fusion temperature:	1400°C (Min.)
(Bed material shall be from Crushed refractory bricks or from sieved ash).	

Table 3.40: Coal and Char Analysis

FUEL	%	COAL	CHAR
Carbon	%	39.90	18.69
Hydrogen	%	02.48	00.57
Nitrogen	%	00.67	00.41
Sulphur	%	00.38	00.27
Moisture	%	08.00	0.00
Ash	%	42.00	78.61
Gross Calorific Value	Kcal/Kg	3800	1800



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Turbo Generator Set (TG):

This project envisages 1 no. of 65 MW extraction cum condensing turbo-generator. The turbine shall be designed for the operation with the inlet steam parameters at 67 ATA and 490° C and shall be with automatic controlled extraction steam. The turbine shall be horizontal, single extraction-cum-condensing type for 65 MW. All casings and stator blade carriers shall be horizontally split.

The exhaust system is mounted bottom side of casing and shall be suitable for connection to the air-cooled condenser without air leakage and suitable for maintaining the condenser vacuum.

Gland Sealing System

The glands shall be of multi-section spring backed labyrinth type and sealed with steam.

Lubrication and Control Oil System :

A pressure lubrication and control oil system shall be provided for the turbo generator unit to supply oil at the required pressure to the steam turbine, gear box, generator and governing system. The lubrication oil system shall supply oil to the turbine generator under

all the load conditions, including the turning gear operation. The oil system of the turbo-generator shall be designed with adequate redundancy and emergency provisions such that a failure of a single active component will not prevent the safe operation or a safe shutdown of the turbo-generator. This system includes Oil Coolers, Filters, Oil purifier and emergency oil storage tank.

Table No. 3.41: Steam & Power Balance

SI. No.	AREA	EXISTING PROJECT		PROPOSED PROJECT		
01	DRI/coke oven Capacity	DRI-500 TPD	DRI- 500 TPD		Coke oven – 0.2 MTPA	Coke oven – 0.3 MTPA



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

02	WHRB	52TPH (from DRI)	54.5 TPH (from DRI)		63 TPH (from coke oven)		92TPH (from coke oven)
03	AFBC/CFBC Boiler	200 TPH (CFBC)	115 TPH (AFBC)	200 TPH (CFBC)		118 TPH (CFBC)	
04	STG	50 MW	40 MW	50 MW	15 MW	38 MW	22 MW

*Note: For generating 38 MW power, 42 TPH steam will be transferred from existing 252 TPH Boiler and finally it will be added to the outlet of 118 TPH Boiler.

FUEL AND ASH CALCULATION FOR CFBC BOILER

Steam Requirement for generation of 158 MW power from CFBC is 633 TPH at Pr.:- 94 Kg/cm² Temp:- 535 +/-5 deg. C (from 200 TPH) & 87 kg/cm² Temp :- 510 deg C (from 115 TPH,200 TPH & 118 TPH)

The average enthalpy of above pressure is 821 kcal/kg.

Fuel: - Max. 93.7 % Indian Coal and 6.3 % generated Char from DRI

Feed water temp. at 125 Deg. C

Net rise in Heat value = 821-125= 696 Kcal/Kg

Boiler efficiency: - 80%

Avg. Generation of Char = 75000 TPA

With 100 % utilization of char generated (Avg. 9.47 TPH)

Fuel ratio to be consumed in AFBC Boilers are 93.7 % Coal and 6.3 % Char

Average GCV of fuel with 93.7 % coal & 6.3 % Char (By Weight) = 3674 Kcal/ Kg

Avg quantity of fuel required per hour in 633 TPH AFBC Boiler =(633 x 696)/(0.8x 3674)

= 149.89 TPH



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Avg Qty. of Coal Consumption = $0.937 \times 149.89 = 140.44$ TPH

Avg Qty. of Char Consumption = $0.063 \times 149.89 = 9.47$ TPH

Avg Qty. of Coal Consumption/Annum = $140.44 \times 24 \times 330 = 1,112,285$ TPA

Avg Qty. of Char Consumption = $9.47 \times 24 \times 330 = 75,000$ TPA

Table No. 3.42: Ash Balance

	Total Capacity (TPA)	S.C.	Ash	Fly ash @90%	Bottom Ash @10%
Coal	11,12,285	0.45	5,00,528	4,50,528	5,005
char	75,000	0.80	67,500	60,750	6,750



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description – Lime Dolo Plant**

Magnitude & Operation:

Utilization of 2,97,000 TPA Limestone in production of 1,65,000 TPA Lime.

100% in-house consumption in SMS.

Table 3.43: Magnitude of Operation of Lime Plant

Description	Unit	Configuration
No. of Lime/Dolo Kiln Units	Nos.	2
Kiln Capacity	TPD	250
Kiln Feed Size (Limestone)	mm	30-60
Kiln Output Size (Lime)	mm	10-60
Calcination Temperature	°C	1050-1150
Working days	Days/annum	330
Specific Consumption of Fuel	Kg/ton of Output	100

Limestone which is naturally occurring mineral, contains primarily Calcium Carbonate (CaCO_3), which when heated during calcinations process releases Carbon Di-oxide and the product is predominantly Calcium Oxide (CaO) which is called “Quick Lime”. Decomposition takes place at a temperature of around 950°C . Dolomite stone contains some Magnesium Carbonate (MgCO_3) also in addition to CaCO_3 which gets converted to CaO and MgO when calcined.

Operation of the Kiln

In a twin shaft regenerative type kiln the two shafts of the kiln are alternatively charged with limestone, while product lime is continuously discharged from the bottom of both the shafts. Fuel and combustion air is supplied to one of the shaft whereas flue gases leave the kiln from the other shaft. The cycle is reversed 5 to 6 times in one hour.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Furnace Oil as fuel is supplied through a number of lances evenly over the cross section of each shaft at the beginning of the burning zone.

Combustion air from blowers is introduced above the charge, and the system is under pressure. Air for combustion recovers the heat in the preheating zone before it mixes with the fuel. Combustion products pass through the burning zone from the top to the bottom, along the movement of the stone charge in a parallel flow thus transferring the heat to charge for a longer time.

Cooling air is simultaneously introduced under pressure at the bottom of the two shafts during the burning period, in counter current to the lime flow.

Waste gas comprising combustion flue and liberated carbon dioxide leave the shaft under firing and enter the other shaft and move upwards, in opposite direction of the material flow. Waste gas, while passing through the charge material, heats the stone mass (which acts as regenerator) in the preheating zone. Waste gases will leave the kiln from top of the shaft and passed through bag filters using fan and will be discharged into the atmosphere through chimney stack.

APCD Details:

Bag Filter at Crusher unit: 1 no. (Height: 30m)



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.44: Material Balance for Proposed Lime Plant (1,65,000 TPA)

Input			Output		
Raw Material	Specific Consumption	Quantity (TPA)	Product	Specific Generation	Quantity (TPA)
Limestone	1.80	2,97,000	Lime	1.00	1,65,000
LDO	0.10	16,500	Burnt Lime	0.18	29,882
			Losses	0.72	1,18,618
TOTAL	1.90	3,13,500	TOTAL	1.90	3,13,500



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Process Description – Oxygen Plant**

Proposed plant configuration:

Unit	Capacity
VPSA	440 TPD
Cryogenic	450 TPD

- **Vacuum Pressure Swing Adsorption (VPSA)**

VPSA (Vacuum Pressure Swing Adsorption) is a non-cryogenic process of separating/producing oxygen gas from atmospheric air. This process works on the principle of “Adsorption”.

The VPSA Oxygen Plant will be installed for better reduction of Iron Ore.

- **Air Feed Blower**

The filtered air passes through a feed inlet silencer and is drawn into the feed blower. The single-stage, rotary-lobe blower delivers air to the VPSA beds at a pressure of up to 1.6 bar (absolute).

- **Feed after Cooler**

The feed blower discharge air, cools in the heat exchanger of a feed after cooler before it is supplied to the VPSA beds. The inlet temperature of the VPSA bed will be maintained within a range of 37°C to 47°C.

- **Oxygen Separation**

When air passes through a regenerated adsorption bed that is subjected to elevated pressure, nitrogen, water, carbon dioxide, and hydrocarbon molecules are selectively adsorbed from the air stream by the molecular sieve while oxygen molecules are allowed to pass through. Adsorption is most efficient at a pressure of approximately



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

0.55 bar (gauge). When the molecular sieve becomes saturated with adsorbed molecules, the bed is regenerated. Regeneration is accomplished by stopping the air feed, lowering the pressure to approximately 0.55 bar (absolute i.e. vacuum) to desorb the molecules, and flushing them out of the bed as a waste stream. The two beds operate on an alternating basis so that one is producing oxygen while the other is being regenerated. Because oxygen is produced in batches as the adsorption beds cycle, the product oxygen is stored in a surge tank at approximately 0.21-0.48 bar (gauge). The surge tank provides a continuous supply of oxygen for compression to the required product delivery pressure.

Table 3.45: Configuration of Oxygen Plant (VPSA)

Description	Unit	Proposed Facilities	
		Quantity	Quantity
MBF			
Capacity of MBF	TPA	519750	750750
Working Days	Days/Annum	350	350
Daily Product of MBF		1485	2145
Oxygen required for 1 Ton Hot Metal for MBF	cum	75	75
Daily requirement of Oxygen at MBF	cum/day	111375	160875
		=111385 x 32 ÷ 22.4 =159.1	=160875 x 32 ÷ 22.4 =229.8
With 90% purity		= 176.8	= 255.4
		= 180 TPD	= 260 TPD

Hence, 180 TPD & 260 TPD VPSA oxygen plant is envisaged for blast furnace in proposed expansion.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- **Air Separation Unit (ASU)(Cryogenic)**

In cryogenic process of air separation Oxygen, Nitrogen and Argon are obtained from the air by the method of low temperature rectification. Oxygen, Nitrogen and Argon are being separated at significantly very low temperature, i.e, Oxygen at -183°C , Nitrogen at -196°C and Argon at -186°C respectively.

Air separation process is being carried out in different stages as follows:

- ✓ Preliminary purification before the air is separated into its gaseous components, unwanted ingredients must be removed. These are filtered out, chemically absorbed of surfaces or frozen out.
- ✓ Compression of the air that has been sucked in is compressed at a pressure of around 6 bar. Heat is created as a result & further this Booster air is compressed to higher pressure.
- ✓ Preliminary cooling the compressed air is first cooled down to a temperature of $10-16^{\circ}\text{C}$. As it expands in the separation columns, it cools down still further. As a result, it liquefies to some extent (the temperature being lower than the boiling point).
- ✓ Air purification: Air after being cooled chilled is introduced to Adsorbers where adsorbents inside adsorbs CO_2 and moisture and allows dry air to enter into further process of separation.
- ✓ Cooling and separating by means of the separation column, the air is separated into its components. This is a purely physical process, not involving any chemical reactions. The liquid mixture of products trickles down to meet the rising stream of gas. The liquid collects on the trays of the column, and is penetrated by the vapor bubbles from beneath. Here it is oxygen pre-eminently, with its higher boiling point (-183 degrees C), which condenses out of the stream of gas. The drops of liquid, on the other hand, give rise for preference to evaporating nitrogen, with its lower boiling point of -196°C . Gaseous nitrogen collects, in consequence, at the top of the separation column, while liquid oxygen collects at the bottom of the column. The



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oxygen at the bottom is vaporized, while nitrogen in liquid form is introduced at the top of the column. This process is continued as long as is required to reach the desired level of purity.

- ✓ Distillation column: A fractionating column or fractionation column is an essential item used in distillation of liquid mixtures so as to separate the mixture into its component parts, or fractions, based on the differences in volatilities. The amount of heat entering the column from the reboiler and with the feed must equal the amount of heat removed by the overhead condenser and with the products. Fractionating columns use external reflux to achieve better separation of products.
- ✓ Reflux refers to the portion of the condensed overhead liquid product that returns to the upper part of the fractionating column. Inside the column, the down flowing reflux liquid provides cooling and condensation of up flowing vapors thereby increasing the efficiency of the distillation tower. The more reflux and/or more trays provided, the better is the tower's separation of lower boiling materials from higher boiling materials. The design and operation of a fractionating column depends on the composition of the feed and as well as the composition of the desired products.
- ✓ Rare gas recovery with a view to obtaining the rare gases, the separation column of the air separation unit is equipped with additional aggregates for raw argon, a neon/helium mixture and a krypton/xenon mixture. These mixtures must be purified still further.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.46: Configuration of Oxygen Plant (ASU)

Description	Unit	Proposed Facilities	
		Quantity	Quantity
EOF			
Capacity of EOF	TPA	478315	736377
Working Days	Days/Annum	330	330
Daily Production of EOF		1450	2230
Oxygen required for 1 Ton Liquid Steel for EOF	cum	60	60
Daily requirement of Oxygen at EOF	cum/day	87000	133800
AOD			
Capacity of AOD	TPA	53146	5312300
Working Days	Days/Annum	330	330
Daily Production of AOD		161	946
Oxygen required for 1 Ton Liquid Steel for AOD	cum	50	50
Daily requirement of Oxygen at AOD	cum/day	8050	47300
Daily requirement of Oxygen for EOF & AOD	cum/day	95050	181100
	Ton/day	135	258
Considering 10% for Misc Uses	Ton/day	150	287



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

3.6 Raw material required along with estimated quantity, likely source, marketing area of final products, mode of transport of raw material and finished product.

Table 3.47: Raw Material requirements as per the final configuration

S.No.	Raw Material	Existing Quantity (TPA)	Proposed Quantity (TPA)	Total Quantity (TPA)	Source	Distance From Site (Kms)	Mode of Transportation
1	Iron ore fines (Fe 58%)	-	20,00,000	20,00,000	Mines in Odisha, Jharkhand/ OMC/ Other Private Mines	200-300	Road/Rail
	High Grade Iron Ore Fines (Fe 62.6%)	-	7,08,010	7,08,010			
2	Coal	10,06,000	8,29,860	18,35,860	Mines in Odisha, Jharkhand/ OMC/ Other Private Mines	200-300	Road/Rail
3	Coking Coal	-	6,75,000	6,75,000	Import/Open Market	80-120	Road/Rail
4	Coke	21,000	14,290	35,290	Kalinganagar, Jajpur	95-120	Road
5	Limestone	4,500	4,95,852	5,00,352	Rourkela/ Raigarh	280-330	Road/Rail
6	Dolomite	18,000	1,34,470	1,52,470	Rourkela/ Raigarh	280-330	Road/Rail
7	Chrome Lumps/ Fines	1,61,000	1,71,000	3,32,000	Sukinda, Odisha	90-110	Road
8	Quartz	11,000	16,500	27,500	Open market	95-120	Road
9	Bentonite	-	8,400	8,400	Rourkela/ Raigarh	280-330	Road/Rail
10	LDO	-	30,900	30,900	Paradeep	80-120	Road
11	Molasses	9,000	9,000	18,000	Open market	95-120	Road
12	Coke Breeze	-	97,117	97,117	Kalinganagar, Jajpur	95-120	Road/Rail



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

3.7 Resource optimization/ recycling and reuse envisaged in the project , if any, should be briefly outlined.

Following steps are adopted towards resource optimization:

- Utilization of low grade iron ore to produce quality steel.
- Utilization of chrome ore fines to manufacture quality chrome.
- Dust from Pelletization and bag filter dust from DRI Kilns will be reused in process.
- Mill scale from SMS, In-Plant return fines & de-dusting fines from Sinter Plant, dust from BF and burnt lime from Lime Plant will be utilised in Sinter plant.
- End cuts or scrap from Rolling Mill will be utilised in SMS.

3.8 Availability of water its source, energy/power requirement and source.

3.8.1 Water Requirement

The total water requirement is 36,856 KLD (Makeup). Existing water requirement is 11,582 KLD, is being sourced from Mahanadi River. The proposed water requirement of 25,004 KLD will also be sourced from Mahanadi River.

Permission for withdrawal of 23,803 KLD (4,760 KLD for drinking purpose & 19,043 KLD for Industrial use) Surface Water from Mahanadi River has been obtained (Agreement letter dtd. 28.04.2004 is attached as **Annexure-17**). Permission for lifting of 9.72 cumecs in first phase and 9.72 cumecs in second phase has been obtained from Dept. of Water Resource vide letter no. WII-DM-Misc.-5/2003/13857 dtd. 26.12.2003 (attached as **Annexure-18**).



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

3.8.1.1 Rainwater Harvesting

As per CGWB guidelines, shaft recharge-type rainwater harvesting structures would be suitable at the project location. The recharge shaft will be perforated and the depth of the shaft will be around 3 m. Rooftop rainwater (from various plant sheds) will be collected and directed towards these harvesting structures. Oil filters will be put in all drain heads to ensure that no oil and grease from the surface gets mixed with the percolated water.

CGWB guidelines shall be followed for the construction of the Rain water Harvesting System.

Rain water harvesting pond capacity: Area = 47614 m²

Depth of Reservoir = 5 m

Rain water availability:

All the water which is falling over an area cannot be effectively harvested, due to various losses on account of evaporation & spillage. Because of these factors the quantity of rainwater which can be effectively harvested is less than the rainwater endowment (Area of Catchment X Amount of rainfall). The collection efficiency is mainly dependent on factors like runoff coefficient. As the catchment area made up of concrete and tiles so coefficient of runoff is 0.85.

Annual average rainfall of Cuttack District = 1670 mm = 1.67 m

(Ref. India-WRIS (2011-2020))

Catchment Area = 130,300 m²

The water harvesting potential could be estimated using the following equation.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Rainwater harvesting potential = Amount of rainfall x Area of catchment x Rainfall coefficient = 1.67 x 0.85 x 130,300 = 184,960 m³

184,960 m³ of runoff water will be available to store in the storage reservoir.

Considering surface evaporation 6mm/day or 0.006 m/day, the net effective depth of water availability will be = 5-1.2= 3.8 m

Water available in reservoir = 47617x3.8 m³/yr = 180,944 m³/yr

Water available for consumption per day = 495 KLD

Table 3.48(A): Breakup of existing water requirement

EXISTING						
Facilities	Capacity	Circulating Water (KLD)	Makeup Water (KLD)	Recirculation Water (KLD)	Evaporation (KLD)	Blow Down (KLD)
Coal Washery	1000000 TPA	4500	66	4434	66	
DRI Plant	300000 TPA	70000	856.8	69143.2	856.8	
SMS (EAF based)	208333 TPA	58000	851.904	57148.096	709.92	141.984
Rolling Mill	200000 TPA	25000	367.2	24632.8	306	61.2
CPP (WHRB - 2x10 MW + CFBC - 50 MW + AFBC - 30 MW)	100 MW	570000	8372.16	561627.84	6976.8	1395.36
Ferro Alloy Plant	50000 TPA	70000	1028.16	68971.84	856.8	171.36
Drinking & sanitisation		40	39.825	0	5.97375	33.85125
Total		797540	11582	785958	9778	1804



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.48(B): Breakup of Total water requirement

TOTAL						
Facilities	Capacity	Circulating Water (KLD)	Makeup Water (KLD)	Recirculation Water (KLD)	Evaporation (KLD)	Blow Down (KLD)
Beneficiation Plant	2000000 TPA	12000	147	11853	147	
Pelletization Plant	1200000 TPA	45000	713	44287	591	122
DRI Plant	300000 TPA	70000	857	69143	857	
SMS	1551763 TPA	480000	7050	472950	5875	1175
Rolling Mill	1500000 TPA	195000	2864	192136	2387	477
CPP (WHRB - 57 MW + CFBC - 128 MW + AFBC - 30 MW)	215 MW	1050000	15422	1034578	12852	2570
Coke Oven	500000 TPA	44000	646	43354	539	108
Sinter Plant	1757880 TPA	105000	1542	103458	1285	257
Blast Furnace	1270500 TPA	390000	5728	384272	4774	955
Coal Washery	1000000 TPA	4300	63	4237	53	11
Ferro Alloy Plant	125000 TPA	77600	1140	76460	950	190
Lime Dolo Plant	165000 TPA	5000	73	4927	61	12
Oxygen Plant	302500 TPA	66000	969	65031	808	162
Drinking & sanitisation		135	135	0	27	108
Total		2544035	37351	2506684	31204	6147

The Blow down water 6318 KLD will be utilized in ash moistening, slag granulation, slag quenching, sprinkling on road and plantation. Rain water harvesting 495 KLD. So net make water requirement from Surface Water will be **36,856 KLD**.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

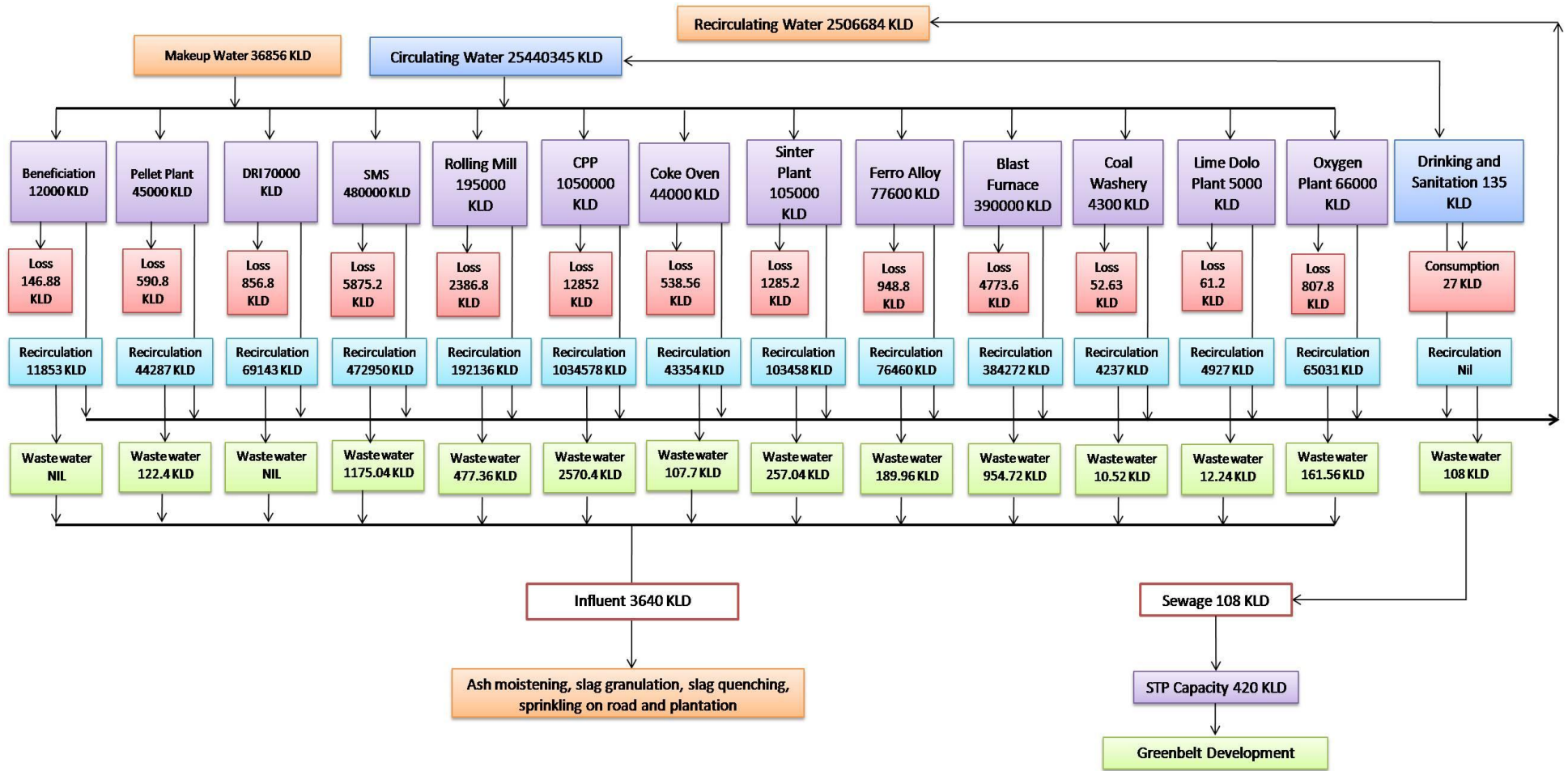


Fig 3.22: Water Flow chart



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

3.8.2 Power Requirement

The total power requirement for plant is 278 MW. Existing power requirement is 74 MW. The proposed power requirement for the project is estimated as 204 MW.

Source: For total 278 MW power requirement, 215 MW will be obtained from CPP & rest 63 MW will be obtained from nearest grid (Permission for the same will be obtained). For emergency startup, 10 MW power will be obtained from GRIDCO (Permission Letter with letter no. Gridco-DC-89/2009/5994(12) dtd. 05.09.2009 is attached as **Annexure-16**).

Table 3.49: Total Power Requirement for the Project after Expansion

Facilities	Present Capacity	Proposed Capacity	Existing	Proposed	Total
			Power Consumption in MW		
Beneficiation Plant		20,00,000 TPA		2.0	2.0
Pelletization Plant		12,00,000 TPA		6.8	6.8
DRI Plant	3,00,000 TPA		3.8		3.8
SMS	2,08,333 TPA	15,51,763 TPA	23.0	77.8	100.8
Rolling Mill	2,00,000 TPA	13,00,000 TPA	2.6	30.2	32.8
CPP	100 MW	115 MW	9.0	10.0	19.0
Coke Oven		5,00,000 TPA		1.2	1.2
Sinter Plant		17,57,880 TPA		10.0	10.0
Blast Furnace		12,70,500 TPA		13.6	13.6
Coal Washery	10,00,000 TPA		0.6		0.6
Ferro Alloy Plant	50,000 TPA	75,000 TPA	31.5	31.5	63.0
Lime Dolo Plant		1,65,000 TPA		1.0	1.0



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

RMHS				3.0	3.0
Oxygen Plant		3,02,500 TPA		16.9	16.9
Misc			3.5		3.5
Total			74.0	204.0	278.0

3.9 Environment Management Plan

A comprehensive environmental management plan has been framed and implemented to keep the pollution levels within prescribed limits. All the following measures will be practiced.

3.9.1 Air Pollution Control

Air pollution mitigation measures would be from the point and fugitive sources within the steel plant. Presently, the air pollution mitigation measures guided by the Indian regulatory standards are mostly confined to the control of Particulate dust, SO₂ and NO_x, emissions of VOC, etc., occur in a pellet plant.

Given, this, the pollution mitigation measures from various shops as envisaged are given below:

- ❖ Pollution control equipment (ESP/Bag filter) will be installed in the raw material handling, other sections and pellet plant circuit & maintained properly.
- ❖ Maintenance of vehicles will be done on regular basis.
- ❖ Vehicles with PUC certificates only will be allowed for transportation.
- ❖ Personal protective equipment like dust masks, earplugs, helmets etc, will be provided to the employees.
- ❖ Adequate greenbelt/plantation will be developed all around the boundary & within the plant premises to attenuate the gaseous emission impact.
- ❖ Regular ambient air monitoring inside the plant and along the boundary will be done.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.50: Existing Air Pollution Control Device

Chimney / Stack No.	Description of Stack	Stack Height (m)	Quantity of emissions (m ³ /hr)	Prescribed Standard		
				PM (mg/Nm ³)	SO ₂	NO _x
1.	Stack attached to ESP of					
	DRI Kiln-I with WHRB	60	1,20,000	100	-	-
	DRI Kiln-II with WHRB	60	1,20,000	100	-	-
2.	Common Bag Filter attached to DRI Kiln-I & II					
	Product house	35	1,35,000	100	-	-
	Stock house	30	33,200	100	-	-
	I-Bin, Product house, Transfer house, Cooler discharge	35	85,000	100	-	-
	Coal injection point	20	9,000	100	-	-
3.	Stack attached to CFBC Boiler (50MW)	100	4,00,000	50	600	450
4.	Stack attached to AFBC Boiler (30MW)	85	1,96,000	50	600	450
5.	Stack attached to GCP of FAP (2x9 MVA)	40	3,20,000	100	-	-
6.	Stack attached to GCP of FAP (1x18 MVA)	40	3,80,000	100	-	-
7.	Bag Filter attached to SMS (EAF/LRF)	35	2,20,000	100	-	-
8.	Common stack attached to bag filter connected in dryer of Chrome Ore briquetting plant (25 TPH)	30	10,200	100	-	-
9.	Common stack attached to bag filter connected to transfer points of 25 TPH briquetting plant and to dryer of 12 TPH chrome ore briquetting plant (old)		33,200			
10.	Stack attached to 40 TPH top and bottom oil fired furnace of rolling mill	65	14,400	100	-	-



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.51: Proposed Air Pollution Control Device

S. No	Name of the Units	Name of APCD	Stack Height (m)	Quantity	Emission Design
1.	Pelletization Plant	ESP	75	1	<100 mg/Nm ³
		Bag Filter	30	4	
2.	SMS	Fume extraction with Bag filter	35	3	<100 mg/Nm ³
3.	Rolling Mill	Chimney	65	1	<100 mg/Nm ³
4.	Blast Furnace	Stove waste gas chimney	45	2	<50 mg/Nm ³
		Flare Stack	45	1	
		Dust extraction with bag filter at Stock House	40	2	
		Dust extraction with bag filter at Cast house	40	2	
5.	Sinter Plant	Main ESP	85	2	<100 mg/Nm ³
		Dedusting ESP	45	2	
		Bag Filter	40	2	
6.	Ferro Alloy	Stack attached to GCP of FAP	40	2	<100 mg/Nm ³



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

7.	Briquetting plant	Common stack attached to bag filter connected in dryer of Chrome Ore briquetting plant and transferred points	30	1	<100 mg/Nm ³
8.	Coke Oven	Chimney	45	1	<50 mg/Nm ³
		Flare Stack	45	1	
9.	Lime Dolo Plant	Bag Filter at Crusher unit	30	1	<100 mg/Nm ³
10.	Power Plant	ESP of 50 MW CFBC	100	1	<30 mg/Nm ³
		ESP of 28 MW CFBC	85	1	
		Coal Handling (Dust extraction with Bag filter)	30	4	<100 mg/Nm ³

*Note: As per MoEF&CC Notification dated 31.03.2012 & 07.12.2015

3.9.2 Water Pollution Control

To minimize pollution of receiving body of wastewater, the project envisages two approaches, namely,

- ✓ Enhance the wastewater recycling to the extent practicable to conserve make-up water and
- ✓ To aim at zero discharge of process effluent.

Water Conservation measures

For the proposed expansion project, the water conservation scheme is based on the following targets:-

- 100% Recycling and reuse practices of water will be followed.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- Wastewater (6147 KLD) will be used for ash moistening, slag granulation, slag quenching, sprinkling on road and plantation.
- Zero discharge concepts: To have a ‘near-zero discharge’ of the proposed expansion plant, the CT blow-down along with all other primary treated wastewater streams with high TDS levels would be used for ash moistening, slag granulation, slag quenching, sprinkling on road and plantation or greenbelt development purpose as the existing practice.

Table 3.52: Wastewater regeneration

Process Unit	Wastewater Qty. (KLD)	Source	Wastewater management
Industrial	3469	Blow Down	Used in Road Sprinkling, Plantation, Slag Granulation Plants
CPP, Process Boiler	2570	Boiler Blow down and DM regeneration water.	will be sent to neutralization pit where, it neutralized by adding acid/alkalis and the same is used in ash quenching/dust suppression after treatment
Domestic wastewater	108	Domestic use for the plant (Toilet, Washing)	Will be treated in STP & treated water reused in greenbelt development & dust suppression.

Work zone comfort

In addition to natural ventilation, selected areas like control rooms would be provided with air conditioning. Where ambient temperature is above 35°C, man coolers would be provided in selected areas of the shop floors. Mechanical sweeper/industrial vacuum



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

cleaner, air circulator, and water mopper would be used to keep the shop floor clean from settled dust. The process control rooms, cubicles, etc will be air- conditioned.

3.9.3 Energy Conservation Measures

- LED Lights to be used in office, streets & worksites.
- All Ceiling Fans in the office will be Brushless DC (BLDC) fans.
- Variable Frequency Drive Motors shall be fitted / Installed at suitable Industrial Fans.
- Pumps shall be installed based on the system BEP (Best Efficiency Point).
- Highly Efficient Motors based on NEMA Level 4 will be used wherever applicable.

3.9.4 Greenbelt / Plantation

Greenbelt/ plantation is present over an area of 107 Ha. (33.95 % of the total area i.e 315.1 Ha). Total no,of trees present in the site is 24,210. Out of which, 1,332 trees will be fell and 3,194 trees will be relocated/ transplanted. Rest 19,684 trees will be retained in the greenbelt and in between plant structures. The greenbelt includes plantation along the roads, boundary walls and around various facilities like shops, offices, waste disposal area etc. Regular maintenance of the existing plantation is being done. The non-covered area will be planted in a phased manner.

- A three-tier plantation comprising of an outermost belt of taller trees acts as a barrier.
- Local plant species have been preferred as per the CPCB guidelines in consultation with the Local Forest Department.
- Greenbelt development along the plant boundary attenuates noise level, arrests dust, and improves the surrounding environment.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.53: List of Trees Present within the Site

SI No.	Species name	Scientific Name	Total no.of Trees	Trees to be felled/ relocated/ transplanted	Trees to be retained	Girth in cm	Height in M.	Sound/ unsound
1	Chakunda	<i>Senna occidentalis</i>	4000	598	3402	10-60	8-9	Sound
2	Acasia	<i>Acasia auriculiformis</i>	2150	572	1578	10-60	8-9	Sound
3	Cashew	<i>Anacardium occidentale</i>	3500	603	2897	10-60	8-9	Sound
4	Kochila	<i>Strychnos nux-vomica</i>	5000	888	4112	10-60	8-9	Sound
5	Neem	<i>Azadirachta indica</i>	2280	116	2164	10-60	8-9	Sound
6	Karanja	<i>Millettia pinnata</i>	3190	516	2674	10-60	8-9	Sound
7	Chironji	<i>Buchanania cochinchinesis</i>	1000	303	697	10-60	8-9	Sound
8	Kurei	<i>Hollorhena pubescens</i>	1250	477	773	10-60	8-9	Sound
9	Bela	<i>Aegla mermelos</i>	50	4	46	10-60	8-9	Sound
10	Kendu	<i>Diospyres melanoxylon</i>	340	123	217	10-60	8-9	Sound
11	Giringa	<i>Pterospermum xylocarpum</i>	285	85	200	10-60	8-9	Sound
12	Amaltash	<i>Fics infectoria</i>	75	22	53	10-60	8-9	Sound
13	Bheru	<i>Chloroxylon swietenia</i>	160	48	112	10-60	8-9	Sound
14	Niras (chara)	<i>Memecylon umbellatum</i>	250	75	175	10-60	8-9	Sound
15	Dalsing	<i>Suregada angustifolia</i>	190	15	175	10-60	8-9	Sound
16	Atundi	<i>Combretum roxburghit</i>	220	23	197	10-60	8-9	Sound
17	Mango	<i>Mangifiera indica</i>	270	58	212	10-60	8-9	Sound
		Total	24210	Fell – 1332 Transplanted – 3194 Total - 4526	19684			



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

3.9.5 Waste Generation and Managemen



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 3.54: Solid and Hazardous Waste Generation and Management

S.No.	Type of Waste	Source Name	Quantity (TPA)			Treatment before Disposal	Mode of Disposal & Area of Use	Agreement details for Disposal
			Existing	Proposed	Total			
SOLID WASTE								
1	Tailings	Beneficiation	-	1,94,000	1,94,000	Dewatered and stored in slime/tailing storage area & the collected water will be recycled in process.	Disposed to construction contractors for road & construction filings.	
2	Dust	Pelletization	-	25,200	25,200		Will be handled pneumatically & reused in-house Pellet Plant	
3	Kiln Accretion	DRI Kilns	1,200	-	1,200		Will be disposed through Truck & use in road construction filings	
	ESP Dust		14,100	-	14,100		Will be disposed through builder & send to cement plant/ brick manufacturing	
	Bag Filter Dust		4,500	-	4,500		Will be handled pneumatically & is burnt in ABC / reused in Pellet Plant	
	Dolochar		75,000	-	75,000		Will be disposed through Material handling equipments & Used as in-house Boiler Fuel	



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

4	Slag/ Impurities	SMS	37,500	2,41,817	2,79,317	Recovery of Metals	Will be disposed through truck & use in road construction filings.
	Mill Scale		4,167	26,868	31,035		
5	In-Plant Return Fines	Sinter	-	2,63,770	2,63,770		Will be handled pneumatically & Reused in-house Sinter Plant
	De-dusting fines			14,941	14,941		
6	Dust	Blast Furnace	-	25,410	25,410		Will be handled pneumatically & Reused in-house Sinter Plant
	Slag		-	4,44,675	4,44,675		
7	Waste	Coal Washery	80,000	-	80,000		Will be disposed through Trucks & Sold to Domestic Market
8	Slag	Ferro Alloy	65,000	97,500	1,62,500	The Slag generated will be transferred to Metal Recovery Plant.	Will be disposed through truck & use in road / civil construction.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

	Dust		2,500	3,750	6,250		Will be handled pneumatically & Reused in-house Briquetting Plant	
9	Burnt Lime	Lime Plant	-	29,882	29,882		Will be handled pneumatically & Reused in-house Sinter Plant	
10	Scrap (End Cuts)	Rolling Mills	6,160	31,803	37,963		Will be handled by Material Handling equipments & Reused in-house Steel Melting Shop	
	Mill Scale		2,173	11,087	13,800		Will be handled pneumatically & Reused in-house Sinter Plant	
11	Fly ash	AFBC / CFBC Boiler	2,63,250	2,48,028	5,11,278		Will be disposed through Bulker & Reused in cement or Ash Bricks/Block Industry (sale in market)	

HAZARDOUS WASTE

S.No.	Waste	Category as per HWM Rules, 2016	Existing Quantity	Proposed Quantity	Total Quantity	Treatment before Disposal	Mode of Disposal	Agreement details for Disposal
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Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

1	Used Oil	Cat. 5.1	30 TPA	150 TPA	180 TPA	Storage in containers over impervious floor under well ventilated covered shed followed by disposal through actual users having valid authorization from SPCB, Odisha	No. of Authorization: IND-IV-HW-569/905 , date of issue 20-01-2022, Ref of application: 2033777 , dated 23-08-2021
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Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

2	Waste/Residues containing oil	Cat. 5.2	1.7 TPA	8 TPA	9.7 TPA		Storage in impervious pits / containers over impervious floor under well ventilated covered shed followed by disposal in the Authorized HW incinerator / Common Hazardous Waste Treatment Storage Disposal Facility (CHWTSDF), Jajpur / Co-processing in authorized Cement Kiln
3.	Spent Resin from DM Plant	Cat. 35.2	3.5 TPA	7.5 TPA	11 TPA		Storage in impervious pits / containers over impervious floor under well ventilated covered shed followed by final disposal in Authorized HW incinerator / CHWTSDF, Jajpur / Co-processing in authorized Cement Kiln / in our own authorized DRI Kiln for energy recovery



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

4.	Flue Gas Cleaning Residue from Ferro Chrome	Cat. 33.1	1000 TPA	2000 TPA	3000 TPA		Storage on impervious floors under covered shed followed by recycle in the Briquetting Plant
5	BF Gas	Cat. 35.1 (Exhaust Air or Gas cleaning residue)	-	26,87,108 TPA	26,87,108 TPA		Distributed to Sinter Plant BF Stove through Pipeline. Flare stack of ht. 45 mtr will be installed to burnt unused BF gas, in emergency.
6	Coke Oven Gas	Cat 13.6	-	1,75,000 TPA	1,75,000 TPA		Through Pipeline, Used in Waste Heat recovery boiler



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

SCHEMATIC DIAGRAM OF ENVIRONMENTAL COMPONENTS

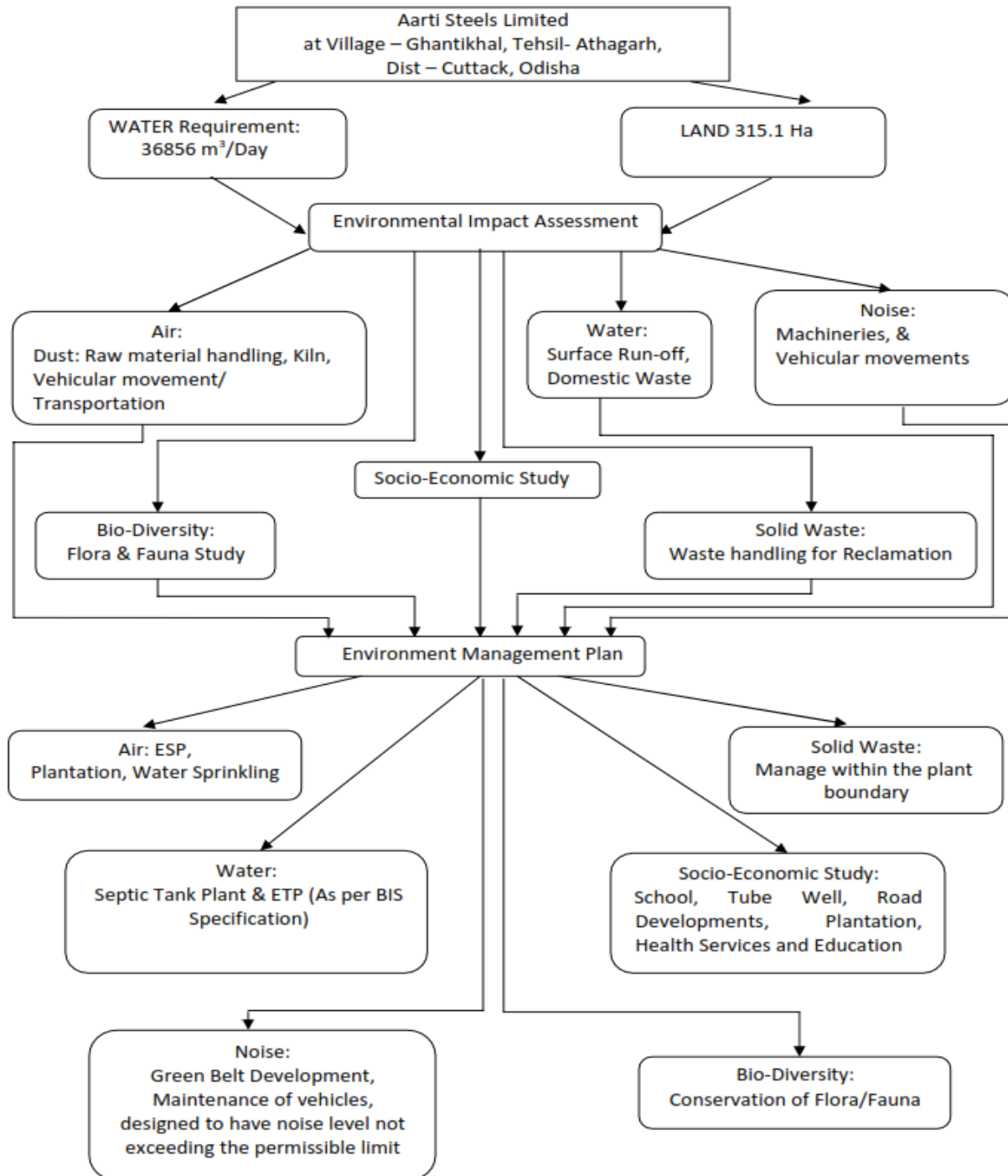


Fig 3.23: Schematic Diagram of Environmental Component



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

4. SITE ANALYSIS

4.1 Connectivity

- Site details: The plant is located at village- Ghantikhal, Tehsil- Athagarh, Dist.- Cuttack, Odisha.
- Road Connectivity: Well connected with village road (Ghantikhal - Khuntuni Road adjacent to Project Site on eastern side) connecting NH-55 (Sambalpur-Cuttack Highway) which is at a distance of 3.63 km (N). Athagarh - Dhableswar Road is present adjacent to Project Site on the southern side.
- Rail Connectivity: Ghantikhal-Nidhipur Railway Station- 0.15 km (E)
- Location: The site is located in Ghantikhal village in the Cuttack district of Odisha. Both skilled and unskilled labour is available in the area. Also the location of the plant is suitable as it meets distance criteria from the various landmarks for environment related requirements.

4.2 Landform Land Use and Ownership

The proposed expansion will be undertaken within the existing plant area. The total land of 315.1 Ha is already under the possession of Aarti Steels Ltd. (Land details sheet is attached as **Annexure-19**). Clarification letter from DFO vide letter no. 1445 dtd. 12.04.2022 regarding no involvement of forest land is attached as **Annexure-20**.

The plant will need main Plant Facilities, Raw Material Storage yard, Raw Water Storage Reservoir & Treatment plant, Auxiliary facilities, viz. Administrative Building, Technical Building etc. The detailed land use break up for the proposed plant has been given in the table below:



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 4.1: Land Use Break Up

Item No.	Description	Area (Hectares)		Total	Percentage (%)
		Existing	Proposed		
1.	Railway Siding with Wagon Tippler	5.0210	-	5.0210	1.59
2.	Raw Material Storage Yard	4.3896	10.5377	14.9273	4.74
3.	Pellet Plant with Beneficiation Plant		7.6334	7.6334	2.42
4.	2x500 TPD Kilns	5.0833		5.0833	1.61
5.	Steel Melting Shop	4.3385	12.4376	16.7761	5.32
6.	Rolling Mill	4.7006	11.5790	16.2796	5.17
7.	Coke Oven Plant (Non-Recovery Type)		20.1020	20.1020	6.38
8.	Sinter Plant		11.8860	11.8860	3.77
9.	Blast Furnace		11.2213	11.2213	3.56
10.	Ferro Alloy Unit	1.8783	2.6914	4.5697	1.45
11.	Power Plant	2.3152	4.9626	7.2778	2.31
12.	Crusher Plant	1.5316		1.5316	0.49
13.	Coal Washery Plant	4.0705		4.0705	1.29
14.	Solid Waste Storage Area	7.5752		7.5752	2.40
15.	Briquetting Plant	2.3076		2.3076	0.73
16.	SMS Slag Crushing Plant	0.2083		0.2083	0.07
17.	Ferro Chrome Metal Recovery Plant	0.8571		0.8571	0.27
18.	Lime & Dolo Plant		5.8680	5.8680	1.86
19.	Oxygen Plant		8.7943	8.7943	2.79
20.	Brick Making Plant		6.4547	6.4547	2.05
21.	Water Reservoir	4.2214		4.2214	1.34
22.	132/33 KV Sub-Station	1.1058		1.1058	0.35
23.	Main Gate	0.4038		0.4038	0.13
24.	Weigh Bridge	0.1856		0.1856	0.06
25.	Adm. Building, Canteen & Dispensary	0.1200		0.1200	0.04
26.	Staff Colony, Bachelor Quarters & Workers Colony	4.5356		4.5356	1.44
27.	Truck Parking Area	17.0040		17.0040	5.40
28.	Roads and Drain	19.8067		19.8067	6.29
29.	Open Area	1.2323		1.2323	0.39
30.	Tailings Storage Area		1.0500	1.0500	0.33
31.	Greenbelt	107		107	33.96



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

32.	Open Area	115.218	-115.218	0	0
	TOTAL	315.1	0	315.1	100

4.3 Topography

Cuttack district is mainly divided into two distinct geographic regions. The district covers an area of 3,932 km². The Sadar subdivision mostly consists of the alluvial delta formed by the river Mahanadi and its distributaries. The width of the delta stretches to about 60-75 kilometres from the coast. The land is mostly flat and is intersected by numerous channels, active and abandoned, of the Mahanadi system. Few isolated hillocks near Cuttack form the only break in the plain. The land is often waterlogged during the monsoon and an elaborate system of canals, embankments and weirs is used for both flood control and irrigation. The Athagad and Banki subdivisions consist of broken hill country on either side of the Mahanadi river. Most of the hills are of low height and present a rounded appearance reaching a maximum of around 2500 feet along the border. Occasional fertile, narrow valleys formed by riverine action are also found. Numerous small streams run down these hills to join the Mahanadi. A thick layer of sandstone underlies these subdivisions while occasional laterite stone outcrops can be seen at many places.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

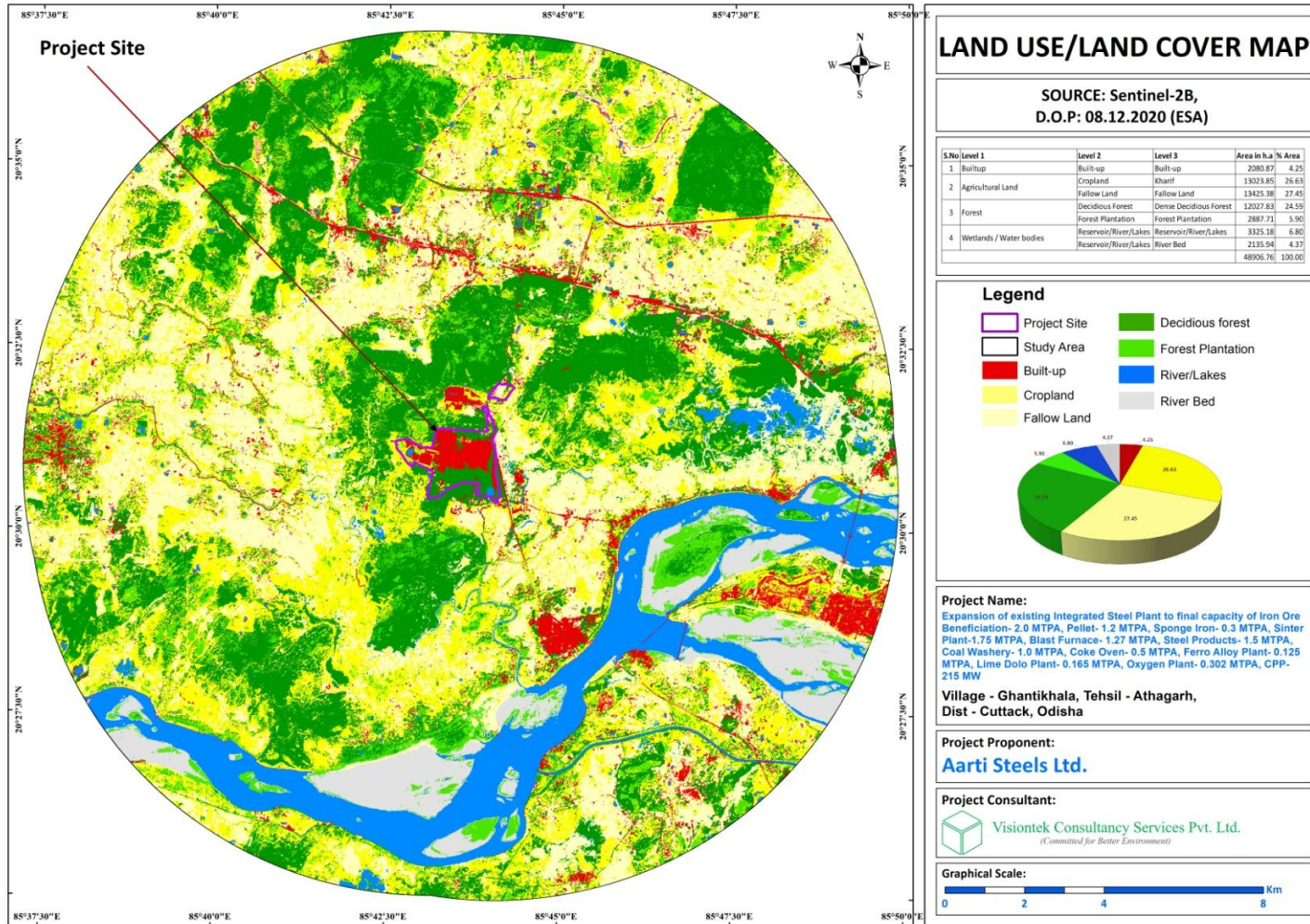


Fig 4.1: Landuse Map



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

4.4 Existing land use pattern (agriculture, non-agriculture, forest, water bodies (including area under CRZ)), shortest distances from the periphery of the project to the periphery of the forests, national park, wildlife sanctuary, eco-sensitive areas, water bodies (distance from the HFL of the river), CRZ. In the case of the notified industrial area, a copy of the Gazette notification should be given.

The land use pattern in the 10 km radius has a mixed land use pattern.

Table 4.2: Settings of the Site

S.No.	Particulars	Details (with approx. aerial distance & direction from the project site)		
		Name of Village	Distance & Direction	Population (as per 2011 Cuttack District Census Handbook)
1.	Nearest Habitation	Ghantikhal	0.26 km (E)	1377
		Nidhipur	0.34 km (E)	1286
		Mahakalbasta	1.50 km (W)	1232
		Athagarh – 8.80 km (W) Cuttack – 9.20 km (ESE)		
2.	Nearest Town/City	Athagarh – 8.80 km (W) Cuttack – 9.20 km (ESE)		
3.	Nearest National Highway / State Highway	<ul style="list-style-type: none"> NH-55 – 3.63 km (N) Athagarh - Dhableswar Rd – Adjacent to Project Site on the Southern side Ghantikhal – Khuntuni Village Rd - Adjacent to Project Site on the Eastern side 		
4.	Nearest Railway Station	Ghantikhal-Nidhipur Railway Station – 0.15 km (E)		
5.	Nearest Airport	Biju Patnaik International Airport, Bhubaneswar – 29 km (SSE)		
6.	National Parks, Wildlife Sanctuaries, Biosphere Reserves	There is no National Parks, Wildlife Sanctuaries, and Biosphere Reserves within 10 km from the plant site.		
	Reserve Forest and Protected Forest within 10 km radius	<ul style="list-style-type: none"> Oringa RF – Adjacent to project boundary Khalakhala RF – 0.64 km (S) Brahmanabasta RF – 0.66 km (E) Subasi RF – 2.09 km (NW) Ranibania RF – 5.09 km (NW) Sukasana RF – 5.10 km (SW) 		



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

		<ul style="list-style-type: none"> • Deulia RF – 5.12 km (NNW) • Bouda Banakhandi RF – 5.46 km (SW) • Adala RF – 5.67 km (NW) • Suniamuhan RF – 6.25 km (ENE) • Sankhiapoi RF – 6.65 km (NE) • Gadabola RF – 7.93 km (NW) • Baula RF – 8.13 km (ENE)
7.	Water Body within 10 km radius	<ul style="list-style-type: none"> • Sapua Nadi – 2.09 km (WSW) • Barha Jor – 2.83 km (NW) • Mahanadi River – 3.40 km (E) • Kathajodi River – 5.84 km (SE) • Bhuiyan Jor – 8.74 km (E)
	Distance of nearest HFL	Mahanadi River - Near Naraj (5.58 km, SE)
8.	Defense Installations	No defense installations within 10 km from the plant site
9.	Seismic zone	Zone – III (Moderate damage risk zone) [as per IS 1893 (Part-I): 2002]
10.	Nearby Eco-sensitive zone	No eco-sensitive location within 10 km from the plant site

4.5 Existing Infrastructure

It is brownfield project for expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant 2.0 MTPA, Pellet Plant 1.2 MTPA, Sponge Iron Plant 0.3 MTPA, Sinter Plant 1.75 MTPA, Blast Furnace 1.27 MTPA, Steel Products (SMS & Rolling Mill) 1.5 MTPA, Coal Washery Plant 1.0 MTPA, Coke Oven Plant (Non-Recovery Type) 0.5 MTPA, Chrome Ore Briquetting Plant 0.3 MTPA, Ferro Alloy Plant 0.125 MTPA, Lime Dolo Plant 0.165 MTPA, Oxygen Plant 0.302 MTPA, CPP- 215 MW.

4.6 Soil Classification

The soil of Cuttack District comes under four orders, viz, (1) Alfisols, (2) Inceptisols, (3) Entisols and (4) Vertisols. The recently formed alluvium comes under Entisols; the comparatively older alluvial soils come under inceptisols and the more matures soils comes under Alfisols. The black soils of Tangi Choudwar Block comes under Vertisols.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

4.7 Climatic Data from Secondary Sources

Cuttack district and study area experiences a tropical wet and dry climate. The summer season is from March to June when the climate is hot and humid. The temperature around this season is 35 °C to 40 °C Thunderstorms are common at the height of the summer. The monsoon months are from July to October when the city receives most of its rainfall from the South West Monsoon. The annual rainfall is around 144 cm. Temperatures are considerably lower during the rainy season, averaging around 30 °C. The winter season from November to February is characterized by mild temperatures and occasional showers. The winter months feature chilly northerly winds which bring down the temperature to around 15 °C, though the bright sunshine helps maintain the pleasant weather. Temperatures may exceed 45 °C at the height of summer and may fall below 10 °C in winters.

4.8 Social Infrastructure Available

Infrastructural Facilities- The study area has well developed facilities for education, health care, drinking water, post and telegraph offices, approach roads and irrigation.

Education- Almost all the villages surveyed during study period have at primary/middle school and high school. Few colleges and a Polytechnic Institute along with Medical Institute are also present within reachable distance.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 4.3: Nearby Facilities / Social Infrastructure

Facilities/Social Infrastructure	Description		
	Name of Village	Distance & Direction	Population (as per 2011 Cuttack District Census Handbook)
Details of nearby villages	Ghantikhal	0.26 km (E)	1377
	Nidhipur	0.34 km (E)	1286
	Mahakalbasta	1.50 km (W)	1232
	<ul style="list-style-type: none"> • Panchayat High School, Ghantikhal – 0.24 km (E) • Mahakalabasta High School – 1.54 km (W) • Kakhadi Juinor College – 3.02 km (E) • Khuntuni Collge – 3.29 km (N) • Dhableswar Institute of Polytechnic – 3.64 km (NNW) 		
Medical Facilities	<ul style="list-style-type: none"> • GIMSAR Hospital, Mahakalabasta – 1.67 km (W) • CHC, Berhampur – 2.94 km (ESE) • PHC, Khuntuni – 3.83 km (N) • Kuleilo Orthopedic Centre – 4.53 km (NW) 		
Road & Other Infrastructure	<ul style="list-style-type: none"> • NH-55 – 3.63 km (N) • Athagarh - Dhableswar Rd – Adjacent to Project Site on the Southern side • Ghantikhal – Khuntuni Village Rd - Adjacent to Project Site on the Eastern side 		
Specific Measures for Safeguard of nearby habitation	<ul style="list-style-type: none"> • Green Belt development is present all around the project site to reduce the dust emission and noise pollution effect on the nearby human settlement. • Regular health check-ups by ASL Medical Team in periphery villages is being carried out at present and shall continue to ascertain impacts, if any. 		



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

5. PLANNING BRIEF

5.1 Planning Concept (type of industries, facilities, transportation etc.) Town and Country Planning / Development Authority classification

It is brownfield project for expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant 2.0 MTPA, Pellet Plant 1.2 MTPA, Sponge Iron Plant 0.3 MTPA, Sinter Plant 1.75 MTPA, Blast Furnace 1.27 MTPA, Steel Products (SMS & Rolling Mill) 1.5 MTPA, Coal Washery Plant 1.0 MTPA, Coke Oven Plant (Non-Recovery Type) 0.5 MTPA, Chrome Ore Briquetting Plant 0.3 MTPA, Ferro Alloy Plant 0.125 MTPA, Lime Dolo Plant 0.165 MTPA, Oxygen Plant 0.302 MTPA, CPP- 215 MW.

5.2 Population Projection

Growth and development of the existing project by way of expansion envisages greater employability in the locality.

- Construction Period: During construction, work force for civil and mechanical will be upto 500 till completion of the project.
- Operation Period: Since the implementation of expansion project will be undertaken in phased manner, employment opportunity will grow proportionately with every new project comes into operation.
- However details of manpower existing and proposed required for operation of entire project is stated in the table below:



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 5.1: Employment Opportunity

Category	Existing	Proposed	Total
Managerial	196	166	362
Supervisory	406	221	627
Skilled	471	300	771
Semi-skilled	637	400	1037
Unskilled	823	2500	3323
Total (direct)	2533	3587	6120
Indirect	12000		

The above manpower estimates have been based on production technologies proposed, type of requirement envisaged from various new facilities units of the plant, level of mechanization and automation, the layout of the plant, the number of operating shifts for the various plant units, etc. The estimate has been carried out with the basic assumption that some of the work will be carried out engaging personnel through contract.

While the above estimates may be considered for planning, a precise review will have to be undertaken at the appropriate time considering the equipment finalized recommendations of the equipment suppliers, the layout of the plant, norms of personnel of the project authority, etc.

5.3 Land use planning

In total 315.1 Ha. (already under possession) land will be adequate to accommodate the entire planned facilities. The total green belt area is 107 Ha. (33.95 % of total plant area). The breakup of land has been provided in Chapter-4.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

5.4 Assessment of Infrastructure Demand (Physical & Social)

The company has assessed the demand for infrastructure (Physical & Social) in the nearby area of the plant site and development activities are being undertaken under the corporate social responsibilities program for rural development initiatives for the upliftment of the nearby communities from time to time.

5.5 Amenities & Facilities

All infrastructure facilities such as education, health facilities and other social facilities are adequate at the district headquarter which makes the region adequate in amenities.

The following site services shall be provided:

- ✓ All statutory services; like a first aid centre, drinking water station, rest shelters, sheds; shall be provided close to the plant being developed.
- ✓ There shall be an ambulance in the area which, during an emergency can take the patient to the nearest hospital.
- ✓ Temporary office facilities for official works shall be maintained.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

6. PROPOSED INFRASTRUCTURE

6.1 Industrial Area (Processing Area)

The existing plant & machinery stands on 315.1 Ha. of land, which is already under company's possession. The land-use breakup has been provided in previous chapters.

6.2 Residential Area (Non-Processing Area)

At present, we are already having colony for staff and workers. However, in view of incremental manpower after expansion, both staff and workers colony will be expanded. The proposed manpower will be sourced from local area and few highly skilled posts will be filled from outside.

6.3 Green Belt

The total greenbelt area is of 107 Ha. which is 33.95% of total area of 315.1 Ha. The greenbelt includes plantation along the roads, boundary walls and around various facilities like shops, offices, waste disposal area etc. Regular maintenance of the existing plantation is being carried out. However, the non-covered area will be planted in a phased manner as per MoEF&CC guidelines.

A comprehensive greenbelt/plantation exists in and around the project. Indigenous trees have been planted in three-tier system which acts as a barrier between the plant and the surrounding areas. The selection of species was done considering the crown shape, surface of bark and leaves, flower, color, the capacity of growth in the wide variations of ecological conditions etc.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 6.1: Species recommended as pollution tolerant plant

S.No.	Scientific Name	Vernacular Name
A.Trees		
1.	<i>Acacia nilotica ssp indica</i>	Babul
2.	<i>Allanthus exceisa</i>	Magaki or Ghoda Neem
3.	<i>Albizia lebbeck</i>	Siris or Needrabati
4.	<i>Alstonia macrophylla</i>	
5.	<i>a. scholaris</i>	Chatiana
6.	<i>Artocarpus heterophyllus</i>	Panas
7.	<i>Butea monosprema</i>	Palas
8.	<i>Casuarina equisetifolla</i>	Jhaun
9.	<i>Citrus medica</i>	Mausimi
10.	<i>Dalbergia sissoo</i>	Sissoo
11.	<i>Disospyros melanoxylon</i>	Kendu
12.	<i>Eucalptus citriodora</i>	Neelgiri
B.Shrubs		
1.	<i>Bougaiknvilla spectabilis</i>	Kagaj phool
2.	<i>Calotropis procera</i>	Arakha
3.	<i>C. gigantean</i>	Arakha
4.	<i>Cassia sophera</i>	Chota chakunda
5.	<i>Ipomoea carnea</i>	Amari
6.	<i>Lantanas camara</i>	Naga airi
7.	<i>Murray panivulata Ricinus communis</i>	Kamini jada or Gaba
8.	<i>Thevetia peruviana</i>	Kaniara
C.Herbs		
1.	<i>Croton bongladianus</i>	Gandhi or Gahdha Tulasi
2.	<i>Solanun xanthocarpum</i>	Ankaranti



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 6.2: Species recommended for tolerance of dust, chemicals, gaseous emissions and temperature

S.No.	Scientific Name	Vernacular Name
1.	<i>Azadirachta indica</i>	Neemba
2.	<i>Bambusa multiplex</i>	Baunsa
3.	<i>Cassia fistula</i>	Sunari
4.	<i>Dalbergia sissoo</i>	Sissoo
5.	<i>Ficus benghalensis</i>	Bara gacha
6.	<i>Ficus religiosa</i>	Osta gacha
7.	<i>Immusops elengi</i>	Baula
8.	<i>Mangifera indica</i>	Aamba
9.	<i>Pongamia pinnata</i>	Karnja
10.	<i>Peltophorum pterocarpum</i>	Radhachuda
11.	<i>Syzygium cumjni</i>	Jamun
12.	<i>Samanea saman</i>	Bada Chakunda, Nidravati
13.	<i>Terminatia arjuna</i>	Arjuna
14.	<i>Tectona grandis</i>	Saguan

The species have been selected in consultation with Forest Department. Mixed plantation has been done keeping optimum spacing between the saplings. Kitchen waste from the plant canteen are used as manure either after composting or by directly burying the manure at the base of the plants.

6.4 Social Infrastructure

Aarti Steels Ltd. will commence a lot of infrastructure developmental works in the periphery area. The project will have a positive impact on the regional and national economy, consolidating employment in the Indian mineral processing industry and its allied subsidies. Value addition to low-grade Iron Ore fines by converting it to Iron Ore pellets is a great achievement for the steel industry.

The project will result in the growth of the surrounding areas by increased direct and indirect employment opportunities in the region including ancillary development and supporting infrastructure. The installation of the proposed plant will lead to the



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

development of certain local ancillary facilities and consequent employment opportunities. Further the project will also lead to the development of markets, trade centres, activities, etc.

6.5 Connectivity

- Road Connectivity: Well connected with local road connecting Ghantikhal village. NH-55 (Sambalpur-Cuttack Highway) is at a distance of 3.63 km (N).
- Rail Connectivity: Ghantikhal-Nidhipur Railway Station- 0.15 km (E)
- Nearest Airport: Biju Patnaik International Airport, Bhubaneswar- 29 km (S)

6.6 Drinking Water

At the final stage domestic & drinking water requirement will be 135 KLD. Domestic water requirement is being/ will be sourced from Mahanadi River.

6.7 Sewage Treatment Plant

A total of 108 KLD domestic sewage will be treated in the existing installed Sewage Treatment Plant of 420 KLD Capacity, which is adequate enough to handle the increased load. Treated water will be recycled and reused. The STP will be run by the MBBR Technology.

Process:

- a) Raw sewage being discharged will be collected and brought to the sewage treatment plant (STP).
- b) The sewage will be first collected in the equalization tank after passing the same through the screen chamber.
- c) The equalized sewage will then be passed through the oil removal tank which will be followed by an elaborate treatment comprising secondary and tertiary treatment.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

- d) Secondary treatment will consist of biological treatment consisting of Single Stage Aerobic Treatment System consisting of aerobic reactors based on the MBBR system followed by the tertiary treatment system.
- e) Tertiary treatment will consist of pressure sand filtration and activated carbon filtration followed by UV Treatment of underflow of the activated carbon filter.

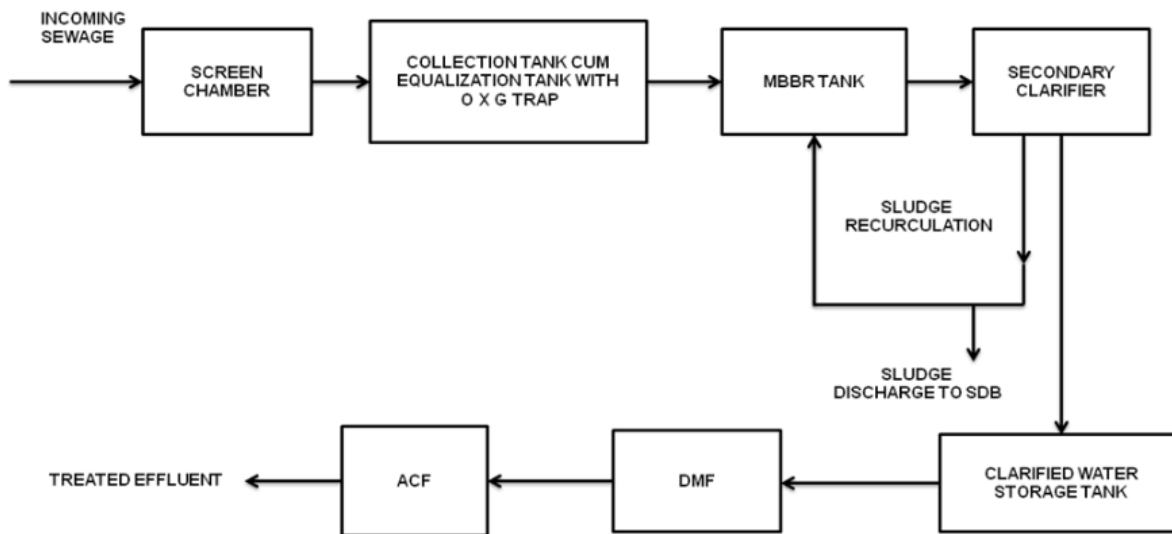


Fig 6.1: STP Flow Diagram

6.8 Rainwater Harvesting

As per CGWB guidelines, shaft recharge-type rainwater harvesting structures would be suitable at the project location. The recharge shaft will be perforated and the depth of the shaft will be around 3 m. Rooftop rainwater (from various plant sheds) will be collected and directed towards these harvesting structures. Oil filters will be put in all drain heads to ensure that no oil and grease from the surface gets mixed with the percolated water.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

CGWB guidelines shall be followed for the construction of the Rainwater Harvesting System.

6.9 Waste Management

The waste that would be produced from the project and their disposal is discussed in Chapter 3.

6.10 Power Requirement and Source

The total power requirement for plant is 278 MW.

Existing power requirement is 74 MW. The proposed power requirement for the project is estimated as 204 MW.

To meet the total power requirement of 278 MW, 215 MW power will be obtained from the CPP & the rest 63 MW from nearest GRID. 10 MW power will be obtained from GRIDCO for emergency startup power.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

7. REHABILITATION AND RESETTLEMENT (R&R) PLAN

7.1 Policy to be adopted (Central/State) in respect of the project affected persons including home oustees, land oustees and landless labourers (brief outline to be given)

Total Land is 315.1 Ha. There are no displaced habitats in the identified land. And the complete land is under Company's possession. Local people will be engaged in construction and operational activities. There will be no need for an R&R plan for the project. The project will result in the growth of the surrounding areas by increasing direct and indirect employment opportunities.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

8. PROJECT SCHEDULE & COST ESTIMATES

8.1 Likely date of start of construction and likely date of completion (schedule for the project to be given)

Planning of Activities

Planning is essential pre-requisites for the timely completion of the project. Following activities will be involved:

- Pre- Project Activities
- Project Activities (Implementation Stage)
- Statutory Clearances- The project will require various statutory approvals and clearances from various authorities of the Government. Clearances required for the project shall be identified in due course and necessary action will be taken to obtain the same.

The factors which are responsible for the timely implementation of the project are:-

- Arrangement of proper finance for the project.
- Finalization of the layout of the plant.
- Design of utilities and services.
- Placement of orders for plant and machinery.
- Arrangements for Govt. sanctions and supply of power.
- Recruitment of personnel.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Project Implementation Schedule

The overall project shall be implemented over 54-60 months commencing from the zero date. Zero Date shall be the date when the Company acquires and possesses the land and have the statutory approvals in hand. The implementation period of the project is estimated at 60 months as detailed:

Table 8.1: Project Implementation Schedule

Project Module	Start Date	End Date
After receipt of EC; Obtaining Consent to Establish	Zero date	
Land Development	Zero date	5 th month
Order of Equipments	5 th month	10 th month
Civil & Steel Structural Foundation	9 th month	32 nd month
Delivery of Equipments	12 th month	20 th month
Erection of Equipments	10 th month	38 th month
Utilities & Infrastructures	15 th month	30 th month
Synchronization	38 th month	50 th month
Consent to Operate	54 th month	57 th month
Trial Run of Production	57 th month	60 th month
Commercial Procution	60 th month	

8.2 Estimated Project cost along with analysis in terms of the economic viability of the project

The overall cost of the Project is estimated at Rs. 6112.00 Crores, the breakup of which is as under:



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 8.2: Cost Breakup

S.No.	Particulars	Existing (Rs. Crores)	Proposed (Approx. Rs. Crores)	Total (Rs. Crores)
1.	Land & Site Development	10.49	-	10.49
2.	Plant & Machinery	794.60	4540.16	5334.76
3.	Civil Construction Activities	152.75	25.00	177.75
4.	EMP Cost	84.16	404.84	489.00
5.	Miscellaneous Fixed Assets	10.00	90.00	100.00
	Total Capital Cost	1052	5060	6112

Other expenditure under this head includes fees to be paid towards legal expenses for fees payable to the lenders' and owner's legal counsel, insurance advisor's fees, startup fuel, construction power, employees recruitment, training and salaries, appraisal fees, merchant banker's fees, upfront fees to lenders, advisors fees, etc.

Total capital cost for Environmental Pollution Control Measures Rs. 489.00 Crores (approx).

Recurring cost/annum for Environmental Pollution Control Measures Rs. 26.55 Crores (approx).



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table 8.3: Cost of Environment Management (Existing + Proposed)

S.No.	Unit	Detail	Capital Cost (Rs. in Lakhs)		Operating Cost (Rs. in Lakhs)		Maintenance Cost (Rs. in Lakhs)		Total Recurring Cost (Rs. in Lakhs)	
			Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
1.	Waste Water	STP and maintenance	1050	4450	40	180	10	35	50	215
2.	Air	APCD (ESP and Bag Filter)	4500	22500	40	180	190	910	230	1090
3.	Hazardous Management	Proper collection, Safe Handling, Storage within premises and disposal of waste at approved TSDF, recyclers, etc as applicable	300	1500	4	21	5	20	9	41
4.	Fire & Safety	Fire Extinguishers, Fire Hydrant system	725	4075	8	42	20	90	28	132
5.	Air, Water, Hazardous	CEMS, Weather Station & Third	775	4825	25	110	5	20	30	130



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

	s Waste Monitoring	Party								
6.	Greenbelt Development	Plantation	100	370	20	90	5	20	25	110
7.	Occupational Health	Medical Health checkup, PPE	220	880	13	57	3	12	16	69
8.	CER	Solar Panel & Road construction etc. as required	663	1002	40	180	20	100	60	280
9.	Misc.	Contingency Fund	83	882	10	60	12	58	22	118
	SUB-TOTAL		8416	40484	200	920	270	1265	470	2185
	TOTAL		48900		1120		1535		2655	



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

9. ANALYSIS OF PROPOSAL

9.1 Financial and social benefits with special emphasis on the benefit of the local people including tribal population, if any in the area

The proposed configuration will have the following benefits:

- Direct and indirect employment opportunities will be generated which will result in the growth and development of the surrounding areas.
- The project will improve the socio-economic condition and also it will raise the living standard of the local population.
- Special emphasis on financial and social benefits will be given to the local people including the tribal population, if any, in the area. Development of social amenities will be in the form of medical facilities, education and the creation of self-help groups.
- No adverse effect on the environment is envisaged as proper mitigation measures will be taken up for the same.

Aarti Steels Ltd. will take into account measures for the socio-economic upliftment & welfare of nearby villages:

- Local infrastructure development
- Social Afforestation
- Extending support to games, sports, and culture to the local community
- Health and medical facilities
- Social awareness programs will further improve the quality of life and standard of living such as sanitation and hygiene.
- Financial assistance to talented and poor students for higher studies.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-1 (EC dated 16.02.2005)

ENVIRONMENTAL CLEARANCE FROM MOEF

No.J.11011/158/2004-IA II(I)
Government of India
Ministry of Environment & Forests
I.A.Division

Email plahujarak@yahoo.com
Paryavaran Bhavan, CGO Complex,
Lodi Road, New Delhi-110003
Dated the February 16, 2005

To
The Vice President
M/s Aarti Steels Limited
Steel and Power
Plot no.11 /1B/41, Sector 11, CDA,
Bidanasi, Cuttack- 753014

Sub: 0.5MTPA integrated steel plant and 50MW Captive power plant by M/s
Aarti Steels Limited at Village Ghantikhal in district Cuttack in Orissa-
environmental clearance reg.

Sir,

This has reference to your letter no. ASL/SP dated 04.09.2004 along with application, EIA /EMP reports and related project documents and subsequent clarifications furnished your letters dated 22nd October, 2004 and 3rd November, 2004 for environmental clearance on the above mentioned project. The Ministry of Environment and Forests has examined your application. It is noted that proposal involves 0.5 MTPA integrated steel plant and 50MW Captive power plant. It is also proposed to install a coal washery of 1.0MTPA capacity based on heavy media technology.

The land area of the project is 700 acres. The project does not involve diversion of forestland and displacement of people. Water requirement of 17316 m³/d would be met from the Mahanadi river. Permission to draw water from the State Water Resources Department has been obtained on 6th December, 2003. Public hearing of the project was held on 17.11.2003. The Orissa Pollution Control Board has granted NOC on 15.12.2003. Total cost of the project is Rs. 886.35 crores.

2.0. The Ministry of Environment and Forests hereby accords environmental clearance to the above project under the provisions of EIA Notification dated 27th January, 1994 as amended, subsequently subject to strict compliance of the following specific and general conditions:



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-2 (EC dated 13.05.2009)

Annexure-2
PND

F. No. J-11011/287/2008- IA II (I)
Government of India
Ministry of Environment and Forests
(I.A. Division)

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi - 110 003

E-mail : pb.rastogi@nic.in
Telefax : 011: 2436 7668
Dated 13th May, 2008

To, ✓
The Vice President (Sponge Iron & Power)
M/s Aarti Steels Limited
At: Ghantikhal, Athgarh
Cuttack-754 029, Orissa

E-mail : narayan.ltp@gmail.com / aartisteel@mail.insel.net / cuttack@aartisteelsltd.com;
Fax No : 0671-3061148, 49, 50, 2871281

Subject: Expansion of Integrated Steel plant at Ghantikhal, Athgarh, Cuttack, Orissa by M/s Aarti Steels Limited – Environment clearance reg.
Ref. : Your letter no. ASL/SP/MOEF dated 10th March, 2008,

Sir,

This has reference to your letter no. ASL/SP/MOEF dated 10th March, 2008 alongwith Application in Form I, Pre-feasibility Report and draft 'Terms of References' as per the EIA Notification, 2006 and related project documents and subsequent clarifications furnished by you vide your letters dated 6th & 19th November, 2008, 8th, 10th, 18th, 24th & 26th December, 2008, 24th December, 2008, 25th January, 2009 and 12th February, 2009 for environmental clearance on the above mentioned project.

2.0 The Ministry of Environment and Forests has examined the application. It is noted proposal is for the expansion of Integrated Steel Plant at Ghantikhal, Athgarh, Cuttack, Orissa by M/s Aarti Steels Limited. Total land acquired is 283.4 ha. No National Park, Wild life Sanctuary and Reserve Forest is located within 10 km radius of the project site. Environmental clearance for the existing plant was accorded in 2004. Total cost of the proposed expansion is Rs. 900.00 Crores.

Facilities	Existing Capacity (TPA)	Proposed Capacity (TPA)	Total Capacity (TPA)
Coal Washery	10,00,000	10,00,000	20,00,000
Sinter	-	3,43,000 (1 x 36 sq. m)	3,43,000
Coke oven	-	2,36,000 (NRCO 4x14 Oven)	2,36,000
Power Plant	50 MW	110 MW (2x50 MW WHRB+1x10 MW CFBC)	160 MW
DR plant	2x1,50,000	2x1,50,000	6,00,000
SMS	94,200	--	94,200
MBF (Pig Iron)	3,00,000	--	3,00,000
Ferro Alloy Plant	25,000	25,000	50,000
Rod, Wire, Square, Rounds, Flats	4,99,300	--	4,99,300



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-3 (2ND CTE)



BY REGD POST

**OFFICE OF THE
STATE POLLUTION CONTROL BOARD, ORISSA**

Parivesh Bhawan, A/118, Nilakantha Nagar, Unit-VIII,
Bhubaneswar - 751 012

OFFICE MEMORANDUM

No. 16176 /IND-II-NOC- 5130

Date 12-10-09

In consideration of the application for obtaining Consent to Establish for M/s. AARTI STEELS LTD., the State Pollution Control Board has been pleased to convey its Consent to Establish for **0.5 MTPA Integrated Steel Plant** under section 25 of the Water (Prevention & Control of Pollution) Act, 1974 and section 21 of the Air (Prevention & Control of Pollution) Act, 1981 for following plant facilities :

Sl. No.	Plant facilities	Phase - I	Phase-II
1.	DRI kiln	2X1,50,000 (2X500 TPD)	
2.	Blast furnace	1X250 m3	i) Wagon Tippler
3.	Coal washery	1.0 MT/Year	ii) Bar Rod
4.	Power plant	1 x 40MW (CFBC)+ 1x10 MW(WHRB)	Mill(finished steel)- 5,00,000 TPA
5.	Raw materials preparation Plant (RMPP)	Matching the production facilities with wagon tippler	iii) Wire Drawing Unit
6.	Induction furnace steel making	i)4x12.5 Ton IF ii)2x26 Ton Ladle furnace	
7.	Billet caster IF shop	1x 2 strand billet caster	
8.	EAF Steel making	i)2X35 T EAF ii)1X35 T LRF iii)1X35 T VD /VOD iv)1X35 T AOD	
9.	Billet caster in EAF shop	1 x 2 strand billet caster	
10.	Bloom caster in EAF shop	1 x 2 strand bloom caster	
11.	Power Distribution		
12..	Ferro Alloys Plant(2x9 MVA)	2x12500 Ton Ferro Alloys Plant	

At:Nidhipur,Ghantikhal,Mahakalbasta,Athagarh in the district of Cuttack with the following conditions.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

This consent to establish order supersedes earlier consent to establish order issued vide letter no.25707 dtd.15.12.2003

GENERAL CONDITIONS.

1. This Consent to establish is valid for the product, quantity, manufacturing process and raw materials as mentioned in the application & for a period of five years from the date of issue of this letter, provided commencement of production of the proposed project has not taken place in the meantime.
2. If the proponent fails to start operation of the project but substantial physical progress has been made then a renewal of this consent shall be sought by the proponent.
3. Adequate effluent treatment facilities are to be provided such that the quality of sewage and trade effluent satisfies the standards as prescribed under Environment Protection Rule, 1986 or as prescribed by the Central Pollution Control Board and/or State Pollution Control Board or otherwise stipulated in the special conditions.
4. All emission from the industry as well as the ambient air quality and noise are to conform to the standards as laid down under Environment (Protection) Act, 1986 or as prescribed by Central Pollution Control Board/State Pollution Control Board or otherwise stipulated in the special conditions.
5. Adequate method of disposal of solid waste is to be adopted to avoid environmental pollution.
6. The industry is to comply to the provisions of Environment Protection Act, 1986 and the rules made there under with their amendments from time to time such as the Hazardous Waste (Management & Handling) Rules 1989, Hazardous Chemical Rules, Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 etc. and amendments there under. The industry is also to comply to the provisions of Public Liability Insurance Act, 1991, if applicable.
7. The industry is to apply for grant of Consent to operate under section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 & Air (Prevention & Control of Pollution) Act, 1981 at least 3 (three) months before the commercial production and obtain Consent to Operate from this Board.
8. This consent to establish is subject to statutory and other clearances from Govt. of Orissa and/or Govt. of India, as and when applicable.

SPECIAL CONDITIONS :-


1. The unit shall comply to the conditions stipulated in the environmental clearance issued by MoEF, Govt. of India vide letter No. J-11011/158/2004-IA II(I) dtd. 16.02.2005.
2. This NOC is given for the capacity as mentioned above and any expansion in the capacity, change or modification in the process, addition, alternation of any nature has to be undertaken with the prior approval of the Board. For any change in the site or area fresh NOC has to be obtained from the Board.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-4 (3RD CTE)

BY REGD POST


**OFFICE OF THE
 STATE POLLUTION CONTROL BOARD, ORISSA**
 Parivesh Bhawan, A/118, Nilakantha Nagar, Unit-VIII,
 Bhubaneswar - 751 012

OFFICE MEMORANDUM

No. 786 /IND-II-NOC- 5130 Date 21.01.2010

In consideration of the application for obtaining Consent to Establish for M/s. **AARTI STEELS LTD.,(Steel & Power)(expansion of 0.5MTPA integrated steel plant)** the State Pollution Control Board has been pleased to convey its Consent to Establish under section 25 of the Water (Prevention & Control of Pollution) Act, 1974 and section 21 of the Air (Prevention & Control of Pollution) Act, 1981 for following plant facilities :

Sl. No.	Plant facilities	Existing	Proposed	Production
1.	Coal washery	1 x 1 MTPA	1 x 1 MTPA	2.0 MTPA
2.	DR Plant	2x1,50,000 TPA(2x500 TPD)	-	3,00,000 TPA
3.	Coke Oven	----	NRCO 4x14	2,36,000 TPA
4.	Sinter Plant	----	1 x 36 Sq.mtr	3,43,000 TPA
5.	SMS	94,200 TPA	----	94,200 TPA
6.	Rolling Mill	4,99,300 TPA	----	4,99,300 TPA
7.	MBF	350 m3(Pig Iron-3,00,000 TPA)	----	3,00,000 TPA
8.	Power Plant	40 MW(CFBC)+ 10 MW (WHRB)	2 x 50MW(CFBC)	150 MW
9.	Ferro Alloys Plant(SAF)	25,000 TPA(2x9 MVA)	25,000 TPA(2x9 MVA)	50,000 TPA(4x9 MVA)

At: Nidhipur, Ghantikhal, Mahakalbasta, Athagarh (in the existing premises of steel plant of M/s Aarti Steel Ltd.) in the district of Cuttack with the following conditions.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-5 (4TH CTE)



STATE POLLUTION CONTROL BOARD, ODISHA

(Department of Forest & Environment, Govt. of Odisha)
ParibeshBhawan, A/118, Nilakanthanagar, Unit-VIII
Bhubaneswar – 751012

BY REGD POST

No. 14797 /

Ind-II-NOC-5130

Date 12-9-14 /

OFFICE MEMORANDUM

Consent to establish was granted to M/s. Aarti Steels Ltd. (Steel & Power), vide letter No. 16176, dated. 12.10.2009 for 0.5 MTPA integrated steel plant and generation of power of 50 MW, at-Nidhipur, Ghantikhal, Mahakalabasta, Athagarh in the district of Cuttack, in which the configuration of power plant was 40 MW (CFBC) + 10 MW (WHRB). The proponent had also obtained Environmental Clearance for 0.5 MTPA steel plant and 50 MW power plant vide letter no. J-11011/158/2004-IA.II (I), dated 16.02.2005. Subsequently, consent to establish was granted for expansion of 0.5 MTPA integrated steel plant vide letter no. 786, dated 21.01.2010, in which configuration of existing 50 MW power plant was 40 MW (CFBC) + 10 MW (WHRB). The proponent has requested to modify configuration of power plant in consent to establish granted on 12.10.2009 as well as 21.01.2010 as 1x30 MW (AFBC) boiler + 2x10 MW (WHRB) as per configuration incorporated in EIA report submitted to MoEF, Govt. of India instead of 1x40 MW (CFBC) boiler and 1x10 MW (WHRB). The matter was discussed in the consent committee meeting held on 26.07.2014.

In consideration to the request of the proponent and recommendation of the consent committee, the Board has been pleased to amend consent to establish granted above on 12.10.2009 and 21.01.2010 for power plant of capacity 50 MW as follows:

Configuration of power plant of capacity 50 MW 1x40 MW (CFBC) + 1x10 MW (WHRB)	May be read as 1x30 MW (AFBC) + 2x10 MW (WHRB for each 500 TPD DRI Kiln)
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All other matter / conditions as given in the above consent to establish order issued vide letter no. 16176, dated. 12.10.2009 and letter no. 786, dated 21.01.2010 shall be remain unchanged


MEMBER SECRETARY

To
✓ The President (Steel & Power)
M/s. Aarti Steel Ltd. (Steel & Power)
At- Ghantikhal, Athagarh, Dist- Cuttack.

Memo No. _____ /Date _____ /

Copy forwarded to:

1. The Secretary, Steel & Mines, Govt. of Odisha, Bhubaneswar.
2. The District Magistrate & Collector, Cuttack.
3. District Industries Centre, Cuttack.
4. Director, Factories & Boiler, Bhubaneswar.
5. DFO, Cuttack
6. Sr. Env. Engineer (c), SPC Board, Odisha, Bhubaneswar.
7. The Regional Officer, SPC Board, Cuttack.
8. Copy to Guard file / Consent to establish Register.

SR. ENV. ENGINEER (N)



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-6 (5TH CTE)

BY REGD POST

 **STATE POLLUTION CONTROL BOARD, ODISHA**
(Department of Forest & Environment, Govt. of Odisha)
Paribesh Bhawan, A/118, Nilakanthanagar, Unit-VIII
Bhubaneswar – 751012

No. 9140 / IND-II-NOC- 5987 Date 02-06-2016

OFFICE MEMORANDUM

In consideration of the application no. 407567 received through online for obtaining Consent to Establish for M/s Aarti Steels Ltd., the State Pollution Control Board has been pleased to convey its consent to Establish under section 25 of Water (Prevention & Control of Pollution) Act, 1974 and section 21 of Air (Prevention & Control of Pollution) Act, 1981 for establishment of Chrome Ore Briquetting Plant of capacity 25 TPH inside the existing premises of integrated steel plant adjacent to the existing 12 TPH Briquetting plant of 2x9 MVA Ferro Alloys Plant., At: Ghantikhal, Post: Mahakalabasta (in Plot nos. and Khata nos. mentioned as per application form) in the district of Cuttack with the following conditions.

GENERAL CONDITIONS:

1. This Consent to establish is valid for the raw materials, product, manufacturing process and capacity mentioned in the application form. This order is valid for five years, which means the proponent shall commence construction of the project within a period of five years from the date of issue of this order. If the proponent fails to do substantial physical progress of the project within five years then a renewal of this consent to establish shall be sought by the proponent.
2. The industry shall apply for grant of Consent to operate under section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 & Air (Prevention & Control of Pollution) Act, 1981 at least 3 (three) months before the commercial production and obtain Consent to Operate from this Board.
3. The industry shall comply to the provisions of Environment Protection Act, 1986 and the rules made there under with their amendments from time to time such as the Hazardous Waste (Management, Handling & Transboundary Movement) Rules 2008, Hazardous Chemical Rules, /Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 etc. and amendments there under. The industry shall also comply to the provisions of Public Liability Insurance Act, 1991, if applicable.
4. This consent to establish is subject to statutory and other clearances from Govt. of Odisha and/or Govt. of India, as and when applicable.

SPECIAL CONDITIONS:

1. This consent to establish is granted for the capacity as mentioned above and any expansion in the capacity, change or modification in the process, addition, alternation of any nature has to be undertaken with prior approval of the Board. For

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P.T.O...



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-7 (6TH CTE)



FAX : 2562822/2560955
Tel : 2564033/2563924
EPABX : 2561909/2562847
E-mail: paribesh1@ospcboard.org
Web site : www.ospcboard.org

**OFFICE OF THE
STATE POLLUTION CONTROL BOARD, ODISHA**
(Department of Forest & Environment, Govt. of Odisha)
Paribesh Bhawan, A/118, Nilakantha Nagar, Unit-VIII
Bhubaneswar – 751012

No. 10214 /

IND-II-NOC - 6162

Date 30-08-2018 /

By Regd. Post.

OFFICE MEMORANDUM

In consideration of the online application no. 2049263 for obtaining Consent to Establish for M/s Aarti Steels Ltd., the State Pollution Control Board is pleased to convey its Consent to Establish under section 25 of Water (Prevention & Control of Pollution) Act, 1974 and section 21 of Air (Prevention & Control of Pollution) Act, 1981 for establishment of Rolling Mill of capacity 4,99,300 TPA & Wire Drawing unit of capacity 1,35,000 TPA with project cost of ₹ 513.00 Crores inside the existing premises At Village: Ghantikhal, Tehsil: Athagarh in the district of Cuttack with the following conditions.

GENERAL CONDITIONS.

1. This Consent to establish is valid for the raw materials, product, manufacturing process and capacity mentioned in the application form. This order is valid for five years. The proponent shall commence construction of the project within a period of five years from the date of issue of this order. If the proponent fails to do substantial physical progress of the project within five years then a renewal of this consent to establish shall be sought by the proponent.
2. The industry shall comply to the provisions of Environment Protection Act, 1986 and the rules made there under with their amendments from time to time such as the Hazardous and Other Wastes (Management and Trans boundary Movement) Rules, 2016 and amendment thereof, Hazardous Chemical Rules / Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 etc. and amendments there under. The industry shall also comply to the provisions of Public Liability Insurance Act, 1991, if applicable.
3. The industry shall apply for grant of Consent to operate under section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 & Air (Prevention & Control of Pollution) Act, 1981 at least, 3 (three) months before the commercial production and obtain Consent to Operate from this Board.
4. This consent to establish is subject to statutory and other clearances from Govt. of Odisha and/or Govt. of India, as and when applicable.

SPECIAL CONDITIONS:

A. GENERAL:

1. The proponent shall inform to the MoEF&CC, Govt. of India regarding installation of Wire Drawing unit and 120 TPH top and bottom fired walking beam type furnace as same was not part of the original proposal for which environmental clearance has



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-8 (7TH CTE)



Tel : 2564033/2563924
EPABX : 2561909/2562847
E-mail: paribesh1@ospcboard.org
Web site : www.ospcboard.org

OFFICE OF THE STATE POLLUTION CONTROL BOARD, ODISHA

Parivesh Bhawan, A/118, Nilakantha Nagar, Unit-VIII,
Bhubaneswar - 751 012

BY SPEED POST

No. 7263 /IND-II-CTE - 6162

Date 20.07.2019 /

OFFICE MEMORANDUM

In consideration of the request of the proponent through online application no. **2049263** and recommendation of the Consent Committee in its meeting held on 22.05.2019, the State Pollution Control Board is pleased to waive out special condition no. 1 and 19 of Consent to Establish issued vide OM No. 10214, dated 30.08.2018 for establishment of Rolling Mill of capacity 4,99,300 TPA & Wire Drawing unit of capacity 1,35,000 TPA with project cost of ₹ 513.00 Crores inside the existing premises, At - Village Ghantikhal, Tehsil - Athagarh in the district of Cuttack.

All other matter / conditions as given in the Consent to Establish order issued vide OM No. 10214, dated 30.08.2018 shall be remain unchanged.


MEMBER SECRETARY

To,

The Director,
M/s Aarti Steels Limited,
At - Ghantikhal, Post - Mahakalbasta,
Via - Athagarh, Dist - Cuttack.

Memo No. 7264 /Date 20.07.2019 /

Copy forwarded to:

1. The Collector & District Magistrate, Cuttack.
2. The District Industries Centre, Cuttack.
3. The Director of Factories & Boiler, Bhubaneswar
4. The DFO, Cuttack.
5. Consent to Operate section, SPC Board, BBSR
6. Hazardous Waste Management section, SPC Board, BBSR
7. The Regional Officer, SPC Board, Cuttack.
8. Copy to Guard file


CHIEF ENV. ENGINEER

o/c




Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-9 (1ST CTO)

File 210

FAX : 2562822/2560955
Tel : 2564033/2563924
EPABX : 2561909/2562847

**STATE POLLUTION CONTROL BOARD, ORISSA**
(Department of Forest & Environment, Govt. of Orissa)
Paribesh Bhawan, A/118, Nilakanthanagar, Unit-VIII
Bhubaneswar – 751012

No. 33948 / IND-I-CON- 4904 Date 25/1/05

By Regd. Post

To : The Vice President
M/s. Arati Steels Ltd (Steel & Power)
At-Ghanti Khal, PO-Mahakalbasta
Via – Athagarh, Dist - Cuttack

Sub : Operation of 1 X 500 TPD DRI kiln, 40 MW CPP, 1 million ton coal washery and steel melting shop at Ghantikhal Athagarh, Cuttack.

Ref : i) This office letter No. 29756 dt. 29.9.05.
ii) Your letter No. ASL/SP/OPCB/10925 dt dt. 10.10.05 and letter No. ASL/SP/OPCB/11302 dt. 5.11.05

Sir,
In inviting a reference to the above and in consideration of your representation and in view of rectification of pollution control measures in your plant, the closure direction issued under section 31A of Air(PCP) Act, 1981 is hereby kept in abeyance and you are allowed operation of the following units alongwith all pollution control measures for a period upto 31.3.06.

1. 1 X 500 TPD DRI kilns
2. 40 MW CPP
3. 1.0 Million ton coal washery
4. Steel melting shop
 - a) Induction furnace - 4X12 MT
 - b) Ladle furnace - 2 x 26 MT
 - c) Billet caster - 1 no.

During this operation period the performance of pollution control measures shall be tested by Regional officer, SPC Board, Cuttack and corrective measures if required shall be taken by you to conform to the norms stipulated by the Board. In case the emission of flue gas/discharge of waste water do not meet the prescribed standard as stipulated in consent to establish order, you shall stop operation of the concerned units suo-motu under intimation to the Board. Please note that you will be required to comply with all special conditions stipulated in



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-10 (2ND CTO)



CONSENT ORDER

SPEED POST

STATE POLLUTION CONTROL BOARD, ORISSA

A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar-751012
Phone-2561909, Fax:2562822, 2560955

CONSENT ORDER

No. 9051 / IND-I-4904

Dt. 10.06.2007

CONSENT ORDER NO. 2713

Sub: Consent for Existing / New operation of the plant under Section 25 of the Water (Prevention & Control of Pollution) Act, 1974 and under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981.

Ref : Your application No Nil dtd. 10.05.2006

Consent is hereby granted under section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of Air (Prevention & Control of Pollution) Act, 1981 and rules framed there under to

Name of the Industry: M/s Arati Steel Ltd.

Name of the Occupier & Designation: Sri Rajeev Mittal, Director

Address: At-Ghantikhal, Mahakalabasta, Athagarh, Dist-Cuttack.

This consent order is valid for the period up to **31.3.2010**.

This consent order is valid for the product quantity, specified outlets, discharge quantity and quality, specified chimney/stack, emission quantity and quality of emissions as specified below. This consent is granted subject to the general and special conditions stipulated therein.

A. Details of Products Manufactured

Sl.No.	Product	Quantity
1.	Sponge Iron	1X500TPD = 500TPD
2	Power Plant(10MW WHRB+30MW AFBC Boiler)	40 MW



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha



CONSENT ORDER

3	Coal Washery	1MTPA
4	Induction Furnace	4x12T
5	LRF & Billet Caster	2x26T
6	F.A.P	1x8MVA

B. Discharge permitted through the following outlet subject to the standard

Outlet No.	Description of outlet	Point of discharge	Quantity of discharge	Prescribed standard					
1.	Domestic effluent from septic tank	Soak pit	No discharge						
2.	Cooling water	To be completely recycled							
3.	Washery effluent	To be completely recycled							

C. Emission permitted through the following stack subject to the prescribed standard

Chimney Stack No.	Description of Stack	Stack height (m)	Quantity of emission (Nm3/hr)	Prescribed Standard mg/Nm3					
				PM					
	Stack attached to								
1	WHRB of DRI plant after pre-collector & ESP	60	120000	100					
2	AFBC Boiler after ESP	85	195768	100					
3	Bag Filter of DRI unit	30	120000	100					
4	Bag Filter of Ladle refining furnace	30	33200	100					
5	Bag house of Ferro Alloys Plant	40	320000	100					



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-11 (3RD CTO)



CONSENT ORDER

SPEED POST

STATE POLLUTION CONTROL BOARD, ORISSA

A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar-751012
Phono-2561909, Fax:2562822, 2560955

CONSENT ORDER

No. 899 / IND-I-4904

Dt. 19-01-2011

CONSENT ORDER NO. 2713

Sub: Consent for Existing / New operation of the plant under Section 25 of the Water (Prevention & Control of Pollution) Act, 1974 and under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981.

Ref: Your letter dated 11.09.2010 & 30.10.2010.

Consent is hereby granted under section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of Air (Prevention & Control of Pollution) Act, 1981 and rules framed there under to

Name of the Industry: M/s Aarti Steels Ltd.

Name of the Occupier & Designation: Sri Rajeev Mittal, Director

Address: At-Ghantikhal, Mahakalabasta, Athagarh, Dist-Cuttack.

This consent order is valid for the period up to **31.03.2011**.

This consent order is valid for the product quantity, specified outlets, discharge quantity and quality, specified chimney/stack, emission quantity and quality of emissions as specified below. This consent is granted subject to the general and special conditions stipulated therein.

A. Details of Products Manufactured

Sl.No.	Product	Quantity
1.	Sponge Iron	1X500TPD = 500TPD
2	Power Plant(10MW WHRB+30MW AFBC Boiler)	40 MW



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha



CONSENT ORDER

3	Power Plant (CFBC)	50MW
4	Coal Washery	1MTPA
5	Electric Arc Furnace(EAF)	35T
6	Vacuum De-gasification(V.D)	35T
7	LRF & Billet Caster	2x26T
8	F.A.P	2x9MVA

B. Discharge permitted through the following outlet subject to the standard

Outlet No.	Description of outlet	Point of discharge	Quantity of discharge	Prescribed standard					
1.	Domestic effluent from septic tank	Soak pit	No discharge						
2.	Cooling water	To be completely recycled							
3.	Washery effluent	To be completely recycled							

C. Emission permitted through the following stack subject to the prescribed standard

Chimney Stack No.	Description of Stack	Stack height (m)	Quantity of emission (Nm3/hr)	Prescribed Standard mg/Nm3					
				PM					
	Stack attached to								
1	WHRB of DRI plant after pre-collector & ESP	60	120000	100					
2	AFBC Boiler after ESP	85	195768	100					
3	Bag Filter of DRI unit	30	120000	100					
4	Bag Filter of Laddle refining furnace	30	33200	100					



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-12 (Lastest CTO (i))



CONSENT ORDER

1

SPEED POST

STATE POLLUTION CONTROL BOARD, ODISHA

A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar-751012

Phone-2561909/ EPABX : 2561909/2562847

E-mail: paribesh1@ospcboard.org / Website: www.ospcboard.org

CONSENT ORDER

No. 3266 / IND-I-CON-4904

Dt. 21/03/2018

Sub: Consent for Existing / New operation of the plant under Section 25 of the Water (Prevention & Control of Pollution) Act, 1974 and under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981.

Ref : Online Application ID No. 1890833, dtd. 30-11-2017

This consent to operate order issued under section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of Air (Prevention & Control of Pollution) Act, 1981 and rules framed there under to

Name of the Industry: M/s. AARTI STEELS LIMITED

At- Ghantikhal, Po-Mahakalbasta, Via- Athagarh, Dist-Cuttack-754029

Name of the Occupier & Designation; Sri Rajeev Mittal, Director

Address: Plot No. 18/IB, Sector – 10, CDA, Cuttack – 753 014

This consent order is valid for the period from 01.04.2018 to 31.03.2023

This consent order is valid for the product quantity, specified outlets, discharge quantity and quality, specified chimney/stack, emission quantity and quality of emissions as specified below. This consent is granted subject to the general and special conditions stipulated therein.

A. Details of Products Manufactured

Sl.No.	Product	Quantity
01.	Sponge Iron - DRI Kiln –I & II	2×500 TPD
02.	WHRB Based Power Plant (DRI Kiln-I & II)	2×10 MW
03.	CFBC Based Power Plant	1×50 MW
04.	AFBC Based Power Plant	1×30 MW
05.	Coal Washery	1 MTPA
06.	Ferro Alloys Plant	2×9 MVA
07.	Ferro Alloys Plant (25,000 TPA)	1×18 MVA
08.	Chrome Briquette (1×25 TPH Briquette Plant)	25 Tons Per Hour
09.	Steel Melting Shop (SMS)	
	a) Electric Arc Furnace (EAF)	1×35 Ton
	b) Vacuum De-Gasification (VD)	1×35 Ton
	c) Ladle Refinery Furnace (LRF) & Billet Caster	2×26 Ton



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-13 (Latest CTO (ii))



CONSENT ORDER

1

SPEED POST

STATE POLLUTION CONTROL BOARD, ODISHA

(DEPARTMENT OF FOREST & ENVIRONMENT, GOVERNMENT OF ODISHA)

A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar-751012

Phone-2561909/ EPABX : 2561909/2562847

E-mail: paribesh1@ospcbboard.org / Website: www.ospcbboard.org

CONSENT ORDER

No. 10254 / IND-I-CON-4904

Dt. 01.10.19

Sub: Consent for Existing / New operation of the plant under Section 25 of the Water (Prevention & Control of Pollution) Act, 1974 and under Section 21 of the Air (Prevention & Control of Pollution) Act, 1981.

Ref : Online Application ID No. **2544990** dtd. **03.04.2019**

This consent to operate order issued under section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of Air (Prevention & Control of Pollution) Act, 1981 and rules framed there under to

Name of the Industry: M/s. AARTI STEELS LIMITED

At- Ghantikhal, Po-Mahakalbasta, Via- Athagarh, Dist-Cuttack-754029

Name of the Occupier & Designation; Sri Rajeev Mittal, Director

Address: Plot No. 18/IB, Sector – 10, CDA, Cuttack – 753 014

This consent order is valid for the period up to **31.03.2023**

This consent order is valid for the product quantity, specified outlets, discharge quantity and quality, specified chimney/stack, emission quantity and quality of emissions as specified below. This consent is granted subject to the general and special conditions stipulated therein.


A. Details of Products Manufactured

Sl.No.	Product	Quantity
01.	Rolling Mill (Special Steel Bars)	2,00,000 TPA



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-14 (NIPL Calculation)



[NIT Rourkela Pollution Load Calculation for Aarti Steels Limited Cuttack]

3.0 Calculation

The entire alloy plant has the three sections which are named as furnace section, briquette plant unit and jigging plant. In the current calculation, the pollution load for each part has been calculated and finally the total load for the entire alloy plant is determined. Initially, the reasons for the attainment of aforesaid augmentation are revealed by analysing the implemented process, used technology and literature [1-7]. Thereafter, by employing mass balance methods, analysing compositions of various streams and using online monitoring data, the quantifications of pollutions load have been performed.

The followings are the identified reasons for the attainment of enhancement

- 1 Operating days have increased from 330 to 345 days for following reasons**
 - Better maintenance practice
 - Root cause analysis of each failure
 - Better monsoon planning and having sufficient dry material for monsoon period
 - Control over input material which has decreased breakdown like sparking and water leakages
- 2 Specific Energy of 9 MVA has decreased from 4200 to 3350 kwh/T due to following reasons**
 - Improvement in briquette quality
 - Briquette increased upto 90% of total burden
 - Control over flux to reduce slag volume
 - Increase in continuous operation with increase in operating days
- 3. Increase in 9 MVA Power Input from 6.63 to 7.72 MW due to below reasons**
 - Increase briquette in burden has given better charge reactance and hence better power factor
 - Consistent chemical composition gives better arc stability and hence increased power input

Verified by: *Soumya S. Mohapatra*
Prof. Soumya S. Mohapatra
Asst. Professor
Department of Chemical Engineering
Principal Investigator

Page 9



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha



[NIT Rourkela Pollution Load Calculation for Aarti Steels Limited Cuttack]

4. 18 MVA Specific Energy is lesser than 9 MVA by 200 kwh

- 18 MVA is a semi closed type and as a result comparatively lesser heat losses to ambient atmosphere is observed.
- Due to increase furnace size, height has increased and as a result enhances charge preheating capability in the comparison with 9 MVA

Present operation is on optimized process and parameters marked in yellow colour have changed (Table 3(B))

Table 3(B): Parameters in the optimisation (the results are output of trial runs)

Initial Case							
Furnace Size	No of Furnace	Annual Production in Tones Per Furnace	Operating Days	Daily Production Tones	T/hr	Specific Energy kwh/T	Furnace Power Input in MW
1x9 MVA	4	12500	330	38	1.6	4200	6.63
Present Operation							
1x9	2	18000	345	52	2.2	3550	7.72
1x18 MVA	1	38000	345	110	4.6	3350	15.37

3.1 Pollution load calculation for the furnace section

In the furnace section, the quantification of raw materials, pollution loads, and the products for the various cases have been determined and also validated with the literature. For each case, the load and the requirements have been calculated by considering one hour operation as the basis.

3.1.1 Raw material requirements


For the various cases, the raw material requirements have been quantified by using mass balance principle [equations 1-13]. Thereafter, the determined values have been compared with the information provided by Aarti Steels Limited Cuttack and the comparison clearly validates the

Verified by: *Soumya S. Mohapatra*
Prof. Soumya S. Mohapatra
 Asst. Professor
 Department of Chemical Engineering
 Principal Investigator



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-15 (Letter regarding HFL Data & Flood History)



 Government of India
 Ministry of Jal Shakti
 Central Water Commission
 Mahanadi & Eastern Rivers Organization
 Bhubaneswar

No: TD/905/CE/VI/2020/ 383 Dated: 31, March, 2022

To,
 L.T.P Narayan, President,
 Aarti Steels Limited,
 Cuttack

Sub: Supply of Hydrological data- reg
 Ref: - letter No: ASL/Env/EC(Exp)/HFL/7407 dated 08/03/2022

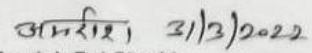
Sir,


Please refer to your above letter requesting for supply of Hydrological data of Mahanadi River for the purpose of "Expansion of Integrated Plant".

The availability of data with this office is as under:

Sl No.	Name of Site	Annual HFL data
1.	Naraj	1995-2020

The above data can be collected from this office by your authorized representative on any working day.

Yours faithfully,

 (Amrish Pal Singh)
 Superintending Engineer (C)



महानदी भवन
 प्लॉट नं. 13 & 14, भोइनगर, भुवनेश्वर-22
 दूरभाष: 0674-2545536
 ई-मेल: cemero-cwc@nic.gov.in
 • जल संरक्षण-सुरक्षित जीवन •

Mahanadi Bhawan,
 Plot No.A-13/14,Bhoinagar,
 Bhubaneswar-22
 Tel: 0674-2545536
 E-mail: cemero-cwc@nic.gov.in
 •Conserve Water- Save Life•



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Annual Highest Flood Level for the period 1990-2019

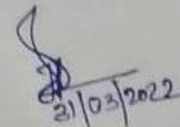
Station Code : NARAJ (NARAJ)

Local River : Mahanadi

Division: E.E., Bhubaneswar

Sub-Division: Bhubaneswar

Year	Highest Flood Level (m)	Date
1990	25.880	9/6/1990
1991	26.580	8/14/1991
1992	26.720	8/21/1992
1993	25.700	8/21/1993
1994	26.960	9/6/1994
1995	26.480	7/25/1995
1996	24.780	8/23/1996
1997	26.300	8/6/1997
1998	26.000	9/13/1998
1999	25.480	8/10/1999
2000	23.440	7/27/2000
2001	27.220	7/20/2001
2002	25.260	9/13/2002
2003	27.050	8/30/2003
2004	25.930	8/15/2004
2005	26.140	8/1/2005
2006	26.700	9/1/2006
2007	25.820	8/9/2007
2008	27.180	9/20/2008
2009	26.110	7/21/2009
2010	26.260	8/8/2010
2011	27.550	9/11/2011
2012	24.180	7/30/2012
2013	26.160	8/1/2013
2014	27.020	8/8/2014
2015	25.300	9/23/2015
2016	25.440	8/7/2016
2017	24.780	7/19/2017
2018	26.220	7/23/2018
2019	25.640	10/2/2019



21/03/2022

(J.R. SWAIN)
Junior Engineer (HQ)
D/o CE, M & ERO
Cuttack, Odisha



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-16 (Power Permission Letter - GRIDCO)

 **GRIDCO Limited**
(A Govt. of Orissa Undertaking)
(Formerly Grid Corporation of Orissa Limited)
Regd. Office: Janpath, Bhubaneswar-751022
Phone: 0674-2541127 Fax: 0674-2543452.

No. Gridco-DC-89/2009/ 5994(12) Date 5th September' 2009

From

Shri A.C. Mallick,
Director (Commercial)

To

The Sr. DGM (E&I),
M/s Aarti Steels Limited,
Plot No. 11/ 1B/ 41, Sector-11,
CDA, Cuttack- 753 014
Phone No.-0671- 2603 285
Fax No.-0671- 2603 407

Sub: Enhancement of Emergency (Start up) power in favour of M/s Aarti Steels Limited for requirement of their work unit at Ghantikhal, Mahakalabasta at district cuttack.

Ref: (i) Your Letter No. 26893 Dated 28.07. 2009.
(ii) Letter No. 20823 Dtd 27.07.2009 from Sr. GM(Tech.),Cesu.

Sir,

M/s Aarti Steels Limited is availing 4.444 MVA at present as Emergency power. With reference to the above cited subject, additional power is here by released in favour of M/s Aarti Steels Limited (Steel & Power) to make total 7 MW with immediate effect and 10 MW from 01.10.2009 including 4,444 MVA power availed by M/s Aarti Steels Limited.

The above release of power is subject to the terms and conditions stipulated in the system study conducted by OPTCL, if any and the terms and conditions to be stipulated by OPTCL on connectivity, protection, communication and data transfer etc. if any, which M/s Aarti Steels Limited is to abide.

Yours faithfully,

Arun Mallick
Director (Commercial) 28/09/2009

CC Dir (Engg.), OPTCL/ Dir (F&CA), Gridco/ CGM (const.)/ CGM (O&M)/ SGM (PP)/ SGM (TP)/SGM (CP)/ SGM(R&T)/ EA to CMD for kind information of CMD.
CEO, CESU for information and further necessary action.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-17 (Water Agreement Letter)



**AGREEMENT
(THE ORISSA IRRIGATION RULES 1961)
FORM T**

(Vide Rule 23A (2) (f) of the Orissa Irrigation Rules 1961)
Agreement for supply of water for purposes other than Irrigation.

This agreement is made on the 28th day of April 2004 between M/s Aarti Steels Ltd. (Steel & Power) At-Ghantikhal Dist-Cuttack (A Company registered under the Companies Act 1956) represented through Mr.Soumendra Mishra, Vice President (steel & Power) aged about 64 years, S/o. Sri Udaykar Mishra, permanent resident of J-A, Row House, Surya Vihar Dundahera, Gurgaon-122016, Haryana, (hereinafter called the Applicant) AND (I) Mr B. Mohapatra, DGM (Power Plant), Village-Plot No. 11/1B/41, Sector-11, CDA, Cuttack service by profession (2) Ch. P. Mishra, Manager (Power Plant), Village-Plot No. 11/1B/41, Sector-11, CDA, Cuttack, service by profession (hereinafter referred to as sureties) of Second part AND the Governor of Orissa which expression unless repugnant to the context shall include his successors and assign (hereinafter called the Government) of the Third Part.

WHEREAS the applicant has made an application for supply of water from Mahanadi Embankment, river Mahanadi for the period as mentioned in the schedule.

AND WHEREAS the sureties have agreed to stand surety for payment of rate or rates charged for such supply in the manner hereinafter appearing and the Government has agreed to supply water for the purpose specified in the schedule below.

SCHEDULE

1. Purpose for which water will be supplied	2. Volume of water if any	3. Period of supply	4. The place at which it will be	5. Rate per 10000 cft supplied
Domestic/Drinking	4760 Cum/day	Till the industry functions	ASL Ghantikhal	(Rs.30.00 per 10000 cft.)
Industrial	19043 Cum/day	-do-		(Rs.250.00 per 100000 gallons)

N.B.: The above rates are as per the existing rates notified vide Gazette Notification No.15763 dt.18.7.98 and are subject to change from time to time as per Govt. Notification in this regard.

Contd..

[Handwritten signature and date]
28/4/04

CERTIFIED COPY

[Handwritten signature]
Executive Engineer 28/4/04

[Handwritten notes]
3.4 2.1
4.5 7.1



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-18 (Letter from Water Resource Department)

Office of the Engineer-in-Chief,
Water Resources, Orissa, Bhubaneswar.

Lr.No WII-DM-Misc.-5/2003/ 13857

Dt. 26/12/03

From:

Shri S.K.Ghosh,
Chief Engineer & Basin Manager
Lower Mahanadi Basin.

To

The Superintending Engineer,
Eastern Circle, Cuttack.

Sub:

Water supply to M/s Aarti Steels Ltd. for their proposed 0.5 Million Tonne steel plant with Coal washing and 50MM (2x25) Power Plant at Village-Ghantikhal / Nidhipur, Tahsil-Athagarh, Dlt.-Cuttack.

Ref:

- 1) DOWR Memo.No.4195/WE dt.06.12.2003.
- 2) M/s Aarti Steel Letter dt.12.12.2003.
- 3) SE,EC Lr.No.9999/WE dt.11.12.2003.

Sir,

In pursuance to the permission accorded by the Government in DOWR letter no.4195/WE dt.06.12.2003 cited above and as per your proposal vide your letter no.9999/WE dt.11.12.2003, M/s. Aarti Steel Ltd. may be allowed for construction of the Intake well and lifting of 9.72 cumecs water in 1st phase and 9.72 cumec in 2nd phase from river Mahanadi with the following terms and conditions.

- 1) The drawal of water will be in accordance with the provision of Orissa Irrigation Act / rules.
2. The M/s Aarti Steel Ltd. will complete all formalities required under the said rule and obtain a license from the competent authority of Water Resources Department.
3. The M/s Aarti Steel Ltd., will execute an agreement with the local authority of Water Resources Department in accordance with the Orissa Irrigation Rules.
4. The M/s. Aarti Steel Ltd. will pay the water rates in force and to be fixed by the Government from time to time.
5. A flow meter shall be installed at the cost of M/s Aarti Steel Ltd. quantity of water drawn will be measured by a competent technical persons of Water Resources Department.
6. The M/s Aarti Steel Ltd. will have to make their own arrangement for storage of water.
7. Any waste water generated will be treated by M/s Aarti Steel Ltd. to acceptable norms before disposal.
8. M/s. Aarti Steel Ltd. will submit the detailed scheme i.e. detail of intake well etc. before drawal of water to the competent authority and only after approval of the scheme by Water Resources Department they will draw water.



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-19 (Land Detail Sheet)

ACQUIRED THROUGH GOVT. ON LEASE

A- GOVT. LAND

VILLAGE - GHANTIKHAL

Sl.No	Name	Khata No.	Plot No	KISAM	Area in AC	Deed No. & Date
1	Abadajogga Annabadi	315	137/1319	Patita	259.58	4099/15.08.03
			138/1320		14.36	
2	Abadajogga Annabadi	315	138/1321	do	53.18	140/08.01.04
			137/1553		2.31	
			490/1316		14.40	
			490/1316/1554		11.20	
3	Abadajogga Annabadi	315	3/1664	do	42.63	6293/17.11.09
4	Abadajogga Annabadi	315	138/1325	do	1.95	401801391 / 02.07.18
TOTAL					399.61	

VILLAGE - NIDHIPUR

Sl.No	Name	Khata No.	Plot No	KISAM	Area in AC	Deed No. & Date
1	Abada Jogya Anabadi	74	3/623	Patita	12.6	140/08.01.04
			3/625		16.45	
			3/624		5.00	
			3/495		11.5	
			3		8.61	
2	- do -	74	3/495	Patita	16.1	4028/11.08.04
			3/625		31.69	
			3/626		3.22	
3	do -	74	3	Patita	25.00	1941/23.02.04
4	do	74	3/624	Patita	1.00	401801390 / 02.07.18
TOTAL					131.17	

VILLAGE - MADHAPUR

Sl.No	Name	Khata No.	Plot No	KISAM	Area in	Deed No & Date
1	Abada Jogya Anabadi	249	491	Patita	94.20	140/08.01.04
2	Abada Jogya Anabadi	249	491	Patita	5.00	4805/30.08.05
3	Abada Jogya Anabadi	249	491	Patita	26.00	4805/30.08.05
TOTAL					125.20	

Total Govt. Land through Alienation = 655.98 Acs

Govt. Land through Alienation= 655.98 Acres (264.47 Ha.)



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

II PRIVATE LAND

VILLAGE - GHANTIKHAL

Sl.No	Name	Khata No.	Plot No	KISAM	Area in AC	Deed No. & Date
1	Bharat Barik, S/o Jata Barik, Ghantikhal	278/59	138/1321/1423	Taila	1.00	1616/11.03.05
2	Pramoda Kumar Dhal, S/o Adhibas Dhal, At- Ghantikhal	278/122	138/1321/1484	-do -	1.00	1616/11.03.05
3	Bansidhar Das, S/o Umakanta Das, Nigigarh	278/63	138/1321/1428	-do-	2.00	1616/11.03.05
4	Bidyadhar Das, S/o:Umakant Das, Nigigarh	278/64	138/1321/1429	-do-	2.00	1616/11.03.05
5	Nityananda Swain, S/o-Aniltha Swain, Ghantikhal	278/129	138/1321/1486	-do -	5.00	1616/11.03.05
6	Mayadhar Behera, S/o Raja Behera, Godipatna	278/145	138/1321/1499	-do -	5.00	1616/11.03.05
7	Ranjan Naik S/o.Natha Naik, Ghantikhal	278/157	138/1321/1506	-do -	2.00	1616/11.03.05
8	Birabar Jena, S/o- Sapani Jena, Kunalo	278/97	138/1321/1467	-do -	1.50	1616/11.03.05
9	Dharanidhar Malika, S/o.Krushna Malika, Karikol	278/96	138/1321/1466	-do -	1.50	1616/11.03.05
10	Bauribandhu Malick, S/o.Harihar Malick, Karikol	278/95	138/1321/1465	-do -	1.50	1616/11.03.05
11	Jogendra Narayan Pattanayak, S/o- Raghunath Pattanayak, Radhadarshanpur	278/58	138/1321/1422	Taila	5.00	1616/11.03.05
12	Dhusasan Behera, S/o-Gobinda Behera, Ghantikhal	278/154	490/1316/1503	Taila	2.00	1616/11.03.05
13	Sankar Swain, Ainth Swain, S/o- Dhoba Swain, Hadu Baral, S/o- Bidya Baral, Satrugan Rout, S/o- Jadu Rout, Madan Behea, S/o- Nila Behera, Chaturbhuja Swain, S/o- Sanada Swain, Hadu Behera, S/o- Anada Behera, Raghu Behera, S/o- Dina Behera, Ghantikhal	278/5	490/1316/1369 490/1316/1368	Taila Taila	4.76	1616/11.03.05 1616/11.03.05
14	Mayadhar Swain, S/o.Sanaada Swain,	278/35	490/1316/1405	Taila	5.00	1616/11.03.05
15	Bhikari Rout, S/o.Madhu Rout, Ghantikhal	278/36	490/1316/1415	Taila	2.82	1616/11.03.05



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

16	Kapila Mahanty, S/o Das Mahanty, Daitri Sahu, Gobinda Sahu, Brundban Pradhan, S/o Mohan Pradhan, Radhashyam Naik, S/o Naratoma Naik, Ghantikhal	278/48	490/1316/1415	Taila	2.82	1616/11.03.05
17	Kulamani Behera, S/o- Gobinda Behera, Ghantikhal	278/34	490/1316/1404	Taila	4.02	1616/11.03.05
18	Sailaprava Dhal, W/o- Adhibas Dhal, Ghantikhal	278/98	490/1316/1468	Taila	0.50	1616/04.03.05
19	Kunja Swain, S/o. Kasi Swain, Ghantikhal	278/47	490/1316/1414	Taila	0.20	1616/11.03.05
20	Kishore Chandra Maharana, S/o. Duryodhan Maharana, Kantol	278/61	138/1320/1425	Taila	2.00	1616/11.03.05
21	Subal Chandra Maharana, S/o- Duryodhan Maharana	278/60	138/1320/1424	do	2.00	1616/11.03.05
22	Biranchi Narayan Samanta, S/o Mayadhar Samanta, Kantol	278/85	138/1320/1456	do	2.00	1616/11.3.05
23	Ajay Kumar Pattnayak, S/o. Mahendranath Pattnayak, Narayanpur	278/25	137/1392	do	5.00	1616/11.3.05
TOTAL PRIVATE LAND ACQUIRED THROUGH LAND ACQUISITION					60.62	

VILLAGE - NIDHIPUR						
Sl.No	Name	Khata No.	Plot No	KISAM	Area in AC	Deed No. & Date
1	Debebdra Natha Satapathy, S/o- Janardan Satapathy, Kapataboaei	63/6	3/512	Gharabari	0.20	1616/11.03.05
2	Alekha Sahu, S/o- Bauribandhu Sahu, Rajanagar	63/9	3/513	Taila	3.80	1616/11.03.05
3	Dayanidhi Sahu, S/o- Raja Kishor Sahu, Rajnagar	63/214	3/513/716	do	0.40	
4	Sabitri Satapathy, W/o. Haribandhu Satapathy,	63/10	3/514	do	2.00	1616/11.03.05
			3/515	Gharabari	0.20	
5	Kamala Kumari Pattnayak, D/o- Debaraja Pattanayak, Nijigarh	63/11	3/516	do	0.20	1616/11.03.05
			3/517	Taila	2.00	
6	Parsuram Nayak, S/o- Bhubaneswar Nayak, Nijigarh	63/12	3/518	do	3.00	4807/30.08.05
7	Indramani Sahu S/o- Sadu Sahoo, Berahampur	63/16	3/522	do	4.49	1616/11.03.05



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

8	Jagabandhu Satapathy, S/o- Sommanatha Satapathy, Berahampur	63/18	3/523	do	4.00	1616/11.03.05
9	Chakradhar Sethy, S/o- Basu Sethy, Nijigarh	63/61	3/563	do	5.00	4807/30.08.05
			3/564	Gharabari		
10	Banchhanidhi Malik, S/o Hrusi Baliyar Singha, Bentapada	63/58	3/559	Taila	0.40	4807/30.08.05
11	Raghunath Mohanty S/o- Panamananada Mohanty, Bharat Dhal, S/o- Anada Dakhinna, Ghantikhal,	63/17	7/497	Goda-II	3.10	1616/11.03.05
12	Maheswar Bisoi, S/o- Bharata Bisoi, Maguni Behera, S/o- Anata Behera, Bhaiga Behera, S/o.Dhoi Behera, Panu Sahoo, S/o- Abhina	42	7	Goda-II	1.01	1616/11.03.05
TOTAL PRIVATE LAND ACQUIRED THROUGH LAND ACQUISITION					29.80	

VILLAGE - MADHAPUR						
Sl.No	Name	Khata No.	Plot No	KISAM	Area in AC	Deed No. & Date
1	Dasaathi Patanayak, S/o- Chandrasekhar Pattanayak, Bentapada	100	491/856	Taila	0.20	1616/11.03.05
2	Binapani Pattanayak, D/o- Dasrathi Pattanayak, Bentapada	243/154	491/856/1174	Taila	4.00	1616/11.03.05
3	Kasinatha Maharana, S/o- Jayakrishna Maharana, Nijigarh	243/69	491/1085	Taila	2.00	1616/11.03.05
4	Mahanta Behera, S/o- Anada Behera, Madhabpur	243/65	491/1084	Taila	1.60	1616/11.03.05
5	Musa Naik, S/o- Banchha Naik, Mahakalbasta	243/75	491/1138	Taila	1.00	1616/11.03.05
6	Musa Naik, S/o- Banchha Naik, Mahakalbast	243/75	491/1091	Taila	1.00	1616/11.03.05
7	Premananda Jena, S/o- Gopal Jena, Nijigarh	243/79	491/1100	Taila	2.00	1616/11.03.85
8	Bhajaman Naik, S/o- Pathani Naik, Mahakalbasta	243/78	491/1099	Taila	2.00	1616/11.03.05
9	Satrugana Behera, S/o- Anata Behera, Mahakalbast	243/84	491/1108	Taila	0.46	1616/11.03.05
10	Hema Bewa, W/o- Sundhar Khatua, Mahakalbasta	243/83	491/1106	Taila	0.35	1616/11.03.05
			491/1107		0.62	
			491/1104		0.53	
	Kumar Behera,					



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

11	S/o- Anadi Behera, Mahakalbasta	243/82	491/1105	Taila	0.40	1616/11.03.05
12	Jai Naik, Sindhu Naik, Mahakalbasta	243/85	491/1109	Taila	1.00	1616/11.03.05
13	Jai Naik, Sindhu Naik, Mahakalbasta	243/39	491/1105	Taila	1.00	1616/11.03.05
14	Kanhu Naik, S/o- Apei Naik, Mahakalbasta	243/40	491/1006	Taila	1.00	1616/11.03.05
15	Amuli Rout, Suresh Rout, Nuagarh	243/41	491/1007	Taila	1.00	1616/11.03.05
16	Raja Behera, S/o- Das Behera, Mahakalbasta	243/42	491/1008	Taila	1.00	1616/11.03.05
TOTAL PRIVATE LAND ACQUIRED THROUGH LAND ACQUISITION					21.16	

Total Pvt. Land through Acquisition = 111.58 Acs

Pvt. Land through Acquisition = 111.58 Acres (45.15 Ha.)



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

VILLAGE - NIDHIPUR						
Sl.No	Name	Khata No.	Plot No	KISAM	Area in AC	Deed No. & Date
1	Jai Sahu, S/o.Nidhi Sahu, Berhampur	63/289	3/775	Taila	2.51	1582/11.12.09
2	Brajabandhu Satapathy, S/o.Somanatha Satapathy, Berhampur	63/21	3/527	Taila	5.00	824/25.06.09
3	Banchha Dehuri, Berhampur	63/288	3/595	Taila	1.00	866/18.05.11
4	Dhadi Dehuri, Berhampur	63/286	3/558	Taila	1.00	868/18.05.11
5	Gagan Swain, Godi Sahi, Ankula	63/287	3/562	Taila	0.50	869/18.05.11
Total					10.01	

VILLAGE - MADHABPUR						
Sl.No	Name	Khata No.	Plot No	KISAM	Area in AC	Deed No. & Date
1	Kunja Swain, S/o.Kasi Swain, Ghantikhal	243/327	491/1320	Taila	0.75	888/04.07.09
TOTAL PRIVATE LAND PURCHASED DIRECTLY					0.75	

Ghantikhal - 0.44 Acs
Nidhipur - 10.01 Acs
Mahakalabasta - 0.75 Acs
Total - 11.20 Acs

Pvt. Land purchased directly = 11.20 Acres (4.53 Ha.)



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-20 (Letter from DFO)

**OFFICE OF THE DIVISIONAL FOREST OFFICER
ATHGARH FOREST DIVISION, ATHGARH
E-mail: - dfoathgarh@gmail.com, Phone-(06723) 220225**

To Letter No.....1445.....dt.....12.04.2022
LTP,Narayan,(President) of Aarati Steels Ltd, Plot No. 18/IB Sector-10, CDA, Bidanasi, Cuttack- 753014.

Sub:- Request for providing DLC verification clearance over 778.76 Acs of non-Forest land leased out by IDCO in favour of Aarti Steels Ltd, Ghantikhal for establishment of steel Plant.

Ref:- Your letter No.ASL/HR&A/ENV/74055 dt.03.03.2022

Sir,

With reference to the above cited letter on the captioned subject, it is to inform you that, on scrutinize of the DLC report at village-Ghantikhal, Nidhipur and Madhapur under Athgarh Tahasil applied DLC verification clearance over 778.76 Acs of non-forest land leased out by IDCO vide your letter dt.03.03.2022, it is ascertained that, the detailed land description given below are neither notified u/s.30 of Orissa Forest Act,1972 nor find place in DLC list. The details of land village wise over 778.76 Acres applied by the project proponent for DLC verification clearance is furnished as below.

S.L No	Name of village	Khata No	Plot No	Area in Ha	Remarks
1	2	3	4	5	6
1	Ghantikhal	315	137/1319	259.58	Not included in the DLC List
			138/1320	14.36	
			138/1321	53.18	
			137/1553	2.31	
			490/1316	14.40	
			490/1316/1554	11.20	
			3/1664	42.63	
			138/1325	1.95	
	Total			399.61	
2	Nidhipur	74	3/623	12.6	Not included in the DLC List
			3/625	16.45	
			3/624	5.00	
			3/495	11.5	
			3	8.61	



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

			3/495	16.1	
			3/625	31.69	
			3/626	3.22	
			3	25.00	
			3/624	1.00	
	Total			131.17	
3	Madhapur	249	491	94.20	Not included in the DLC List
			491	5.00	
			491	26.00	
	Total			125.20	
4	Ghantikhal	278/59	138/1321/1423	1.00	Not included in the DLC List
		278/122	138/1321/1484	1.00	
		278/63	138/1321/1428	2.00	
		278/64	138/1321/1429	2.00	
		278/129	138/1321/1486	5.00	
		278/145	138/1321/1499	5.00	
		278/157	138/1321/1506	2.00	
		278/97	138/1321/1467	1.5	
		278/96	138/1321/1466	1.5	
		278/95	138/1321/1465	1.5	
		278/58	138/1321/1422	5.00	
		278/154	490/1316/1503	2.00	
		278/5	490/1316/1369	4.76	
		-do-	490/1316/1368		
		278/35	490/1316/1405	5.00	
		278/36	490/1316/1405	2.82	
		278/48	490/1316/1415	2.82	
		278/34	490/1316/1404	4.02	
		278/98	490/1316/1468	0.50	
		278/47	490/1316/1414	0.20	
		278/61	138/1320/1425	2.00	
		278/60	138/1320/1424	2.00	
		278/85	138/1320/1456	2.00	
		278/25	137/1392	5.00	
	Total			60.62	



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

5	Nidhipur	63/6	3/512	0.20	Not included in the DLC List
		63/9	3/513	3.80	
		63/214	3/513/716	0.40	
		63/10	3/514	2.00	
		-do-	3/515	0.20	
		63/11	3/516	0.20	
		-do-	3/517	2.00	
		63/12	3/518	3.00	
		63/16	3/522	4.49	
		63/18	3/523	4.00	
		63/61	3/563	5.00	
		-do-	3/564		
		63/58	3/559	0.40	
		63/17	7/497	3.10	
		42	7	1.01	
	Total		29.80		
6	Madhapur	100	491/856	0.20	Not included in the DLC List
		243/154	491/856/1174	4.00	
		243/69	491/1085	2.00	
		243/65	491/1084	1.60	
		243/75	491/1138	1.00	
		243/75	491/1091	1.00	
		243/79	491/1100	2.00	
		243/78	491/1099	2.00	
		243/84	491/1108	0.46	
		243/83	491/1106	0.35	
		-do-	491/1107	0.62	
		-do-	491/1104	0.53	
		243/82	491/1105	0.40	
		243/85	491/1109	1.00	
		243/39	491/1105	1.00	
		243/40	491/1006	1.00	
		243/41	491/1007	1.00	
243/42	491/1008	1.00			
	Total		21.16		

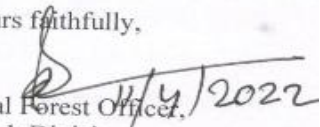


Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

7	Ghantikhal	278/513	490/1794	0.44	Not included in the DLC List
	Total			0.44	
8	Nidhipur	63/289	3/775	2.51	
		63/21	3/527	5.00	
		63/288	3/595	1.00	
		63/286	3/558	1.00	
		63/287	3/562	0.50	
	Total			10.01	
9	Madhabpur	243/327	491/1320	0.75	
	Total			0.75	
	Grand Total			778.76	

This is for your information.

Yours faithfully,


Divisional Forest Officer,
Athgarh Division



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

ANNEXURE-21 Baseline Monitoring Locations

(Pre-Monsoon: March 2022 – May 2022)

Table – Ambient Air Quality Monitoring Locations

LOCATION CODE	LOCATION NAME	DISTANCE	DIRECTION	SELECTION CRITERIA	LATITUDE	LONGITUDE
AQ1	At Project Site	Inside project site		On-site Location	20°31'0.40"N	85°43'24.36"E
AQ2	Main Entry Gate of the Plant	Inside project site		On-site Location	20°31'18.98"N	85°44'2.77"E
AQ3	Ghantikhal village	0.26 km	E	Crosswind direction; Nearest habitation to the Project Site	20°30'43.71"N	85°44'13.59"E
AQ4	Dwarabatipur village	0.56 km	S	Upwind direction; Habitation near Project Site; Near Athagarh - Dhabaleshwar Rd	20°30'20.23"N	85°43'38.07"E
AQ5	Near Shree Cement Plant Boundary	0.58 km	N	Downwind direction; Nearby industry	20°31'40.27"N	85°43'36.68"E
AQ6	Jenapur village	1.20 km	S	Upwind direction; Village habitation	20°29'43.51"N	85°44'7.60"E
AQ7	Near High School, Mahakalbasta village	1.65 km	W	Crosswind direction; Dense village habitation to the Project site	20°30'30.35"N	85°42'9.03"E
AQ8	Gurangapur village	1.68 km	W	Crosswind direction; Near Oringa RF & village habitation	20°31'13.44"N	85°41'40.45"E
AQ9	Radhashyampur village	1.89 km	N	Downwind direction; Nearby village habitation and industry	20°32'23.70"N	85°44'18.02"E
AQ10	Bishnupur village	2.40 km	E	Crosswind direction; Village habitation	20°31'1.94"N	85°45'27.15"E
AQ11	Dalabhaga village	2.55 km	NNE	Crosswind direction; Village habitation	20°32'42.67"N	85°42'47.49"E
AQ12	Khuntuni village	4.39 km	N	Downwind direction; Village habitation and nearby highway traffic	20°33'44.30"N	85°43'35.85"E



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table - Ambient Noise Level Monitoring Locations

LOCATION CODE	LOCATION NAME	DISTANCE	DIRECTION	SELECTION CRITERIA	LATITUDE	LONGITUDE
N1	Near DRI Kiln, at Project Site	Inside project site		On-site Location; Near machinery	20°30'53.36"N	85°43'26.43"E
N2	Admin Building, at Project Site	Inside project site		On-site Location	20°31'3.16"N	85°43'27.14"E
N3	Main Entry Gate of the Plant	Inside project site		On-site Location & Material entry gate	20°31'19.28"N	85°44'2.93"E
N4	Greenbelt, at Project Site	Inside project site		On-site location; Near existing greenbelt	20°30'39.62"N	85°43'50.67"E
N5	Sri Ramananda Aashram, Dwarabatipur village	0.21 km	S	Habitation near Project Site; Nearby approach road	20°30'21.48"N	85°43'52.55"E
N6	Panchayat High School, Ghantikhal village	0.24 km	E	School (Silence zone) and habitation near the Project Site	20°30'43.74"N	85°44'12.84"E
N7	Near Shree Cement Plant Boundary	0.58 km	N	Nearby industry	20°31'40.04"N	85°43'36.75"E
N8	Subarnamanjaripur village	0.62 km	W	Village habitation near project site	20°30'40.47"N	85°42'46.70"E
N9	Near Mahakalbasta High School & GIMSAR Hospital	1.64 km	W	School & Hospital (Silence zone)	20°30'30.35"N	85°42'9.03"E
N10	Near Khuntuni Police station, NH-55	3.53 km	NNE	Nearby highway traffic	20°33'31.72"N	85°44'26.05"E



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table – Ground Water Quality Sampling Locations

LOCATION CODE	LOCATION NAME	DISTANCE	DIRECTION	SELECTION CRITERIA	LATITUDE	LONGITUDE
GW1	At Project Site	Inside project site		On-site location	20°30'37.41"N	85°43'21.53"E
GW2	Ghantikhala village	0.53 km	E	Borewell sample from nearest village habitation to the project site	20°30'42.55"N	85°44'23.31"E
GW3	Mahakalbasta village	1.55 km	WSW	Borewell sample from village habitation nearby project site	20°30'19.06"N	85°42'12.35"E
GW4	Gurangapur village	1.64 km	W	Borewell sample from village habitation near Oringa RF	20°31'13.44"N	85°41'40.44"E
GW5	Dalabhaga village	2.58 km	NNW	Borewell sample from village habitation near Subasi RF	20°32'43.43"N	85°42'47.40"E
GW6	Dhurusia village	2.78 km	SSE	Borewell sample from village habitation nearby industry	20°29'2.00"N	85°44'50.13"E
GW7	Brahmanabasta U.P School	2.92 km	E	Borewell sample from school	20°31'6.08"N	85°45'44.12"E
GW8	Near Kakhadi Junior College	3.00 km	ESE	Borewell sample from dense village residential area	20°30'5.25"N	85°45'48.53"E
GW9	Rajanagar village	4.30 km	SW	Borewell sample from village residential area	20°29'33.84"N	85°40'46.28"E



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table – Surface Water Quality Sampling Locations

LOCATION CODE	LOCATION NAME	DISTANCE	DIRECTION	SELECTION CRITERIA	LATITUDE	LONGITUDE
SW1	At Project Site			Reservoir inside project site	20°30'34.14"N	85°43'57.20"E
SW2	Ghantikhala village	0.67 km	E	Pond in the nearest village residential area to the project site	20°30'36.07"N	85°44'29.71"E
SW3	Mahakalabasta village	1.40 km	SW	Pond near village residential area close to the project site	20°30'16.77"N	85°42'17.95"E
SW4	Dalabhaga village	2.06 km	NNW	Pond nearby village habitation close to Subasi RF	20°32'27.46"N	85°42'53.76"E
SW5	Talagada village	2.81 km	NW	Upstream of Barha Jor Nala / Nearby village habitation	20°32'12.20"N	85°41'23.84"E
SW6	Confluence point of Sapua Nadi & Barha Jor near Dahisara village	2.90 km	W	Confluence point of Sapua Nadi & Barha Jor	20°30'30.90"N	85°41'25.43"E
SW7	Kakhadi village	3.74 km	E	Downstream of Mahanadi River (Major river)	20°30'12.75"N	85°46'15.23"E
SW8	Balarampur village	4.73 km	S	Confluence point of Sapua Nadi & Mahanadi River (Upstream of Major river)	20°27'50.77"N	85°44'33.29"E



Expansion of existing Integrated Steel Plant to final capacity of Iron Ore Beneficiation Plant- 2.0 MTPA, Pellet Plant- 1.2 MTPA, Sponge Iron Plant- 0.3 MTPA, Sinter Plant-1.75 MTPA, Blast Furnace- 1.27 MTPA, Steel Products (SMS & Rolling Mill) - 1.5 MTPA, Coal Washery- 1.0 MTPA, Coke Oven Plant (Non-Recovery Type)- 0.5 MTPA, Chrome Ore Briquetting Plant- 0.3 MTPA, Ferro Alloy Plant- 0.125 MTPA, Lime Dolo Plant- 0.165 MTPA, Oxygen Plant- 0.302 MTPA, CPP- 215 MW of Aarti Steels Ltd. at Village - Ghantikhal, Tehsil - Athagarh, District - Cuttack, Odisha

Table – Soil Quality Monitoring Locations

LOCATION CODE	LOCATION NAME	DISTANCE	DIRECTION	SELECTION CRITERIA	LATITUDE	LONGITUDE
S1	At Project Site			On-site location / Solid waste storage area	20°31'1.69"N	85°43'2.21"E
S2	At Project Site			On-site location / Raw material storage yard	20°30'54.99"N	85°43'57.16"E
S3	Mahakalbasta village	0.99 km	WSW	Crop land near village area	20°30'24.29"N	85°42'31.36"E
S4	Gopinathpur village	1.42 km	E	Fallow land	20°30'32.22"N	85°44'56.86"E
S5	Gurangapur village	1.48 km	W	Forest land near village habitation (Oringa RF)	20°31'15.27"N	85°41'46.05"E
S6	Near JK Cement Plant, Radhashyampur village	1.55 km	N	Dense forest land nearby industry (Subasi RF)	20°32'10.05"N	85°44'11.82"E
S7	Dhurusia village	2.96 km	SE	Rural built-up land	20°28'59.21"N	85°44'57.54"E



VISIONTEK CONSULTANCY SERVICES PVT. LTD.

(Committed For Better Environment)

[Plot No. M-22 & 23, Chandaka Industrial Estate, Patia, Bhubaneswar - 751024, Odisha]