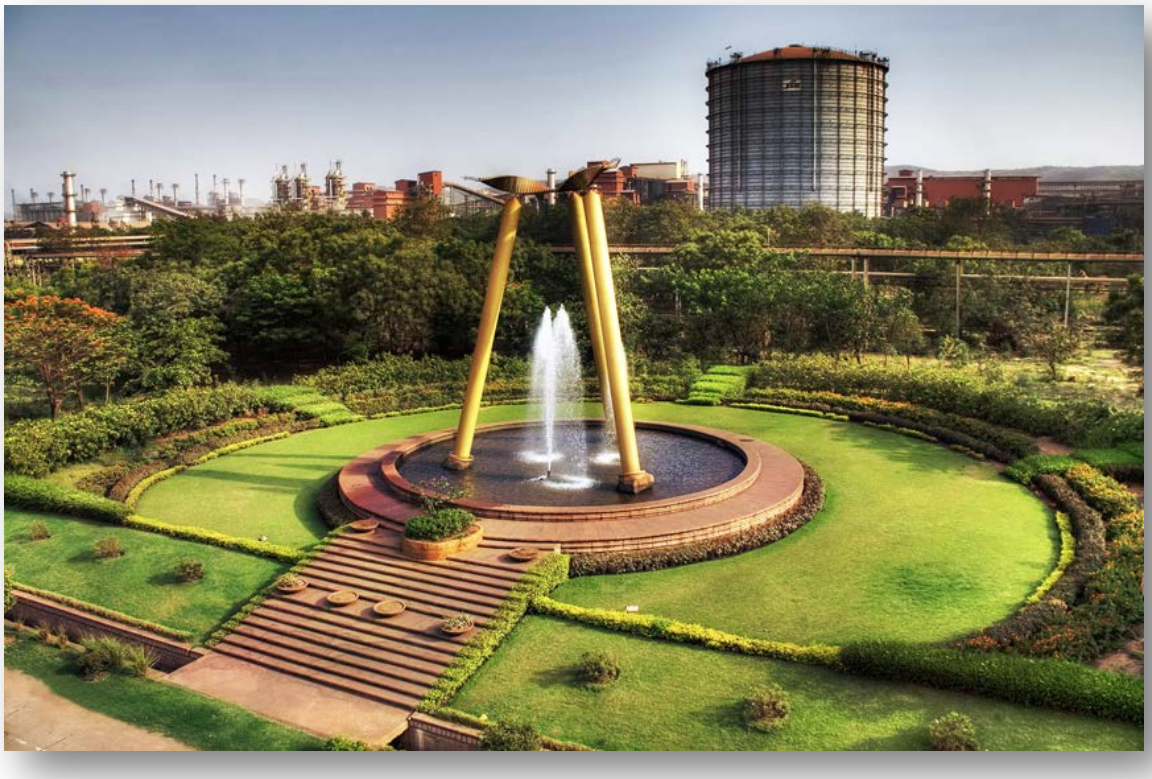
AMENDMENT IN ENVIRONMENTAL CLEARANCE FOR 16 MTPA INTEGRATED STEEL PLANT

ENVIRONMENTAL APPRAISAL REPORT



JSW STEEL LIMITED
AT
TORANAGALLU, DISTRICT BELLARY, KARNATAKA

MEC/11/S2/Q7D2/EIA-EMP/2407/R.0

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Project Proponent

EnvironmentalConsultant

MECONLIMITED
(AGovt.ofIndiaEnterprise)
VivekanandaPathP
O.Doranda
Dist–Ranchi,Jharkhand-834002
CERTIFICATENO:NABET/EIA/1417/SA 007

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1.0 INTRODUCTION

M/s JSW Steel, formerly known as Jindal Vijayanagar Steel Ltd. (JVSL), is a flag ship company of Jindal group of industries. This integrated steel plant at Toranagallu is currently the largest, most modern, and technologically efficient, eco-friendly integrated steel plant in India. JSW Steel, Vijayanagar is currently rated as the sixth best integrated steel plant in the world. Following backward integration, JSW Steel started its operation in 1997 by commissioning HSM-1. The following is the chronology of various phases of its expansion from 1.25 MTPA in 1999 to 10 MTPA by 2011

- 1.25 MTPA plant commissioned in 1999
- 1.57 MTPA plant commissioned in 2001
- 2.50 MTPA plant commissioned in 2004
- 4.0 MTPA plant commissioned in 2006
- 7.0 MTPA (Phase-1 of 10 MTPA) commissioned in 2009
- 10 MTPA (Phase-2 of 10 MTPA) commissioned in 2011
- 12 Mtpa (Phse-1 of 16 Mtpa) Commissioned in 2016
- 16 Mtpa (Phase-2 of 16 Mtpa) Under execution

Subsequently, keeping pace with the increasing demand of steel in the country, JSW proposed to expand the production facilities from 10 MTPA to 16 MTPA of crude steel within the existing complex. Environmental Clearance for the same wasgranted by MoEFCC vide letter no. J-11011/489/2009-IA.II(I) dated 1st October, 2015 (**Annexure 1)**. The EC was further amended for modification in different units of the Integrated Steel plant without change in overall steel production capacity vide letter no. J-11011/489/2009-IA.II(I) dated 9th June, 2016 (**Annexure 2)**. The units proposed during both the expansions are given below in Table 1.1.

Table 1.1- Production capacity of units proposed during 4 MTPA to 10 MTPA and 10 MTPA to 16 MTPA Expansion

Sl No.	Unit Name	At 4 MTPA	4 MTPA to 10 MTPA	10 MTPA to 16 MTPA	Total Capacity in MTPA
1	Beneficiation Plant	4.5	15	-	19.5
2	Pellet Plant	5	5	-	10
3	Sinter Plant	2.3	8.05	9.8	20.15
4	Coke Oven Non-Recovery	1.28	-	Dismantling of existing NR Coke ovens	0
5	Coke Oven Recovery	0	3.5	4.5	8
6	Hot Metal COREX	1.2	0	0	1.2
7	Hot Metal BF	3.07	6	6	15.07
8	Pig Caster(TPD)	1200	7200	3600	12000
9	SMS (EAF+BOF)	3.8	6	6	15.8
10	Lime Kiln(TPD)	1200	3600	2400	7200
11	Slab Caster	0	6.4	8.4	14.8
12	Billet Caster	-	1.5	1.2	2.7
13	HSM	2	6.2	3.6	11.8

Sl No.	Unit Name	At 4 MTPA	4 MTPA to 10 MTPA	10 MTPA to 16 MTPA	Total Capacity in MTPA
14	WRM	0	0.6	1.2	1.8
15	Rebar Mill	0	1	0	1
16	BRM	0	0	1.2	1.2
17	CRM	0	3	0	3
18	Pipe Mill	0	0.4	-	0.4
19	Galvanizing Line	0	1	-	1
20	Colour coating	0	0.5	-	0.5
21	Captive power plant	230	600	660	1390
22	Incinerator (Kg/hr)	0	750	250	1000
23	Slag grinding	1.6	2.6	2	6.2
24	Oxygen Plant(TPD)	500	4500	3600	10600
25	Township(Nos)	2	2	1	5

2.0 NEED OF THE PROJECT

JSW Steel obtained the environment clearance for the expansion from 10 MTPA to 16 MTPA on Oct 2015. Subsequently, the Phase-1 of the project of 12 MTPA has been completed by 2016. The unit is currently producing at a capacity of 12 MTPA. During 2016-17, JSW Steel produced 11.05 Mt of crude steel against a plan of 11.5 MTPA (96%).

In the meanwhile, there has been a consistent downturn in the domestic steel market due to large scale cheaper imports and increased input costs. It is proposed to marginally change the approved configuration in the production facilities (presented in Table-3.1). The rationale for the proposed change are given below:

- **SINTER PLANT (SP)-** The approved capacity of 7.5 MTPA is split into two sinter plants of 5.75 and 1.75 MTPA respectively. These will cater to the two blast furnaces which are located physically at different locations.

- **BLAST FURNACE(BF)** - The upgradation of BF-1 has been completed. The existing BF-3 has come for rebuilding. This opportunity is being utilised to enhance the capacity of the furnace to from 3.0 MTPA to 4.4 MTPA. The new blast furnace BF-5 will be of 3.0 MTPA capacity.

- **STEEL MAKING (SMS) -**Under the expansion, it was proposed to install 3X300 t BOF converters and 1 X150 t EAF furnace. This is being changed to 2X300 t BOF and 2X150 T EAF. The first EAF has already been commissioned in the 12 MTPA stage of expansion.

- **HOT STRIP MILL (HSM) -**A new HSM of 3.6 MTPAhas been approved in the expansion. However, it is proposed to carry out improvements in operational practices (innovation) by way of coil weight increase, Better welder performance, Reduction in roll gap time & reduced roll change time, which will

result in increase in capacity of HSM-1 from 3.2 to 4.0 MTPA and of HSM-2 from 5.0 to 5.2 MTPA.

- **COLD ROLLING MILL (CRM) -** The existing cold rolling mill is being upgraded by replacing the existing batch type rolling mill to continuous type, resulting anincrease in capacity by 0.8 MTPA. Further with improved operational practices using the Line speed optimisation model, the capacity of CRM-2 is being increased to 2.3 MTPA.

- **GALVANASING LINE (CGL) -** In view of the increased production from CRM-1, it is proposed to install two new galvanising lines of 0.95 MTPA each.

- **CAPTIVE POWER PLANT (CPP) -**The existing CPP 3&4 utilise imported coal and gases for power generation. However, due to difficulties in getting imported coal, it is proposed to blend domestic coal with imported coal so that the blended ash content is max 25%.

- **TOWNSHIP FOR PROJECT WORJKERS** - In order to accommodate the construction workers, it is proposed to build a township of 500 dwellings.

3.0 PROJECT DETAILS

JSW Steel Ltd is currently having overall production capacity of 12 MTPA of crude steel. The finished products include Pig iron, HR coils, Wire rods, rebars, pipes & cold rolled/ galvanised sheets. The details of the existing configuration and changesproposed in the present plant are given in Table 3.1.

Table 3.1- Present plant configuration and changes proposed

Sl No	Unit Name	Existing configuration			Total (MTPA)	Changes proposed	New Total (MTPA)	Increase (MTPA)
		0-4 MTPA	4-10 MTPA	10-16 MTPA				
1	Beneficiation plant	4.5	15	0	19.5	No Change	19.5	0
2	Pellet Plant	5	5	0	10	No Change	10	0
3	Sinter Plant	SP1 - 2.3 MTPA	SP2 – 2.3 MTPA SP3 – 5.75 MTPA Total - 8.05 MTPA	SP4 – 2.3 MTPA SP5 – 7.5 MTPA Total – 9.8 MTPA	20.15	SP4 – 2.3 MTPA SP5 – 5.75 MTPA SP6 – 1.75 MTPA Total – 9.8 MTPA	20.15	0
4	Coke Oven NR	1.28	0	Phasing out	0	No Change	0	0
5	Coke Recovery	0	3.5	4.5	8.0	No Change	8.0	0
6	Hot Metal COREX	1.6	0	0	1.6	No Change	1.6	0
7	Hot Metal BF	BF1- 0.9 MTPA BF2- 2.17 MTPA Total- 3.07 MTPA	BF3- 3 MTPA BF4- 3 MTPA Total- 6.0 MTPA	BF1- 2.5 MTPA BF5- 4.4 MTPA Total- 6.9 MTPA	15.07	BF1- 2.5 MTPA BF3- 4.4 MTPA BF5- 3.0 MTPA Total- 6.9 MTPA	15.07	0
8	Pig Caster(TPD)	1200	7200	0	8400	No Change	8400	0
9	BOF	SMS1 – 3.8 MTPA	SMS2- 6 MTPA	SMS2-6.4 MTPA SMS3- 5.6 MTPA (3X 200 T BOF + 1.2 MTPA EAF) Total – 6 MTPA	15.8	SMS2- 6.4 MTPA SMS3- 5.6 MTPA (2X 200 T BOF + 2X1.2MTPA EAF) Total – 6 MTPA	15.8	0
10	Lime Kiln(TPD)	1200	3600	2400	7200	No Change	7200	0
11	Slab Caster	3.5	6.4	8.4	14.8	No Change	14.8	0

12	**Billet caster**	0	1.5	1.2	2.7	No Change	2.7	0
13	**HSM**	HSM1- 2 MTPA	HSM1 –3.2 MTPA HSM2 – 5 MTPA Total- 8.2 MTPA	HSM3 – 3.6 MTPA	11.8	HSM1 - 4 MTPA HSM 2 - 5.2 MTPA HSM-3: 3.6 MTPA	12.8	1.0
14	**WRM**	0	0.6	0	0.6	No Change	0.6	0
15	**Rebar Mill**	0	1	0	1	No Change	1	0
16	**CRM**	0	CRM1 – 1 MTPA CRM2 – 2 MTPA Total- 3 MTPA	0	3	CRM1 - 1.8 MTPA CRM2 – 2.3 MTPA Total – 4.1 MTPA	4.1	1.1
17	**Galvanizing**	0	4 X 0.25 MTPA	0	1.0	4 X 0.25 to 3 X 0.45 & additional 2 X 0.95	3.25	2.25
18	**Colour Coating**	0	0.5	0	0.5	No Change	0.5	0
19	**CPP(MW)**	100 MW + 130 MW	2 X 300 MW	660 MW	1490	Amendment in fuel type in 2x300MW	1490	0
20	**Incinerator(Kg/ hr)**	0	250	0	250	No Change	250	0
21	**Oxygen Plant**	2500	4500	0	7000	No Change	7000	0
22	**Cement Plant/Slag Grinding**	0.2	4	0	4.2	No Change	4.2	0
23	**Township**				5	1 with 500 dwellings	6	1 with 500 dwellings

3.1 Proposed changes

a. Sinter Plant

Sintering is a high temperature process operation for agglomeration of iron ore fines with coke breeze and other fluxes like limestone. The sintering plant also facilitates in use of recyclable solid wastes like lime fines, BOF sludge, bag filter dust, sludge etc The sintered mass having higher strength is one of the main metallic bearing burden material for BF. The hot sinter product after cooling is screened to desired size and sintered product is sent to the BF stock house for charging to the BF along with lump iron ore.

JSW is presently having three (3) sinter plants viz. SP1 of 2.3 MTPA, SP2 of 2.3 MTPA and SP3 of 5.75 MTPA. SP1 and SP2 are having sintering bed areas of 204 m^2 each and SP3 is having bed area of 496 m^2.The overall sinter production capacity of JSW is 10.35 MTPA. All the sinter plants are having following clean technologies.

- Separate ESPs for process and space de-dusting, with capability to meet less than 50 mg/Nm^3 of particulate emissions
- Use of waste heat from sinter cooler for generation of steam and/or preheat
- Use of micro pelletizing technology for agglomerating all waste fines.
- Use of >95% dust/sludge generated in steel plant as base mix.
- Use of state of the art bag filter for control of emission to <10 mg/Nm^3 in the large sinter plant, the current state of the art technology on a trial basis in SP-2.

For the expansion from 10 MTPA to 16 MTPA, JSW has earlier proposed to install two new Sinter plants of capacity 2.3 MTPA and 7.5 MTPA.

JSW now proposes to install two sinter plants of smaller capacity 1.75 MTPA and 5.75 MTPA in place of one big Sinter plant of 7.5 MTPA. Technology of plants of similar configuration as of 5.75 MTPA are already installed and operational at present. There shall be no increase in overall sinter production capacity from the integrated steel plant.

b. Blast Furnace

Sized iron ore, pellet, sinter and coke along with other fluxing materials are charged into the tall vertical BF for production of hot metal in presence of air. The temperature within the furnace is maintained above 1500^0C. The gangue minerals present in the iron ore are converted to slag known as BF slag and 'Fe' content of the oxide ore gets reduced to molten iron due to reduction of iron oxides of the ore with carbon present in the coke. In order to have adequate carbon for reduction purpose, as well as to reduce coke consumption, powdered coal is injected as a supplementary fuel into the furnace.

The BF slag is granulated by water jetting and granulated BF slag produced is proposed to be used for cement making. The BF gas containing mostly Carbon monoxide (CO) is wet cleaned in high pressure drop venturi scrubbers, to bring down

the dust level in the gas to below 5 mg/Nm^{3}The cleaned BF gas is used as plant fuel and for heating the BF stoves to produce hot blast air.

After commissioning of the 10 MTPA steel plant, JSW has a gross hot metal production capacity of 9.07 MTPA from Blast furnaces and 1.6 MTPA from COREX plant. The plant is having four blast furnaces viz. BF1-0.9 MTPA, BF2-2.17 MTPA, BF3-3 MTPA & BF4-3 MTPA.

In the previous proposal, for increase in crude steel production capacity from 10 MTPA to 16 MTPA, JSW proposed to augment the existing BF1 to increase its production capacity from 0.9 MTPA to 2.5 MTPA and installation of a new BF5 of 4.4 MTPA capacity. The capacity of BF-1 has since then been augmented.

In the present proposal, JSW plans to change the configuration of proposed expansion by installing a new BF5 of 3 MTPA capacity in place of 4.4 MTPA and augmenting the already installed BF3 of 3 MTPA to increase its production capacity to 4.4 MTPA. The proposal shall result in no overall increase in hot metal production capacity.

Following facilities have been proposed as part of the BF3 modernization-

- Installation of a new standby dry gas cleaning plant.
- Installation of a new gas conditioning tower with 3 nos scrubbers.
- Installation of a new Waste heat recovery system for stoves.
- Augmentation of existing Top recovery turbine from 12 MW to 18 MW.
- Installation of a new PCI system having a capacity of 110 TPH.
- Installation of a new stock house dedusting system.
- Augmentation of slag granulation plant.

c. SMS

In the Steel Melt Shop, the desulphurised hot metal along with burnt lime and fluxing agents are charged into the BOF converter. Carbon present in the hot metal is oxidized by controlled blowing of oxygen. The temperature of molten metal in BOF increases to around 16000C, due to the energy generated by the combustion of carbon present in the hot metal. The BOF gas having carbon monoxide and dust passes through the wet gas cleaning plant, comprising of high pressure venturi scrubber where the dust in the gas is separated due to inertial impaction. The contaminated water containing dust is treated in a water treatment plant and recycled to the system. The clean BOF gas depending on 'CO' content is recovered and used as a fuel within the plant.

At 10 MTPA stage, JSW was having a total crude steel production capacity of 9.8 MTPA. JSW at present has three SMS complexes. SMS1 has installed with a production capacity of 3.8 MTPA and SMS2 is having capacity of 6 MTPA.

In 10 to 16 MTPA expansion, it was proposed to install three converters of 200 t capacity(2 working + 1 standby) and install one 150 T electric arc furnace for producing 6 MTPA of crude steel.

At present, the 1.2 MTPA EAF has already been installed and is operational.

It is now being proposed to install two units of 200 t BOF converters instead of three and install an additional EAF of 1.2 MTPA with same configuration of earlier EAF. The final crude steel production capacity of the plant shall remain at 15.8 MTPA.

d. Hot Strip Mill

At 10 MTPA stage, JSW has a slab production capacity of 8 MTPA. In order to utilize these slabs to produce flat products, JSW has installed Hot strip mills. Previously, at 4 MTPA stage, JSW was having a Hot Strip Mill of 2 MTPA capacity. In the expansion from 4 MTPA to 10 MTPA, JSW increased the production capacity of the existing HSM to 3.2 MTPA. Besides that, a new HSM was also installed with an overall production capacity of 5 MTPA, making the total HSM production capacity to be 8.2 MTPA.

In the previous proposal to increase the crude steel capacity to 16 MTPA, JSW again proposed to install a new HSM of 3.6 MTPA in order to utilize the added output of the Slab casters. The proposed total HSM capacity was 11.8 MTPA.

In the present proposal, keeping in mind the demand of the changing market, JSW also proposes to modernize and increase the production capacity of existing HSM1 from 3.2 MTPA to 4 MTPA and HSM2 from 5 MTPA to 5.2 MTPA. The net increase in HSM production capacity shall be 1 MTPA. Gross capacity of the HSM plant shall be 12.8 MTPA.

e. Cold Rolling mill

The coils from the hot strip mill are further processed in a cold rolling mill to produce value added products. In the CRM, the coils are pickled using hydrochloric acid to remove scales adhering to the surface of the coils. The pickled coil is further rolled in cold reversing mills to the desired thickness. A portion of the cold rolled coils are then processed in the batch/continuous annealing furnaces to produce annealed steel products. The heat energy for the annealing operation is provided by the fuel gases. The balance portion of the cold rolled coils is coated to produce special coated products. There is a provision for two types of coating of steel viz., galvanizing and colour coating. While the galvanized cold rolled products are used mainly in the construction industry, the colour coated products find wide application in the white goods sector.

JSW is presently having installed two cold rolling mills –CRM1 and CRM2. CRM1 is having production capacity of 1.0 MTPA and CRM2 is having production capacity of 2.0 MTPA.

In the present proposal, JSW proposes to augment both the existing CRMs for producing 1.8 MTPA from CRM1 in place of 1.0 MTPA and 2.3 MTPA from CRM2 in place of 2.0 MTPA. The augmentation shall also involve the following-

- Augmentation of existing Continuous Galvanizing line
- Augmentation of existing continuous pickling line.

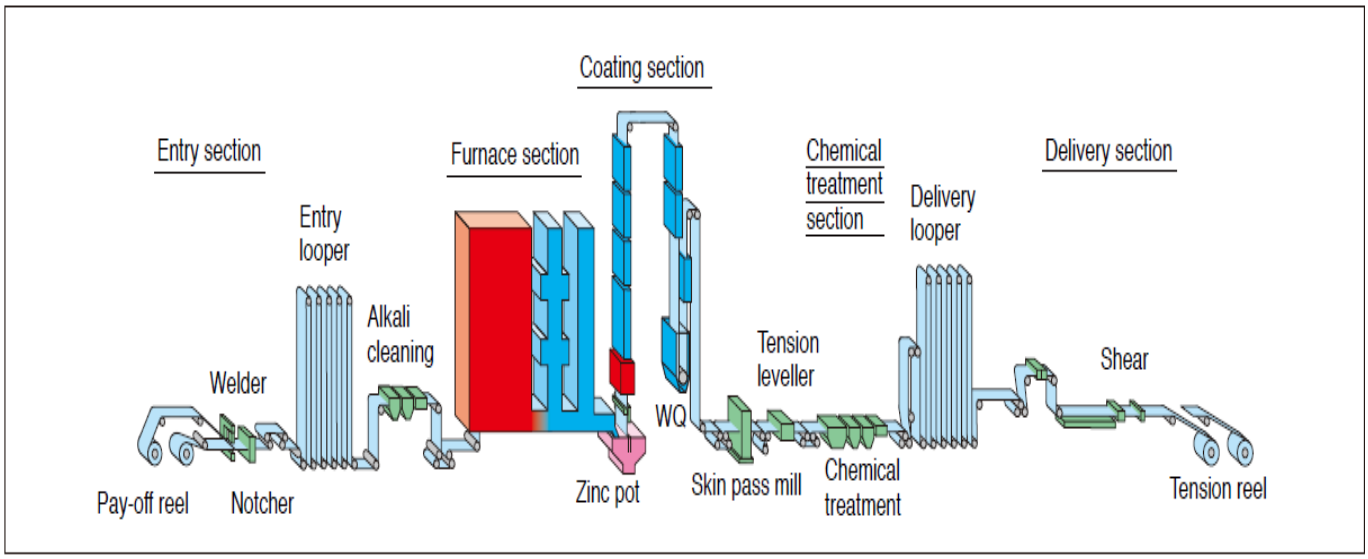
- Addition of 2 nos new Acid regeneration plants of 6400 LPH capacity each.

All the remaining facilities of the existing plant shall be utilized in the present proposal.

f. Galvanizing line

Galvanizing is the process of applying a protective zinc coating to steel of iron to prevent rusting. The most common method is hot-dip galvanizing, in which continuous running thin sheets, obtained after coal rolling, are submerged in a bath of molten zinc. The heat required for melting the zinc is generally obtained by using fuel gases. The galvanized sheet are thefinished products of cold rolling mills. Process flow diagram of continuous galvanizing line is give in Figure 3.1.

Figure 3.1- Process flow diagram of Continuous Galvanizing line.



JSW is currently having 4 galvanizing lines each of 0.25 MTPA production capacity.

JSW is now proposing to augment the existing 4 X 0.25 MTPA galvanising lines by replacing it with a new 3 X 0.45 MTPA line and an additional 2 X 0.95 MTPA line.

The proposal shall also involve addition of new molten zinc baths and fume extraction system. The proposal shall include latest state of the art technologies, thereby reducing overall pollution load from the existing configuration.

g. Captive power Plant

JSW is currently having captive power generation capacity of 830 MW. Configuration of the plant are given below:

Sl. No.	Capacity	Fuel	Year commercial operation
1	100 MW	Gas based	2003
2	130 MW	Gas based + Waste gas from Coke 1&2	2005
3	CPP-3&4 each 300 MW	Coal & Gas	2010/11

Due to limitation of imported coal, JSWSL is now proposing to change the coal source for the existing 2 X 300 MW units from 100 % imported to a combination of domestic and imported coal. Due to this the coal requirement will increase from 203 TPH to 285 TPH with a maximum ash content of 25%.

3.2 Raw material requirement

3.2.1 Sinter Plant

JSW is presently receiving all the raw material required for various units of the Steel plant through railways. For the present proposal for sinter plant, no additional raw materialshall be required to be procured from outside. Additional amount of sinter shall be produced by utilizing the presently unutilized ore fines and ESP dust.

3.2.2 Blast furnace

Configuration of proposed blast furnaces in the 10 MTPA to 16 MTPA expansion is now being changed. In place of a new 4.4 MTPA blast furnace, a smaller 3 MTPA blast furnace shall be installed. And the existing BF3 shall be augmented to produce 4.4 MTPA in place of 3.0 MTPA at present. Therefore, there is no increase in production capacity of BF hot metal production. So, No additional raw material requirement shall be required.

3.2.3 Steel Melting Shop

Crude steel production capacity of JSW shall be remain the same after the present proposal. So, no additional raw material is required for the present proposal.

3.2.4 Hot strip Mills

The hot strip production capacity of the steel plant is proposed to be increase by 1 MTPA. The additional raw material requirement shall be made up from the existing slab production capacity of the plant.

3.2.5 Cold Rolling Mills

Cold rolling mills only utilize finished products of hot rolling mills. Cold rolling of hot rolled products only provide value addition. Additional HR coils shall be made available to the CRM from the existing Hot Strip mills. Small quantities of acid may be required additionally for acid baths. The same shall be made available to the units from existing sources.

3.2.6 Galvanizing line

Galvanizing the Cold rolled strips only required small quantities of molten zinc. The additional quantity of zinc shall be made available from the existing sources.

3.2.7 2X300 MW Captive power Plant

The present coal requirement for the 2X300 MW CPP units of JSW is 1.8 MTPA. The coal is basically imported coal with a CV of 6000 Kcal/Kg. Coal is being procured from Australia via Sea and railways. For the present proposal, JSW plans to blend imported coal with domestic coal in the ration 60:40. The total coal requirement after this shall increase to 2.4 MTPA. The imported coal requirement shall reduce to 1.2 MTPA and the domestic coal requirement will be 1.5 MTPA. Imported coal shall be made available from the existing sources. Domestic coal shall be obtained through E-auction. The comparative details of present and proposed coal is given in Table 3.2 (a) & (b).

Table 3.2 (a): Coal Analysis for present and future scenario

Sl.No.	Property	Present coal used (100% Imported)*	Proposed blended coal (Imported & Domestic in equal ratios)
1	Coal Quantity(MTPA)	1.8	2.5
3	Sulphur content (%)	0.6	0.6
4	GCV (Kcal/Kg)	6000	4600-5000
5	Ash Content (%)	15	25
6	Ash Generation (MTPA)	0.26	0.625

Table 3.2 (b): Coal Analysis of different sources

Sl. No.	Property	Coal characteristics & source			
		Imported			Domestic
		S. Africa	Columbian	Indonesian	E-auction
1	Sulphur content (%)	0.6	0.6	0.6	0.6
2	GCV (Kcal/Kg)	6100	6000	5100	4600
3	Ash Content (%)	15	6	5	34

3.3 Fuel requirement

There will be minor changes in the utilization of by product fuels in the overall complex due to rolling mills. The current practice of maximizing the recovery of by product gases; maximize use of gaseous fuel and to use the surplus gases for power generation will continued to be used in the revised configuration also. The revised gas balance is given in Table 3.3.

Table 3.3- Revised gas balance

Units	10-16 MTPA Proposed revision Proposed				10-16 MTPA Proposed revision Proposed			
	Specific yield Gcal/t	Production	CV Kcal/Nm^3	Hourly supply Gcal/hr	Specific yield Gcal/t	Production	CV Kcal/Nm^3	Hourly supply Gcal/hr
Generation								
BF-1 existing/Upgradation	1.4	5200	900	303.3	1.4	5200	900	303.3
BF 5&6/BF- 5/ BF -5 & BF -3 upgradation	1.4	12000	900	700.0	1.4	12000	900	700.0
Coke Oven 5 & 6	1.38	12300	4300	707.3	1.38	12300	4300	707.3
BOF 4xBOF/BOF (2) + upgradation	0.16	1100	2000	7.3	0.16	1100	2000	7.3
BOF (2 Conv)	0.16	12000	2000	80.0	0.16	8700	2000	58.0
Total				**1798**				**1776**
Consumption								
Units	**specific consumption**	**Production**	**CV Kcal/Nm^3**	**Hourly requirement Gcal/hr**	**specific consumption**	**Production**	**CV Kcal/Nm^3**	**Hourly requirement Gcal/hr**
Sinter Plants 4, 5 & 6	0.02	26800	1500	22.3	0.02	26800	1500	22.3
COB 6 in place of CO 1&2	0.6	4109	1200	102.7	0.6	4109	1200	102.7
COB 5	0.60	8200	1200	205.0	0.60	8200	1200	205.0
BF1 (upgradation from 0.9 MTPA to 2.5 MTPA)	0.7	5200	1200	147.3	0.7	5200	1200	147.3

Units	10-16 MTPA Proposed revision Proposed				10-16 MTPA Proposed revision Proposed			
	Specific yield Gcal/t	Production	CV Kcal/Nm^3	Hourly supply Gcal/hr	Specific yield Gcal/t	Production	CV Kcal/Nm^3	Hourly supply Gcal/hr
BF-5	0.68	12000	1200	340.0	0.68	8000	1200	226.7
BF3 upgradation to 4.4 MTPA					0.68	4000	1200	113.3
SMS-2 - Augmentation of capacity of Converter from 175 t to 185 t	0.018	1100	1500	0.8	0.018	1100	1500	0.8
SMS-3 BOF Conv	0.018	12000	1500	9.0	0.018	8700	1500	6.5
Mills	0.28	16500	2000	192.5	0.28	28600	2000	333.7
Total				**1020**				**1158**
Surplus energy				**778**				**618**

3.4 Power requirement

The estimated power requirement for the expansion of the Integrated Steel Plant from 10 MTPA to 16 MTPA was estimated around 400 MW. This requirement is being made up by the captive power generation units. For the present proposal, there shall be an increase in overall power required of the steel plant. The additional 33 MW of power being required for the present proposal shall be made available from the excess power generated by the Captive power plants. The revised power balance is given in Table 3.4.

Table 3.4 – Revised power requirement of various units

Units	10-16 MTPA proposed revision			Changes in proposed units	Sp PC	Production (t/d)	Demand MW
	Sp PC	Production (t/d)	Demand MW				
Sinter Plants 4	35	6300	9.2	**Sinter plant 4**	35	6300	9.2
Sinter Plants 5	35	20500	29.9	**Sinter plant 5**	35	15750	23.0
				Sinter Plant 6	35	4750	6.9
COB 6 in place of CO1&2	50	4109	8.6	**CO 1&2**	50	4109	8.6
CO 5	50	8200	17.1	**No change**	50	8200	17.1
BF1 (upgradation from 0.9 MTPA to 2.5 MTPA)	56	5200	12.1	**No change**	56	5200	12.1
BF-5	140	12000	70.0	**BF 3 ugradation**	140	8000	46.7
				BF-5	140	4000	23.3
SMS-2 - Augmentation of capacity of Converter from 175 t to 185 t	69.5	1100	3.19	**existing**	69.5	1100	3.19
SMS-3 EAF	300	3300	41.25	**SMS3 2X1.2 MTPA EAF**	300	6600	82.5
SMS-3 BOF Conv (3x200t) (2Op+1Sp)	60	12000	30	**SMS 3 2x200t BOF converter**	60	8700	21.8
Mills	115	16500	79.1	**Mills (HSM,CRM,WRM)**	115	16500	79.1
Oxygen	-	-	96		-	-	96
Total	-	-	396.4		-	-	429.4
Surplus to grid(MW)	**394**			**Surplus to grid(MW)**	**361**		

3.5 Water requirement

The JSW Steel Complex has an allocation of 72.8 MGD of fresh water from Tungabhadra and Krishna rivers at 10 MTPA stage. With the introduction of several water reuse / recycle technologies, it has been possible to reduce the specific water consumption from 8.0 m^3 to 3.46 m^3 per ton of crude steel, which has made it possible to meet the fresh water required for the expansion of the steel plant up to 16 MTPA.

For the proposed expansion from 10 MTPA to 16 MTPA, 2500 m^3/hr was required. After the present proposal, around 320 m^3/hr of water shall be required additionally for the rolling mills and EAF. The same shall be met by treating STP water from Shankar Hill Township and VV Nagar Township. No additional fresh water shall be required to be drawn for the present proposal. The revised water balance diagram form the present proposal is given in **Table 3.5**.

Table 3.5- Revised Water balance diagram

Units	10-16 MTPA Proposed revision			New Proposal			
	Specific Water Consumption	Production	Water Consumption	Units	Specific Water Consumption	Production	Water Consumption
Sinter Plants 4	0.03	20500	615	Sinter Plants 4	No change		
Sinter Plants 5		6300	189	SP5 of 5.75 MTPA			
				SP6 of 1.75 MTPA			
COB 6 in place of CO1&2	0.9	4109	3698	No change			
CO 5 of 3 MTPA	0.92	8200	7544				
BF1 (upgradation from 0.9 MTPA to 2.5 MTPA)	0.6	5200	3120	No change			
BF-5&6	0.6	12000	7200	BF 3 up gradation	No change		
				New BF 5 of 3 MTPA as BF3 will be upgraded			
SMS-2 - Augmentation of capacity of Converter from 175 t to 185 t	0.5	1100	550	No change			
SMS-3 EAF	1.0	3300	3300	SMS 3 -2X1.2 MTPA EAF	1.0	6600	6600
SMS-3 BOF Conv (3x200t) (2Op+1Sp)	0.5	12000	6000	SMS 3 – 2 X 1.6 MTPA BOF	0.5	8700	4350
Mills	0.5	16500	8250	Mills (HSM, CRM & CGL)**	0.5	28600	14300
Power plant (including distribution)	2	660	31680	No change			
Recovery from 750 m^3 RO ZLD	750			No change			
Total	57146			64846			
Difference in consumption	**16953**			**7700**			

4.0 EXISTING ENVIRONMENTAL STATUS

In order to comply with the various conditions stipulated in the earlier ECs, JSWSL is regularly monitoring various environmental attributes such as meteorology, ambient air quality, water quality, noise levels, etc. within and outside the complex, locations covering 10 Km radius through MoEFCC approved and NABL accredited third party agency. Also to monitor the effectiveness of the pollution control measures applied to various units of the plant, work zone monitoring is also being conducted on monthly basis. The details of parameters, location and frequency are explained in the **Table 4.1.**

Table 4.1 – Various parameters being monitored by JSWSL

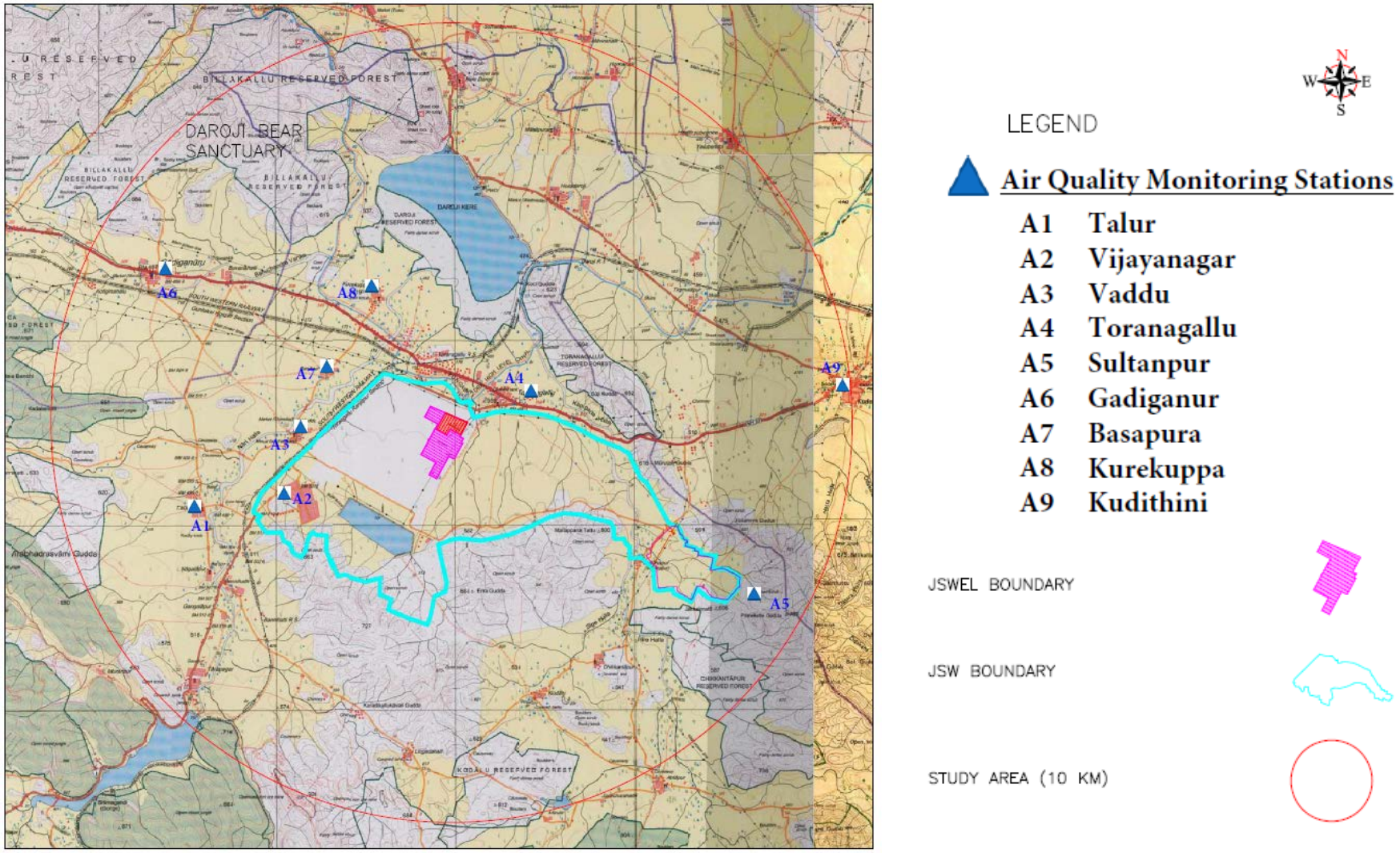
SL. NO.	Area	Parameters
1	Continuous Ambient Air Quality Monitoring (near plant boundary)- • Vaddu • Vidyanagar • V V Nagar • 10 MT • S G Colony	NO_2, SO_2 , PM_{10}, $PM_{2.5}$,CO
2	Manual Air Quality Monitoring- • Talur • Vaddu • Sultanpur • Toranagallu • Gadignur • Basapur • Kurekuppa • Kudutini • Hampi • Karadidhama • Vidyanagar	NO_2, SO_2 , PM_{10}, $PM_{2.5}$
3	Water Quality (monthly):	
	a) Surface- • Narihalla • Kaniganal -U/S, D/S • Darojikere Tank, • Inlet to Daroji • Outlet of Daroji tank, • Nalla from slime pond • Drinking water to Vaddu village from Vidyanagar,	pH, Color, Turbidity, Temperature, TDS, TSS, Volatile Solids, Total Solids, Total hardness, Oil & grease, DO, BOD_3, COD, Residual Chlorine, Nitrogen, Free ammonia, Cl, F, SO_4 , S, NO_3 , CN, PO_4 , C_6H_5OH, Cr_6 , Total Chromium, Fe, Cu, Se, As, Cd, N, B, Hg, Pb, Zn, Sodium, Insecticides / Pesticides.
	b) Open well- • Toranagallu School • HLC • Sultanpur	pH, Color, Turbidity, Conductivity, TDS, Alkalinity, Total hardness, Fe, Mn, Cl, SO_4, TSS, NO_3 , F, C_6H_5OH, Se, As, Cd, N, B, Hg, CN, Pb, Zn,

SL. NO.	Area	Parameters
	• Kurekuppa Cattel Farm	Anionic Detergents, Poly. Aromatic Hydrocarbons, Mineral oil, Residual Chlorine, Pesticides, Coli form Organisms, Alpha & Beta emitters.
	c) Bore well- • Talur • Vaddu • Dumpsite • Sultanpur • Toranagallu.	
4	Drinking Water-WTP (Daily): • V V Nagar • Shankar Gudda • Vidyanagar	pH, Conductivity, TDS, TSS, Total Hardness, Ca Hardness, Mg Hardness, Chloride, Turbidity, Free Chlorine.
5	STP : • V V Nagar • Shankar Gudda • Vidyanagar Reed Bed Water • JSH	pH, TDS, TSS, Turbidity, Free Chlorine, MPN, E coli, BOD_3, COD
6	Noise: a.Villages- • Talur • Vaddu • Sultanpur • Toranagallu • Gadignur • Basapur • Kurekuppa • Kudutini • Hampi • Karadidhama • Vidyanagar.	Leq
	b. Plant Boundary-	JSH

4.1 Ambient Air Quality

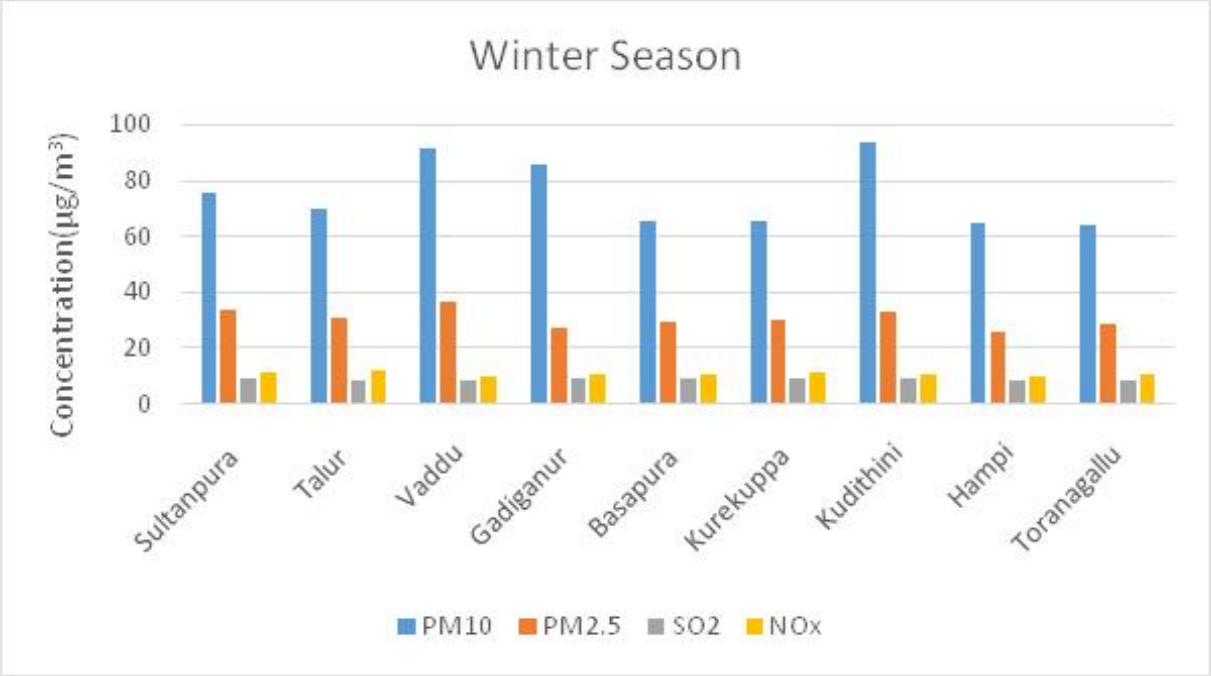
Continuous Ambient air quality monitoring is being done at 4 locations. Additionally, ambient air quality is also monitored manually through MoEFCC approved third party (with NABL accredited lab Facility) at 10 different locations. Location map of the ambient air monitoring stations is given in **Figure 4.1**.

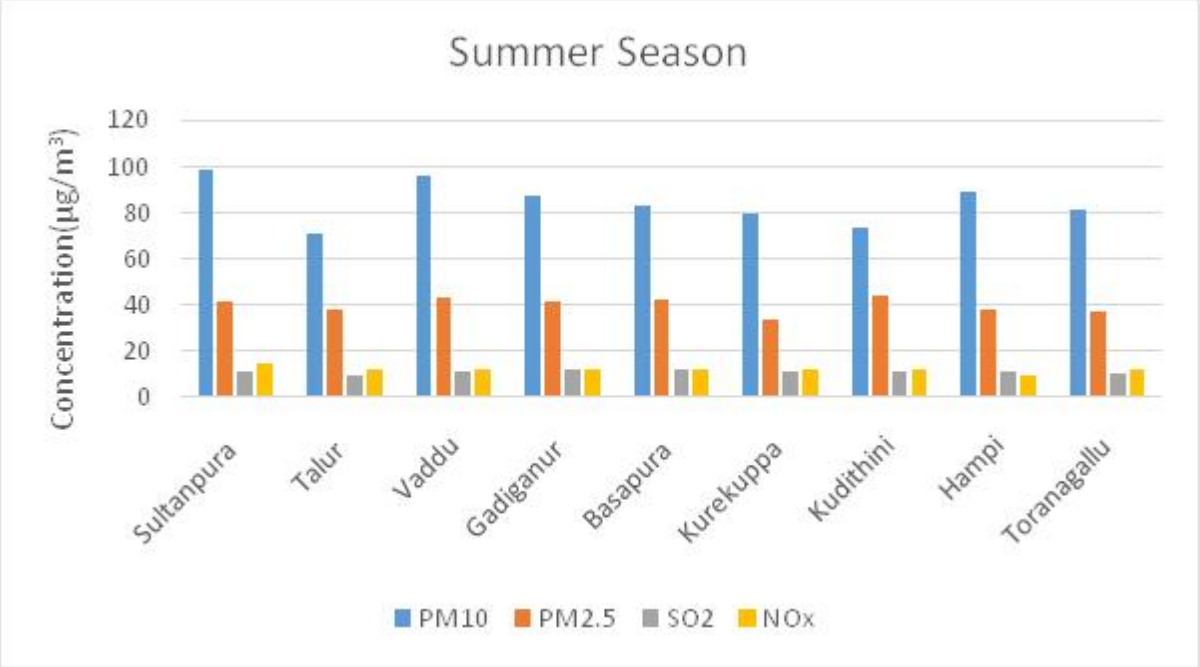
Figure 4.1-Map showing AAQ monitoring locations within 10km



Values of average concentrations of the pollutants monitored at the stations for winter and Summer are shown in the **Figure 4.2.**

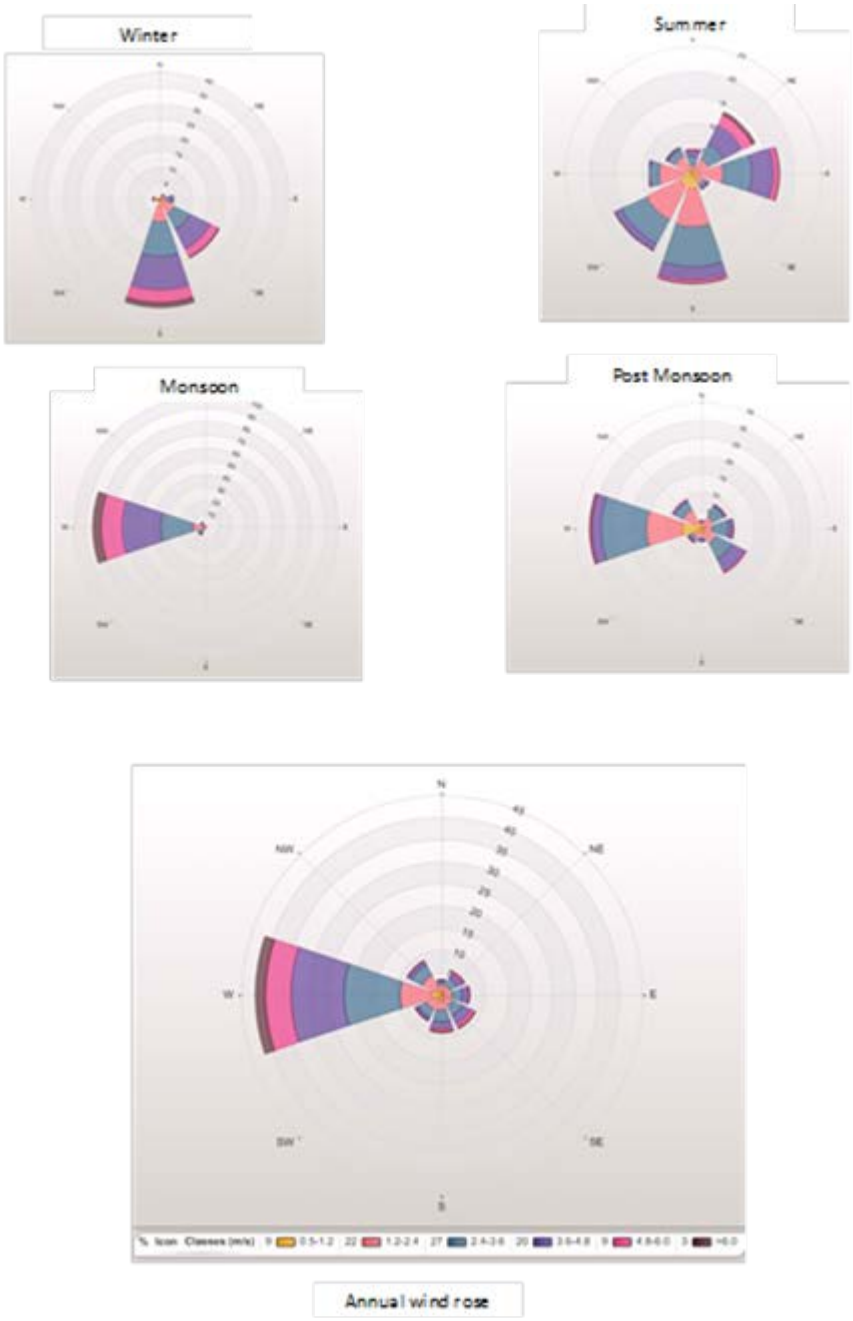
Figure 4.2 – Ambient concentrations of the pollutants





JSWSL is also continuously monitoring the meteorological data at site. Based on the site monitored meteorological parameters, wind roses are prepared for different seasons. Wind roses prepared based on site specific data are shown in **Figure 4.3.**

Figure 4.3: Site specific Wind roses



4.2 Water Quality

As shown in **Table 4.1** above, regular monitoring of ground water quality is monitored at several locations. The results of water quality analysis are given in **Table 4.2 (a) and Table 4.2 (b)** below.

Table 4.2 (a) - Water Quality- Bore well

Sl. No.	Parameters	IS: 10500 Norms		Sultanpur Bore well near Bus Stop	Talur Bore WELL Village	TNGL Village
		Desirable	Permissible			
1.	Colour, Hazen units	5	25	<5	<5	<5
2.	Odour	Unobjectionable		Unobjectionable		
3.	Taste	Agreeable		Agreeable		
4.	Turbidity, NTU	5	10	1.3	0.9	1.7
5.	pH	6.5-8.5	6.5-8.5	7.6	7.3	7.4
6.	Conductivity, µmhos/cm	-	-	1290	1632	2263
7.	T.Dissolved Solids, mg/l	500	2000	832	1058	1470
8.	T.Alkalinity as CaCO3, mg/l	200	600	262	399	378
9.	T.Hardness as CaCO3, mg/l	300	600	490	510	590
10.	Calcium as Ca, mg/l	75	200	118	130	153
11.	Magnesium as Mg, mg/l	30	100	48	45	69
12.	Total Suspended Solids, mg/l	-	-	1.5	2	4
13.	Iron as Fe, mg/l	0.3	1.0	BDL	BDL	BDL
14.	Manganese as Mn, mg/l	0.1	0.3	0.0008	BDL	BDL
15.	Chlorides as Cl, mg/l	250	1000	198	255	333
16.	Sulphates as SO4, mg/l	200	400	177	84	413
17.	Nitrates as NO3, mg/l	45	100	5.4	0.8	11.4
18.	Flouride as F, mg/l	1.0	1.5	1	1.2	1
19.	Phenols as C6H5OH, mg/l	0.001	0.002	BDL	BDL	BDL
20.	Mercury as Hg, mg/l	0.001	0.001	-	-	-
21.	Cadmium as Cd, mg/l	0.01	0.01	BDL	BDL	BDL
22.	Selenium as Se, mg/l	0.01	0.01	BDL	BDL	1.2775
23.	Arsenic as As, mg/l	0.05	0.05	BDL	BDL	BDL
24.	Cyanide as CN, mg/l	0.05	0.05	BDL	BDL	BDL
25.	Lead as Pb, mg/l	0.05	0.05	BDL	BDL	BDL
26.	Zinc as Zn, mg/l	5	15	0.0063	0.0864	0.0019
27.	Anionic detergents as MBAS, mg/l	0.2	1.0	-	-	-
28.	Chromium as Cr, mg/l	0.05	0.05	0.002	0.0011	0.001
29.	Poly.Aromatic Hydrocarbons, mg/l	_	_	-	-	-
30.	Mineral Oil, mg/l	0.01	0.01	-	-	-
31.	Residual Chlorine, mg/l	0.2	-	-	-	-
32.	Pesticides	Absent	0.001	-	-	-
33.	Coliform Organisms, MPN/100ml	Absent	Absent	Absent	Absent	Absent
34.	Alpha emitters, µc/ml	10 6	10 6	-	-	-
35.	Beta emitters, µc/ml	10 7	10 7	-	-	-

Table 4.2 (b) - Water Quality- Surface water

Sl. No.		IS: 2296 1982 Norms** (Class C)	Kanigana l D/S	D/W Supply to Vaddu	Darojikere Outlet
1.	pH	6.5 - 8.5	8.4	7.3	7.6
2.	Colour	-	-	-	-
4.	Turbidity	-	10.1	7.9	132
5.	Temperature	-	26.2	27.3	24.2
6.	Solids	-	-	-	-
	a. Volatile	-	-	-	-
	b. Suspended	-	8.5	5	74
	c. Dissolved	1500	1482	120	288
	d.Total solids	-	1690.5	125	362
7.	Total Hardness	-	500	88	78
8.	Dissolved Oxygen	4.0	5.5	8	7.4
9	BOD - 5 days, 20°C	3	BDL	BDL	BDL
10.	COD	-	5	10	18
11.	Free Ammonia	-	BDL	BDL	BDL
12.	Chloride (as Cl)	600	520	19	96
13.	Fluoride (as F)	1.5	1.2	1	1
14.	Sulphates (as SO4)	400	437	33	84
15.	Sulphides (as S)	-	BDL	BDL	BDL
16.	Nitrates (as NO3)	50	16.7	BDL	2.3
17.	Cyanides (as CN)	0.05	BDL	BDL	BDL
18.	Dissolved Phosphates (as PO4)	-	-	-	-
19.	Insecticides/ Pesticides	-	-	-	-
20.	Phenols (as C6H5OH)	0.005	BDL	BDL	BDL
21.	Chromium (as Cr) (Hexavalent)	0.05	0.0024	BDL	BDL
22.	Iron (as Fe)	50	BDL	BDL	0.1246
23.	Copper (as Cu)	1.5	0.0125	BDL	0.0052
24.	Arsenic (as As)	0.2	BDL	BDL	BDL
25.	Cadmium (as Cd)	0.01	BDL	BDL	BDL
26.	Mercury (as Hg)	-	-	-	-
27.	Lead (as Pb)	0.1	BDL	BDL	BDL
28.	Zinc (as Zn)	15	0.0062	BDL	0.0028

****Class of Water**

Class C	Drinking water source with conventional treatment followed by disinfection

4.3 Air Quality of Existing Plant

All major stacks are provided with continuous emissions monitoring systems (CEMS). The real time data connectivity has been established to SPCB and CPCB servers as per CPCB guidelines. Emissions from all other remaining stacks is also monitored regularly.

The present Environmental performance of Existing plant are given in **Table 4.3** (a) & (b) below.

Table 4.3 (a) – Emissions from major units of Existing plant

SL NO	STACKS	Norms as per CFO	AVG
1	SP 1 Process ESP1	150	48
2	PP1 WIND EXHAUST	150	73
3	PP1 HOOD EXHAST	150	98
4	BF3 CAST HOUSE EAST	50	17
5	BF3 CAST HOUSE WEST	50	25
6	BF4 CAST HOUSE EAST	50	16
7	BF4 CAST HOUSE WEST	50	14
8	COREX 1	150	102
9	BF1 CAST HOUSE	150	15
10	SMS 1 HMDS-3	150	32
11	SMS 1 LHF-3	150	15
12	COKE OVEN-3 C&D Process	50	4
13	SP2 PROCESS ESP	50	37
14	SP2 DEDUSTING ESP	50	57
15	SP3 PROCES ESP1	50	48
16	SP3 PROCES ESP2	50	66
17	SP3 DEDUSTING ESP	50	54
18	BF-3 STOCK HOUSE	50	12
19	CRM 1 BAF	50	17
20	BAR ROD MILL	50	14
21	WIRE ROD MILL	50	9
22	HSM-2 RHF-1	50	18
23	CPP#3 SO2	-	440
24	CPP#3 NOx	-	171
25	CPP#3 PM	100	53
26	CPP#4 SO2	-	539
27	CPP#4 NOx	-	214
28	CPP#4 PM	100	63

Table 4.3 (b) – Emissions from other units of Existing plant

Sl.No	Stack Emission	Temp	Velocity	Flow	PM	Norms, as per CFO
Raw Material Handling Systems						
1	JNT 30 dedusting-RMHS1	40	7.92	25761	31	150
2	CSP-RMHS1	44	11.71	44781	18	150
3	FSB-RMHS1	40	9.96	13108	15	150
4	JH 14-15 DDS-RMHS1	45	9.87	51211	57	150
5	COSP-RMHS1	44	11.34	43366	63	150
6	JH 17-RMHS1	44	13.06	12464	64	150
7	JH 16-RMHS1	44	10.60	22815	81	150
8	RMHS B10-RMHS7&10MT	41	15.77	433081	49	50
9	RMHS B11-RMHS7&10MT	40	16.21	210570	48	50
10	RMHS B9-RMHS7&10MT	40	14.46	398374	45	50
11	RMHS B6-RMHS7&10MT	40	15.07	146175	15	50
12	RMHS B26-RMHS 7 &10MT	42	12.07	46451	18	50
13	RMHS B24-RMHS 7&10MT	40	13.08	379812	28	50
Coke Oven 1&2						
14	Coke screening-CO1&2	40	13.08	379812	28	50
15	Cutter House-CO1&2	43	8.93	72876	39	50
Coke Oven 3						
16	Ground Dedusting System(A&B)	59	13.80	139962	22	50
17	Ground Dedusting System (C&D)	59	13.76	139597	15	50
18	Coke Dry Quenching 1	54	13.84	180787	35	50
19	Coke Dry Quenching 2	54	13.88	180778	34	50
20	Process stack AB	236	23.00	160000	45	50
21	Process stack CD	70	16.00	160000	34	50
Coke Oven 4						
22	CDQ 3	56	14.45	188651.67	40	50
23	CDQ 4	60	14.46	197039.25	36	50
24	GDS(C&D)	60	14.87	217170.4	16	50
25	GDS(A&B)	59	15.29	223378.4	12	50
26	Process stack AB	249	22.92	4471923.7	46	50
27	Process stack CD	245	22.18	4361845	48	50
28	Screen House	40	9.34	72348.775	25	50
Sinter Plant 1						
29	Dedusting ESP	117	18.65	786079.67	60	150
30	Process ESP	140	19.64	1101735.7	49	150
Sinter Plant 2						

Sl.No	Stack Emission	Temp	Velocity	Flow	PM	Norms, as per CFO
31	7J36-SP2	40	9.07	57107	41	50
32	Dedusting ESP	88	16.70	446419.67	39	50
33	Process ESP	120	17.66	1286033	49	50
34	MND Discharge	140	10.80	37119	16	50
Sinter Plant 3						
35	Dedusting ESP	100	16.98	526461	35	50
36	Process ESP 2	160	20.69	1051886	48	50
37	Process ESP 1	160	21.36	1085949	45	50
Sinter Palnt 4						
38	DDS ESP Stack Outlet	103	15.47	397306	45	50
39	Process ESP Stack Outlet	141.667	18.90333	1369156.7	46	50
Pellet Plant 1						
38	Ball mill	78	17.30	41506	110	150
39	Bentonite bin	45	10.42	6890	47	150
40	Drier 1	60	16.19	88120	41	150
41	Drier 2	60	16.89	89473.5	73	150
42	Drier 3	55	10.74	59366	34	150
43	HLSS	45	9.52	195299.67	55	150
44	P2 JH Bag Filter	45	16.52	15716	101	150
45	Hood Exhaust	121	19.85	505247.83	75	150
46	Process ESP	115	16.76	1584383	63	150
47	Wind box	123	19.71	499135.2	53	150
48	Hood Exhaust	118	20.00	520511	50	150
Pellet Plant 2						
49	Additive Bin	43	16.34	27848	30	50
50	Ball mill 2	79	17.64	38068	15	50
51	HLS	50	11.59	50813	15	50
52	Pellet Plant 2 process ESP	81	16.94	700780	25	50
53	Pellet Plant 2 Vertical mill	80	17.87	17650	12	50
54	Storage building	44	11.57	122948	58	50
Lime Plant 1						
55	LCP Kiln 1	108	18.65	41265	55	150
56	LCP Kiln 2	111	18.29	46067	67	150
57	LCP Kiln 3	113	17.87	38939	47	150
58	LCP Kiln 4	107	17.97	39858	71	150
Lime Plant 2						
59	LCP Kiln 5	101	18.19	39475	45	50

Sl.No	Stack Emission	Temp	Velocity	Flow	PM	Norms, as per CFO
60	LCP Kiln 6	116	18.26	39526	62	50
61	LCP Kiln 7	104	18.29	39527	54	50
62	LCP Kiln 8	102	18.22	39543	64	50
63	DBB dedusting (7&8)	37	14.37	79667	58	50
64	DBB dedusting -9	40	12.17	47135	51	50
65	DBB 10	40	11.64	45082	34	50
Lime Plant 3						
66	LCP kiln 9	106	18.50	101069	46	50
67	LCP kiln 10	107	18.39	100675	60	50
68	LCP kiln 11	110	17.42	97561	44	50
Corex 1						
69	Old CDP-CRX1	69	11.93	84627	31	150
70	Cast house DDS-CRX1&2	57	16.63	821618	33	150
71	Coal Transportation	45	8.41	64347	34	150
72	Incinerator	62	10.79	5491	16	150
73	PCX3 (Old CDP)	60	11.68	83096	57	150
74	Stockhouse DDS -coal	45	9.36	48565	42	150
Corex 2						
75	additional dedusting	43	13.71	36537	13	150
76	Stockhouse DDS-Oxide	40	7.49	39483	39	150
77	Stock house DDS(Coal)-CRX2	40	7.23	38112	15	150
Blast Furnace 1						
78	Cast house DDS	68	15.02	594020	40	150
79	Stock house DDS	45	17.58	533690	72	150
Blast Furnace 2						
80	Stock House DDS new	43	19.30	130531	81	150
81	Stock House DDS old	44	10.30	120445	65	150
82	Cast House	60	9.68	391280	32	150
Blast Furnace 3						
83	Blast Furnace 3 Cast house east	69	14.09	867904	26	50
84	Blast Furnace 3 Cast house West	68	14.05	702218	33	50
85	Blast Furnace 3 Stock House	59	14.20	728293	43	50
Blast Furnace 4						
85	Blast Furnace 4 Cast house East	65	13.71	855143	25	50
86	Blast Furnace 4 Cast house West	65	14.14	881924	28	50
87	Stock house Fine DDS area	195	7.77	105621	18	50
88	Stock house	99	10.11	822594	44	50

Sl.No	Stack Emission	Temp	Velocity	Flow	PM	Norms, as per CFO
Steel Melting Shop 1						
89	Convertor secondary dedustinng	66	13.40	1044214	22	150
90	SMS 1 HMDS 1 &2	105	12.17	73649	75	150
91	SMS 1 HMDS 3&4	66	7.15	72551	27	150
92	SMS1 LHF1	100	7.31	66017	47	150
93	SMS 1 LHF 2	95	8.91	75411	64	150
94	SMS 1 LHF 3	72	12.94	97349	30	150
95	SMS 1 HMPT 1	70	7.26	218290	55	150
96	SMS 1 HMPT 2	70	7.10	213481	40	150
97	SMS 1 LHF 2	100	7.19	64933	24	150
Steel Melting Shop 2						
98	SMS 2 converter dedusting 1	56	7.20	460358	47	50
100	SMS 2 converter dedusting 2	60	10.50	505918	38	50
Steel Melting Shop - 3 EAF						
101	Baghouse-SMS3	70	12.24	1431026	32	50
Cold Rolling Mill 1						
102	CRM 1 Acid Regeneration Plant	84	5.52	18756	42	50
103	ACL Plant RTF	275	7.06	24408	16	50
104	Batch Anealing Furnace	254	11.37	58866	15	50
105	CCM	50	7.06	66360	12	50
106	CPL	67	10.47	9330	17	50
107	ECL	100	15.38	15571	11	50
108	Fume extraction from ECL top chimney	100	15.19	15378	25	50
109	SPM	50	13.91	36267	13	50
Cold Rolling Mill 2						
110	ARP	85	6.81	40785	47	50
111	CAL Furnace 1	198	7.59	102575	15	50
112	CAL Furnace 2	195	7.79	105892	14	50
113	CGL	318	8.38	90274	21	50
114	CPL	65	13.84	16868	15	50
115	Oxide Bin	60	16.95	19221	25	50
Hot Strip Mill 1						
116	HSM 1 RHF 1	435	10.29	215870	29	150
117	HSM1 RHF 2	440	10.25	213447	27	150
Hot Strip Mill 2						
118	HSM2 RHF 1	582	11.68	140851	48	50

Sl.No	Stack Emission	Temp	Velocity	Flow	PM	Norms, as per CFO
119	HSM2 RHF 2	580	11.72	141591	32	50
120	HSM 2 RHF 3	540	10.52	133354	28	50
LP Mills						
121	Bar Rod Mill	457	10.12	105129	22	50
122	WRM	450	10.63	111449	30	50
Captive Power Plant 1						
97	CPP 1 Boiler 1	152.333	7.61	376186	15	150
Captive Power Plant 2						
98	CPP2 Boiler 1	259.2	8.284	110233	50	150
99	CPP2 Boiler 2	257.333	8.69	116596	28	150
100	CPP2 Boiler 3	262.2	8.04	108258	43	150
101	CPP2 Boiler 4	261	7.378	99221	47	150
102	CPP2 Boiler 5	255.5	8.58	115027	34	150
103	CPP2 Boiler 6	257.75	8.04	107317	27	150
104	CPP2 Boiler 7	266	8.80	117622	28	150
105	CPP2 Boiler 8	268	8.38	111090	42	150
106	CPP2 Boiler 9	190	12.46	349735	23	150

4.4 Water Quality of Existing plant

a) ETP-Coke Ovens

JSW is the first steel company in the world which has installed a 250m^3/h innovative membrane bioreactor with reverse osmosis technology for reuse of effluent recovery type Coke Ovens. The treated water which comes out as clear water is reused in cooling towers in Coke Oven plant itself. Hence no discharge of effluent from coke Ovens. Environmental performance of plant water quality are given in Table 4.4(a-d).

Table 4.4 (a)- Environmental performance of ETPs

Parameters	MoEF gazette notification 31.03.2012	GCP-BF1	GCP-BF2	GCP-BF3	GCP-BF4
pH	6.0-8.5	7.5	7.7	7.8	7.9
Oil & grease	10	2	3	2.2	4.2
Suspended solids	100	54	80	86	90
Ammonia Nitrogen as NH_3-N	50	35	41	32	36
Cyanide as CN	0.2	1.82	1.02	BDL	BDL

Table 4.4(b)- Environmental performance of Guard Ponds

Sl. No.	Parameters	General Standards (Schedule VI of EP Act 1986)*	Guard pond-1 outlet	Guard Pond II Outlet	Guard Pond III Outlet	Sultanpur Seepage (Natural Stream)
1.	pH	5.5-9.0	7.07	6.9	7.4	8.4
2.	Suspended Solids, mg/l	100	47	36	21	95
3.	Oil & Grease	10	0.4	0.6	-	-
4.	Total Residual Chlorine	1	-	-	-	-
5.	BOD - 3 days, 20°C	30	BDL	8	BDL	BDL
6.	COD	250	5	32	13	12
7.	Nitrogen					
	a. Ammonical	50	27.7	27.4	42.8	BDL
	b. Total Kjeldhal	100	-	-	-	-
8.	Free Ammonia	5.0	3.39	1.24	0.52	BDL
9.	Fluoride (as F)	2.0	-	-	-	-
10.	Sulphides (as S)	2.0	BDL	BDL	BDL	BDL
11.	Cyanides (as CN)	0.2	BDL	BDL	BDL	BDL
12.	Dissolved Phosphates (as PO4)	5	-	-	-	-
13.	Phenols (as C6H5OH)	1.0	BDL	BDL	BDL	BDL
14.	Chromium (as Cr) a. Hexavalent b. Total	 0.1 2.0	-	-	-	-
15.	Selenium (as Se)	0.05	BDL	BDL	0.0189	BDL
16.	Arsenic (as As)	0.2	-	-	-	-
17.	Cadmium (as Cd)	2.0	BDL	BDL	BDL	BDL
18.	Nickel (as N)	3.0	-	-	-	-
19.	Copper (as Cu)	3.0	0.0451	0.0431	0.0479	0.0394
20.	Mercury (as Hg)	0.01	-	-	-	-
21.	Lead (as Pb)	0.1	-	-	-	-
22.	Zinc (as Zn)	5.0	0.0236	0.0323	0.0327	0.0213

Table 4.4(c)- Environmental performance of STPs

Sl. No.	Parameters	KSPCB NORMS	Vidyanagar STP O/L	SGC STP O/L	VVN STP O/L
1	pH	6-9	6.6	7	6.7
2	Turbidity, NTU	2	1.1	1	1.8
3	BOD_3, mg/l	10	6	4	8
4	Residual Chlorine Cl_2, mg/l	<=1	1.2	1.1	1

Table 4.4(d)- Environmental performance of Boiler Area water

Sl. No	Parameter	Unit	CPP 1	CPP 2
1	Colour	-	-	-
2	Odour	-	-	-
3	pH	-	7.5	7
4	Temperature	Deg C	33.4	30.4
5	TSS	mg/lt	24	62
6	TDS	mg/lt	2512	2096
7	Particle size	-	-	-
8	Oil & Grease	mg/lt	0.4	0.6
9	BOD	mg/lt	8	10
10	EC	µmhos/cm	3864	3227
11	COD	mg/lt	33	40
12	Chloride	mg/lt	385	342
13	Ammonia (Free)	ppm	-	-

5.0 ANTICIPATED ENVIRONMENTAL IMPACTS

JSWSL's steel plant is in a continual development phase. At present, the plant is at 12 MTPA production capacity with the existing facilities. The impacts due to proposed changes in fuel mix on ambient environment is predicted in the preceding paragraphs.

5.1 Impacts on Ambient Air Quality

The estimated pollution loads before and after the present proposal are given in **Table 5.1**.

Table 5.1(a) – Estimated pollution Loads before and after the proposal at 16 MTPA plant

Sl. No.	Phase	Pollution Load(Kg/hr)		
		PM	SO_2	NOx
1	Contribution from the units which are expected to be installed during 12 to 16 MTPA Stage as per EC& from existing units for which augmentation proposed	1003.3	2997.4	2026.1
2	After present proposal including changes in capacities of upcoming units during 12 to 16 MTPA and proposed augmentation in existing units	950.8	2639.9	1922.4
Net Change(2-1)		(-)52.6 (-5.2%)	(-)357.5 (-11.9%)	(-)103.7 (-5.1%)

Table 5.1(b) – Breakup of Comparative Pollution load before and after the present proposal (values in g/sec)

Units	Contribution from the units which are expected to be installed during 12 to 16 MTPA Stage as per EC (1)			After present proposal (2)			Change		
	PM	SO2	NOx	PM	SO2	NOx	PM	SO2	NOx
Coke Ovens	31.4	190.8	190.8	31.4	190.8	190.8	0.0	0.0	0.0
Sinter Plant	91.2	279.1	145.8	55.7	176.7	132.5	-35.5	-102.4	-13.3
Blast Furnace 5	35.4	10.0	4.4	26.3	2.4	2.4	-9.1	-7.6	-2.0
SMS	33.8	11.1	24.9	46.5	2.5	4.2	12.7	-8.6	-20.7
Lime Kiln	3.0	0.6	0.3	3.0	0.6	0.3	0.0	0.0	0.0
HSM 3	1.9	1.9	4.7	1.9	1.9	4.7	0.0	0.0	0.0
WRM	0.8	5.6	4.2	0.8	5.6	4.2	0.0	0.0	0.0
CPP 660 MW	13.8	46.1	46.1	13.8	46.1	46.1	0.0	0.0	0.0

	Monitored data for Units existing at 12 MTPA Stage			After present proposal			Change		
Blast Furnace 3	22.9	1.0	1.0	31.6	0.3	0.3	8.7	-0.7	-0.7
HSM1&2	7.5	7.0	17.6	11.2	10.3	26.2	3.7	3.3	8.6
CRM	1.8	0.0	9.1	3.8	0.0	0.0	2.0	0.0	-9.1
Galvanizing line	3.0	7.5	7.0	4.3	10.6	10.0	1.3	3.1	3.0
CPP 2X300 MW	32.2	271.9	106.9	33.8	285.5	112.3	1.6	13.6	5.4
Total(g/sec)	**278.7**	**832.6**	**562.8**	**264.1**	**733.3**	**534.0**	**-14.6**	**-99.3**	**-28.8**
Total(Kg/hr)	**1003.3**	**2997.4**	**2026.1**	**950.8**	**2639.9**	**1922.4**	**-52.6**	**-357.5**	**-103.7**

From the above table it is seen that there is a slight decrease in the total pollution load due to proposed modifications when compared to the present scenario. However, in order to predict the impacts of the proposed changes in the ambient environment, Ground Level Concentrations (GLCs) are also predicted at various ambient air quality monitoring stations to determine the cumulative impact.

Prediction of Impacts

After proposed modification in the plant configuration, a decrease in pollution load is observed. However, to study the ground level concentrations in future scenario and to predict the impact on the ambient air quality due to the revised pollution loads, following methodology has been adopted.

For assessment of expected air emissions after the proposed project, the basic assumption followed are:

- The air pollution load emitted from all the stacks of JSWSL from the units installed up to 12 MTPA is reflected in the air pollutants concentration in the ambient air quality as monitored during continuous/regular monitoring done around JSW.

- The predicted GLCs from the existing units, which are going to be modified, will be subtracted from the AAQ data of the various stations. The present monitored stack emission parameters shall be used for GLC prediction.

- For estimating GLCs from existing configuration, maximum stack emissions values of last year monitored data have been considered.

- Revised GLCs shall be predicted from the existing units using the revised flue gas quantity from the units being modified with present emission rates. The predicted GLC values at individual AAQ stations will be added to the resultant AAQ Data after removing contribution from the existing configuration.

- For estimating GLCs from units which are going to be installed in future under 12 to 16 MTPA stage, maximum permissible emission values with calculated flow rates shall be used.

Atmospheric dispersion modelling using estimated release rates has been conducted to provide information on the location and levels of GLCs that may be expected as the result of the proposed project. Hourly meteorological data was generated for a period of three (3) months (Dec 15 to Feb 16). This data is used to examine the effects of wind speed, direction and stability on projected concentrations of contaminants in air and on nearby surfaces.

Estimated emission quantities which were considered during previous EC for 10 to 16 MTPA expansion stage are shown in **Table 5.2**. Monitored values of emissions from the existing stacks of JSWSL which are proposed to be augmented in present proposal are given in **Table 5.3**. Air quality contamination emissions have been calculated by release mechanism and production activities which will take place in future. The estimated values of final stack emissions from all the proposed/augmented units for 12 to 16 MTPA expansion are given in **Table 5.4**.

Table 5.2. Estimated values of Stack Emissions for 12 MTPA to 16 MTPA expansion as given in earlier EC

SL no.	Unit	Height (m)	Dia (m)	Temp (K)	Discharge Nm^3/h	Anticipated Emissions (g/sec)		
						PM	SO_2	NOx
1.	COB5AB	125	4.2	473	240000	5.03	50.3	50.3
2.	COB5CD	125	4.2	473	240000	5.03	50.3	50.3
3.	COB6AB	40	3	328	400000	4.55	7.3	7.3
4.	COB6CD	40	3	328	400000	4.55	7.3	7.3
5.	CODE5AB	125	4.2	473	220325	3.3	33.3	33.3
6.	CODE5CD	125	4.2	473	220325	3.3	33.3	33.3
7.	CODE6AB	40	3	328	400000	2.8	3.5	3
8.	CODE6CD	40	3	328	400000	2.8	3.5	3
9.	SP5	130	9	423	229114	69.8	279.1	145.8
10.	SP5DE	65	4.5	313	57279	21.4	0.0	0.0
11.	BF5STV	60	4.5	473	57279	7.2	10.0	4.4
12.	BF5CH1	40	5.5	313	85564	8.5	0.0	0.0
13.	BF5CH2	40	5.5	313	85564	8.5	0.0	0.0
14.	BF5SH	40	5.5	313	85564	11.2	0.0	0.0
15.	BOF3C1	60	2	333	11314	1.4	3.7	8.3
16.	BOF3C2	60	2	333	11314	1.4	3.7	8.3
17.	BOF3C3	60	2	333	11314	1.4	3.7	8.3
18.	FEEAF	60	5.5	333	85564	15.0	0.0	0.0
19.	SMS3FE	40	5.5	333	85564	14.4	0.0	0.0
20.	LP13	45	1.8	403	9165	1.0	0.2	0.1
21.	LP14	45	1.8	403	9165	1.0	0.2	0.1
22.	LP15	45	1.8	403	9165	1.0	0.2	0.1
23.	DP16	40	1.8	403	9165	1.0	0.2	0.1
24.	WRM2	45	1.5	498	6364	0.8	5.6	2.1
25.	HSM3	65	3	523	25457	1.9	1.9	4.7

SL no.	Unit	Height (m)	Dia (m)	Temp (K)	Discharge Nm^3/h	Anticipated Emissions (g/sec)		
						PM	SO_2	NOx
26.	PP660	275	6	413	101829	13.8	46.1	46.1
27.	RHDGAS2	30	0.6	333	1018	0.1	0.0	0.0
28.	RHDGAS3	30	0.6	333	1018	0.1	0.0	0.0

Table 5.3. Monitored values of Stack Emissions from the Existing stacks of units which are proposed to be augmented in the present proposal of JSWSL

SL no.	Unit	Height (m)	Dia (m)	Temp (K)	Discharge Nm^3/h	Anticipated Emissions (g/sec)		
						PM	SO_2	NOx
1.	BF3STV	60	3	473	360000	3.00	1.0	1.0
2.	BF3CH1	40	6	313	867904	7.23	0.0	0.0
3.	BF3CH2	40	5.5	313	702218	5.85	0.0	0.0
4.	BFSH	60	3	473	822594	6.85	0.0	0.0
5.	HSM1RH1	65	3.5	523	215870	1.74	1.80	4.50
6.	HSM1RH2	65	3.5	523	213447	1.60	1.78	4.45
7.	HSM2RH1	65	3.5	523	140851	1.88	1.17	2.93
8.	HSM2RH2	65	3.5	523	141591	1.26	1.18	2.95
9.	HSM2RH3	65	3.5	523	133354	1.04	1.11	2.78
10.	CRM1ARP	65	1.2	523	18756	0.22	0.00	0.52
11.	PLTCM	65	4	523	58866	0.25	0.00	1.64
12.	CRM2ARP	65	1.2	523	40785	0.53	0.00	1.13
13.	CALF	65	2.5	523	208467	0.84	0.00	5.79
14.	CGL1	65	1.5	523	90274	0.75	1.88	1.76
15.	CGL2	65	1.5	523	90274	0.75	1.88	1.76
16.	CGL3	65	1.5	523	90274	0.75	1.88	1.76
17.	CGL4	65	2.5	523	90274	0.75	1.88	1.76
18.	CPP3	275	5	413	1000000	14.72	122.22	47.50
19.	CPP4	275	5	413	1000000	17.50	149.72	59.44

Table 5.4. Estimated values of stack emissions from all the proposed/augmented units for 12 to 16 MTPA expansion after the present proposal

SL no.	Unit	Height (m)	Dia (m)	Temp (K)	Discharge Nm^3/h	Anticipated Emissions (g/sec)		
						PM	SO_2	NOx
1.	COB5AB	125	4.2	473	240000	5.03	50.3	50.3
2.	COB5CD	125	4.2	473	240000	5.03	50.3	50.3
3.	CODE5AB	40	3	328	400000	4.55	7.3	7.3

SL no.	Unit	Height (m)	Dia (m)	Temp (K)	Discharge Nm^3/h	Anticipated Emissions (g/sec)		
						PM	SO_2	NOx
4.	CODE5CD	40	3	328	400000	4.55	7.3	7.3
5.	COB6AB	125	3	473	220325	3.3	33.3	33.3
6.	COB6CD	125	3	473	220325	3.3	33.3	33.3
7.	CODE6AB	40	3	328	400000	2.8	3.5	3
8.	CODE6CD	40	3	328	400000	2.8	3.5	3
9.	SP5	130	7.7	423	2137835	29.7	118.8	89.1
10.	SP5DE	65	4.5	313	526461	7.3	0	0
11.	SP6	130	5	423	1041750	14.5	57.9	43.4
12.	SP6DE	65	3	313	302298	4.2	0	0
13.	BF3STV	60	3	473	459474	3.8	0.3	0.3
14.	BF3CH	40	6	313	1800000	15.0	0	0
15.	BF3SH	40	5.5	313	1536000	12.8	0	0
16.	BF5STV	60	5	473	860000	7.16667	2.4	2.4
17.	BF5CH1	40	6	313	1570122	13.0844	0	0
18.	BF5SH	40	5	313	728293	6.06911	0	0
19.	SMS3 EAF2	60	6	523	1800000	15	0	0
20.	SMS3 EAF1	60	6	523	1431026	12.7202	0	0
21.	SMS3 BOF	60	3	523	300000	4.16667	2.5	4.2
22.	SMS3 SDD	40	6	333	1600000	13.3333	0	0
23.	SMS3LHF	60	2	333	152000	1.3	0	0
24.	HSM1RHF1	65	3.5	523	281250	2.26563	2.3	5.9
25.	HSM1RHF2	65	3.5	523	281250	2.10938	2.3	5.9
26.	HSM2RHF1	65	3	523	228800	3.05067	1.9	4.8
27.	HSM2RHF2	65	3	523	228800	2.03378	1.9	4.8
28.	HSM2RHF3	65	3	523	228800	1.77956	1.9	4.8
29.	CRM_1_ARP	65	1.2	523	45210	0.53	0	0
30.	PLTCM	65	4	523	462000	1.9	0	0
31.	CRM_2_ARP	65	1.2	523	40785	0.53	0	0
32.	CALF	65	2.5	523	208467	0.84	0	0
33.	CGL1	65	1.5	523	70000	0.58333	1.5	1.4
34.	CGL2	65	1.5	523	70000	0.58333	1.5	1.4
35.	CGL3	65	1.5	523	70000	0.58333	1.5	1.4
36.	CGL4	65	2.5	523	150000	1.25	3.1	2.9
37.	CGL5	65	2.5	523	150000	1.25	3.1	2.9
38.	LP13	45	1.8	403	162282	0.75	0.15	0.075
39.	LP14	45	1.8	403	162282	0.75	0.15	0.075
40.	LP15	45	1.8	403	162282	0.75	0.15	0.075
41.	LP16	40	1.8	403	162282	0.75	0.15	0.075
42.	WRM2	45	1.5	498	83557	0.83	5.6	4.2
43.	CPP3	275	5	413	1049870	15.4564	128.3	49.9
44.	CPP4	275	5	413	1049870	18.3727	157.2	62.4

SL no.	Unit	Height (m)	Dia (m)	Temp (K)	Discharge Nm^3/h	Anticipated Emissions (g/sec)		
						PM	SO_2	NOx
45.	**CPP5**	275	6	413	2301721	13.8401	46.1	46.1
46.	**HSM3**	65	3.5	523	281250	1.9	1.9	4.7

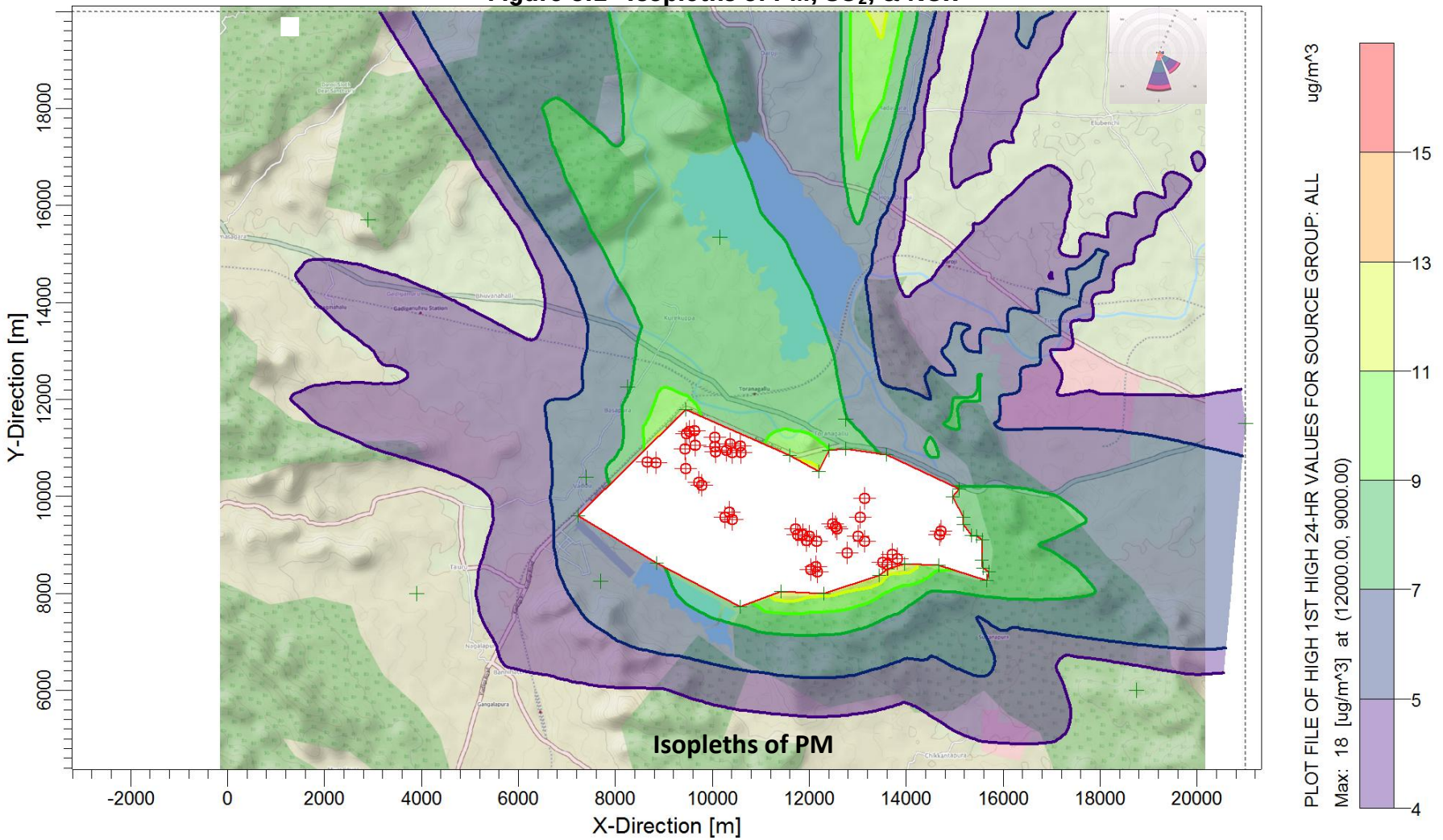
The US Environmental Protection Agency's (EPA's) AERMOD computer code is used to estimate atmospheric dispersion and concentrations of the released emissions in the immediate vicinity of the proposed sources. The modelling is conducted to be inclusive of the weather conditions that are possible and representative of the expected sources.

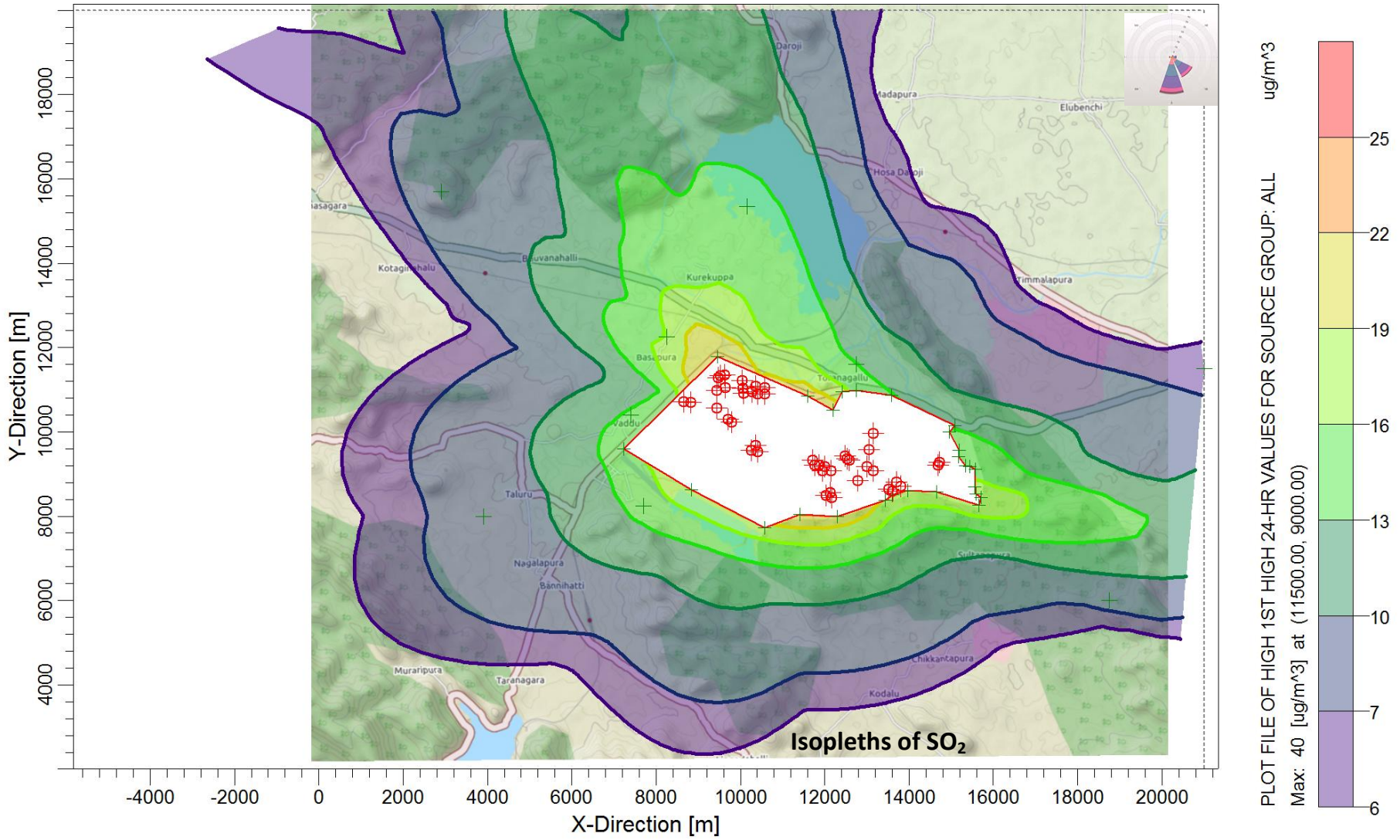
Both airborne and surface concentrations are modelled with AERMOD. Hourly derived air concentrations (DAC) are modelled for an array of receptors covering the sources and surrounding areas. Peak values of time-integrated air concentrations at these major receptors points are derived from these hourly values, with modelled results reported as total incremental air concentrations in DAC-hours occurring over the selected time period. Total pollutants concentration over the area are evaluated with AERMOD using the same array of receptors, with results reported as microgram per m^3.

The impact has been predicted over a 20 km X 20 km area with the proposed location of the stack as the center. GLCs have been calculated at every 500 m grid point.

As indicated above, in order to obtain the impact due to proposed project, seasonal average values of pollutant concentrations recorded at different AAQ stations in the study area are added to the predicted net GLC of the particular AAQ station. The net GLCs are obtained from GLCs predicted due to replacement of existing configuration of fuel use vis- à -vis with the present proposal of fuel use. The predicted GLC values have been provided in **Table 5.5**. Isopleths of PM_{10}, SO_2& NOx predicted for all the proposed/augmented units/after the present proposal are given in **Figure 5.1**.

Figure 5.1- Isopleths of PM, SO_2, & NOx





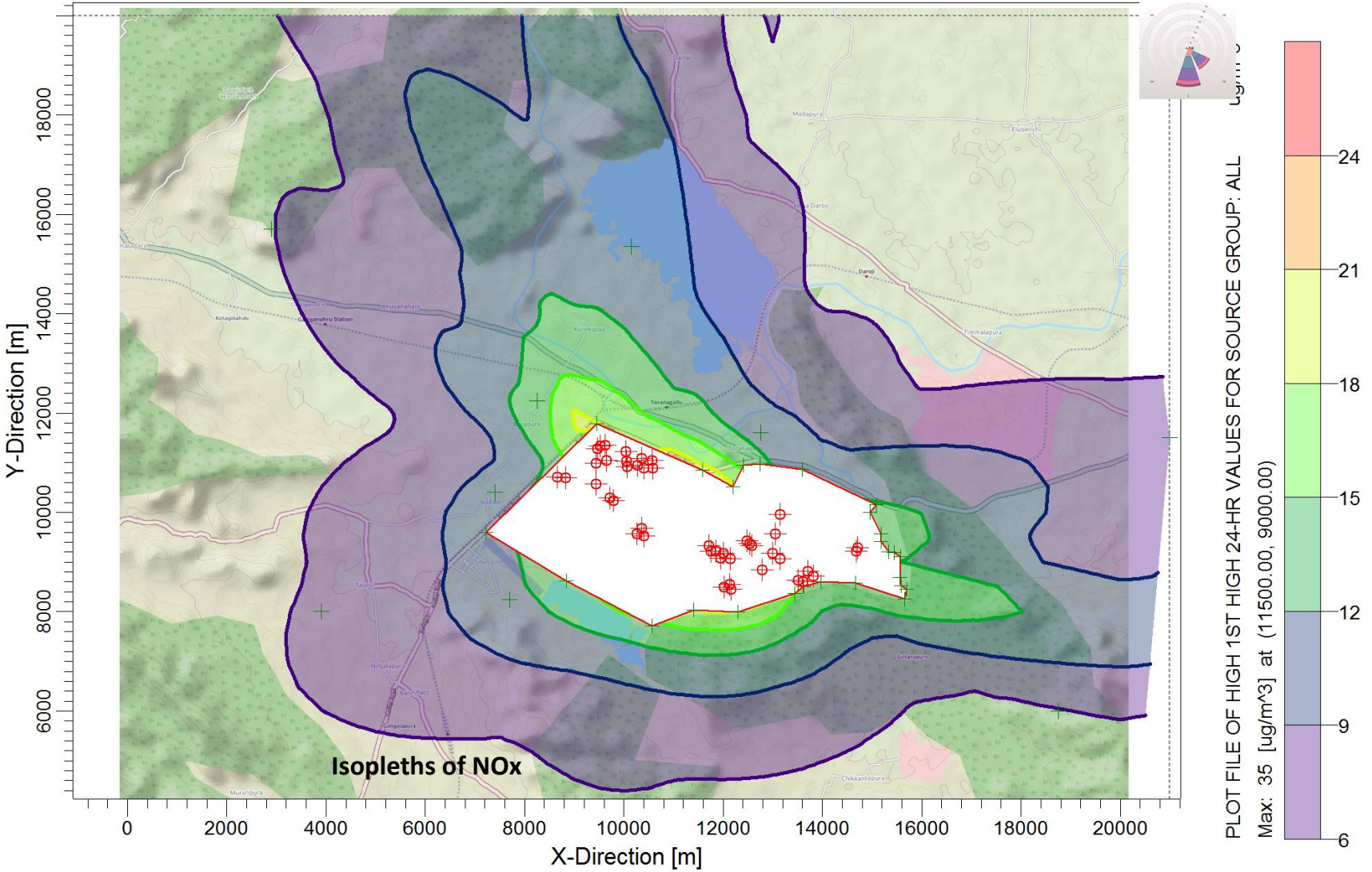


Table 5.5- Predicted GLC valuesfrom units proposed for 12 MTPA to 16 MTPA stage as estimated during EC stage and after the proposed project (GLC values in µg/m^3 (24hrs. avgs))

PM

Station ID	Description	Predicted GLCs for 12 MTPA to 16 MTPA units as per EC (A)	Present Contribution of existing units proposed for augmentation on AAQ (B)	Predicted GLCs from 12 MTPA to 16 MTPA units after present proposal along with existing units to be augmented (C)	Change in GLCs (C-B-A)
A1	Talur Village	2.71	0.90	3.53	-0.08
A2	JSW Township	4.23	1.46	5.62	-0.07
A3	Vaddu Village	4.49	1.65	6.12	-0.02
A4	Toranagallu	8.03	1.19	7.28	-1.94
A5	Sultanpur Village	2.85	0.86	3.17	-0.54
A6	Gadiganur Village	2.41	0.93	2.82	-0.51
A7	Basapura Village	4.65	2.22	6.62	-0.25
A8	Kurekuppa	6.69	2.09	8.40	-0.38
A9	Kuditini	3.75	0.99	4.45	-0.29

SO_2

Station ID	Description	Predicted GLCs for 12 MTPA to 16 MTPA units as per EC (A)	Present Contribution of existing units proposed for augmentation on AAQ (B)	Predicted GLCs from 12 MTPA to 16 MTPA units after present proposal along with existing units to be augmented (C)	Change in GLCs (C-B-A)
A1	Talur Village	5.84	3.12	8.17	-0.79
A2	JSW Township	10.09	5.48	14.17	-1.40
A3	Vaddu Village	8.26	6.08	13.54	-0.80
A4	Toranagallu	10.63	3.72	13.10	-1.24
A5	Sultanpur Village	5.98	2.54	7.71	-0.81
A6	Gadiganur Village	5.20	3.20	7.83	-0.56
A7	Basapura Village	10.42	7.36	16.14	-1.63
A8	Kurekuppa	12.71	4.80	13.86	-3.64
A9	Kuditini	6.63	2.60	6.22	-3.01

NOx

Station ID	Description	Predicted GLCs for 12 MTPA to 16 MTPA units as per EC (A)	Present Contribution of existing units proposed for augmentation on AAQ (B)	Predicted GLCs from 12 MTPA to 16 MTPA units after present proposal along with existing units to be augmented (C)	Change in GLCs (C-B-A)
A1	**Talur Village**	5.52	1.77	6.46	-0.83
A2	**JSW Township**	9.56	2.85	11.05	-1.36
A3	**Vaddu Village**	8.59	3.75	10.34	-2.00
A4	**Toranagallu**	9.42	2.60	10.89	-1.14
A5	**Sultanpur Village**	5.02	1.23	5.84	-0.41
A6	**Gadiganur Village**	4.84	1.81	5.95	-0.69
A7	**Basapura Village**	10.63	4.65	13.50	-1.78
A8	**Kurekuppa**	11.13	2.70	10.18	-3.65
A9	**Kuditini**	6.12	1.78	6.90	-1.00

As seen in the above table, the overall change to the ambient air ground level concentrations is negative at all stations. This will result in slight decrease in the AAQ concentration of PM_{10}, SO_2& NOx in the study area from that expected during earlier EC. The resultant values of the AAQ concentration at the monitoring stations is shown in **Table 5.6**.

Table 5.6- Resultant AAQ values after proposed project
(GLC values in µg/m^3 (24hrs. avgs))

Station ID	Description	AAQ Data PM_{10}	Resultant GLCs considering present proposal	AAQ after proposed project
A1	**Talur Village**	69.7	2.63	72.33
A2	**JSW Township**	52.33	4.16	56.49
A3	**Vaddu Village**	91	4.47	95.47
A4	**Toranagallu**	64	6.09	70.09
A5	**Sultanpur Village**	75.3	2.31	77.61
A6	**Gadiganur Village**	85.3	1.89	87.19
A7	**Basapura Village**	65.3	4.40	69.70
A8	**Kurekuppa**	65.7	6.31	72.01
A9	**Kuditini**	94.3	3.46	97.76

Station ID	Description	AAQ Data SO_2	Resultant GLCs considering present proposal	AAQ after proposed project
A1	**Talur Village**	8.7	5.05	13.75
A2	**JSW Township**	18.33	8.69	27.02

A3	**Vaddu Village**	8.7	7.46	16.16
A4	**Toranagallu**	8.7	9.38	18.08
A5	**Sultanpur Village**	9.7	5.17	14.87
A6	**Gadiganur Village**	9.7	4.63	14.33
A7	**Basapura Village**	9	8.78	17.78
A8	**Kurekuppa**	9	9.06	18.06
A9	**Kuditini**	9	3.62	12.62

Station ID	Description	AAQ Data NOx	Resultant GLCs considering present proposal	AAQ after proposed project
A1	**Talur Village**	12.3	4.69	16.99
A2	**JSW Township**	14.67	8.20	22.87
A3	**Vaddu Village**	10.3	6.59	16.89
A4	**Toranagallu**	11	8.29	19.29
A5	**Sultanpur Village**	11.3	4.61	15.91
A6	**Gadiganur Village**	11	4.14	15.14
A7	**Basapura Village**	11	8.85	19.85
A8	**Kurekuppa**	11.7	7.48	19.18
A9	**Kuditini**	10.7	5.12	15.82

The above tables reveal that after the proposed project, there will be minor addition to background AAQ values. However, on comparing with the values of GLCs from earlier EC, **a slight decrease in the background ambient concentrations is expected**.

In order to identify the cumulative impact of the proposed project as well as other expansion and new projects in the study area, the GLCs from all other upcoming projects are estimated on the AAQ Stations and the resultant GLCs from these future projects are added to the resultant AAQ data as obtained in **Table 5.6**. The cumulative values are shown in **Table 5.7.**

Table 5.7- Cumulative impact of all other future projects in the study area (GLC values in µg/m^3 (24hrs. avgs.))

PM_{10}

Station ID	Description	AAQ after proposed project	Contribution from upcoming other Projects	AAQ in Future
A1	**Talur Village**	72.33	0.03	72.36
A2	**JSW Township**	56.49	0.04	56.53
A3	**Vaddu Village**	95.47	0.05	95.52
A4	**Toranagallu**	70.09	0.04	70.13
A5	**Sultanpur Village**	77.61	0.02	77.63
A6	**Gadiganur Village**	87.19	0.03	87.22
A7	**Basapura Village**	69.70	0.04	69.74
A8	**Kurekuppa**	72.01	0.06	72.07

Station ID	Description	AAQ after proposed project	Contribution from upcoming other Projects	AAQ in Future
A9	Kuditini	97.76	0.02	97.78

SO_2

Station ID	Description	AAQ after proposed project	Contribution from upcoming other Projects	AAQ in Future
A1	Talur Village	13.75	0.39	14.14
A2	JSW Township	27.02	0.51	27.53
A3	Vaddu Village	16.16	0.59	16.75
A4	Toranagallu	18.08	0.51	18.59
A5	Sultanpur Village	14.87	0.25	15.12
A6	Gadiganur Village	14.33	0.35	14.68
A7	Basapura Village	17.78	0.54	18.32
A8	Kurekuppa	18.06	0.74	18.80
A9	Kuditini	12.62	0.29	12.91

NOx

Station ID	Description	AAQ after proposed project	Contribution from upcoming other Projects	AAQ in Future
A1	Talur Village	16.99	0.27	17.26
A2	JSW Township	22.87	0.36	23.23
A3	Vaddu Village	16.89	0.41	17.30
A4	Toranagallu	19.29	0.35	19.64
A5	Sultanpur Village	15.91	0.18	16.09
A6	Gadiganur Village	15.14	0.25	15.39
A7	Basapura Village	19.85	0.37	20.22
A8	Kurekuppa	19.18	0.51	19.69
A9	Kuditini	15.82	0.2	16.02

5.2 Impacts of Traffic on Ambient Air

As predicted in the earlier proposal, for the expansion of steel plant from 10 MTPA to 16 MTPA, 1430 additional trucks per day were required to be run for transportation of raw material. Due to the same, a minor increase in particulate matter concentrations at various receptor points was estimated.

For the present proposal, as there is no requirement of raw material to be procured from outside. Therefore, there shall be no change to the earlier predicted values after the present proposal for change in plant configuration. The expected GLC values of particulate matter concentrations including the impact of vehicular movements are given in **Table 5.8**.

Table 5.8 – Impact of traffic on ambient air-GLCs of PM

Station ID	Description	AAQ after present change in plant configuration	Contribution due to traffic	Cumulative AAQ in Future
A1	**Talur Village**	72.36	0.31	72.67
A2	**JSW Township**	56.53	0.13	56.66
A3	**Vaddu Village**	95.52	1.93	97.5
A4	**Toranagallu**	70.13	0.83	70.96
A5	**Sultanpur Village**	77.63	0.01	77.64
A6	**Gadiganur Village**	87.22	0.11	87.33
A7	**Basapura Village**	69.74	0.94	70.68
A8	**Kurekuppa**	72.07	0.39	72.46
A9	**Kuditini**	97.78	0.01	97.79

Also, for the present proposal, the only additional raw material required is thermal coal for captive power plants. At present, the coal for the CPPs is being brought to the plant through railways. The increased coal quantity will result in additional one rake of coal in two days. The coal shall be unloaded through wagon tippler and conveyed to the silos via coal stockyard, ground hoppers and network of covered conveyors. Suitable facilities are already existing for handling the same.

The stock yard has been provided with facilities of Dust Suppression (DFDS) Systems and operational sprinklers to cope with the fugitive dust generation during the coal handling process. Wind barriers have been provided around the coal stockyard area for further reducing wind erosion. Therefore, no additional increase in GLCs is estimated from the same.

After the present project, around 0.29 MTPA of additional fly ash shall be generated from the CPPs. In order to utilize the same, the ash shall be transported to the nearby fly ash utilizers through road. Additional 35 number of bulkers shall be required to transport the additional quantum of fly ash which will be generated. This will result in a slight increase in overall particulate matter generation from roads.

JSWSL also proposes to install a new Pipe Conveyor to transport iron ore and fines iron ore from mines to steel plant for a distance of 60 km. This is estimated to reduce road transportation by more than 95%. At present, about 3000 trucks are deployed for transportation of ore from mines. After the above proposal, about 2850 trucks will be reduced from road.

The overall impact of this proposal will result in a significant decrease in particulate emissions from road. Due to this, the higher emission values being obtained at Vaddu village monitoring station shall be significantly reduced.

5.3 Impacts of Traffic on local Infrastructure

Presently, JSWSL is generating about 0.26 MTPA of fly ash from the existing 2X300 MW CPP units, by 32/22 ton bulkers to transport the fly ash from JSWSL to M/s JK and other users for cement making and construction

After the present proposal, additional about 0.365 MTPA of fly ash shall be generated from the 2X300 MW units. The additional quantum of fly ash generated after the present proposal shall also be sent to cement making and construction usage. Additional 25 Nos of bulkers of 32 T capacities shall be used to transport the same via existing ash transportation route.

5.4 Impacts on Water Environment

For the proposed project, no additional fresh water shall be required to be drawn from outside. The additional water required for Cold rolling mill shall be met by utilizing the treated water from STP of Shankar Nagar and VV Nagar Townships of JSW.

Moreover, as specified in the previous EC, Zero liquid discharge concept shall be followed.

Therefore, no impacts on surface or ground water quality are expected.

5.5 Impacts on Land

Small quantities of additional solid wastes from rolling mills shall be generated after the present proposal. The solid waste shall include mill scales and spent oil.

Mill scales will be reutilized by charging in BOFs and sinter plants. Spent oil shall be stored in designated areas before being sold to authorized vendors.

The increase in coal quantity as well as increased percentage of Ash content in coal will result in an increase in bottom ash generation and fly ash generation.

The estimated quantities of ash generation from the 2X300 MW units after the proposed project are given in **Table 5.9**.

Table 5.9- Estimated quantities of ash generation after proposed project

Details	Present	Proposed
Coal quantity	1.8 MTPA	2.5 MTPA
Ash Content	15 %	25 %
Ash Generation	0.26 MTPA	0.625 MTPA

JSWSL has made an agreement with M/s JK , M/s Gammon India and JSW Cement for 100% utilization of fly ash.

6.0 CLEAN INITIATIVES BY JSW

Keeping pace with the latest technologies in Environmental Pollution control, JSW is continuously deploying the new technologies around the plant for sustainable development. JSW has been awarded the best Integrated steel plant on the country for the year 2016-17. Details of some of the technologies deployed by JSW in the integrated steel plant facility at Toranagallu are given below.

1. Pipe conveyor for Ore transportation

Currently around 3000 trucks are deployed by JSW to transport the iron ore from mines to Steel plant. JSW has proposed to establish a new pipe conveyor to transport the iron ore and ore fines from mines to steel plant. The total length of the conveyor shall be around 60 Km.

It is estimated that after this proposal, about 95% of the trucks being used for transportation shall be reduced. This will result in a major positive impact on ambient air near the roads.

The estimated cost of the project is Rs 850 crores and estimated time of completion is December 2018.

2. MEROB type of bag filters in SP2

JSW is installing the latest technology bag filters by MEROS in their existing Sinter Plant 2. This is being implemented first time in India. This technology is estimated to limit the particulate emissions from the sinter plant from 50 mg/Nm^3 to 10 mg/Nm^3. This will also help in capturing dioxin and furans from the flue gases. The technology shall be implemented on a trial basis.

3. Zero Liquid Discharge

JSW steel is the only Integrated Steel Plant of its size in the world to implement ZLD in the complex. Nearly 45% of water being used in steel making process, is obtained by recycling water/sewage from the complex.

At present, no water is being discharged outside the plant boundary.

Other clean initiatives taken by JSW are given in **Table 6.1** below.

Table 6.1 – Details of Clean initiatives by JSW Toranagallu

Sl No	Details	Environment Impacts	Remarks
1	Selective waste gas reduction in sinter plants	This will reduce the volume of emission by nearly 50%, besides reducing the coke rate by 4-5 kg/ton of sinter	This is being implemented in SP-2 on a trial basis. This is being implemented for the first time in India.
2	Upgradation of environmental control at CPP-3&4	The existing captive power plant is being upgraded to meet stricter environment standard applicable for power plants, this includes desulphurization flue gases also.	There will be >98% reduction in SO2 from flue gases.
3	Upgradation of ESP of Pellet plant - 1 The ESP of PP-1 was designed to must the old norm of 150mg/m^3. it is being upgraded to meet the current norm of 50mg/m^3	Reduced emission	
4	Installation of additional bag filter in conveyor / junction houses (20 new filters)	To reduce fugitive emission from the conveyor operations	Till date, JSWSL installed 166 bag filters and 15 nos & additional bag filters also will be installed
5	Construction of a new raw water pond to store water	A new water reservoir of 33 million cbm capacity capacity is being constructed to provide water security for steel plant operation. This will improve the microclimate in the surrounding area.	The water from the reserve will be provided to the adjoining bear sanctuary for habitat improvement.
6	Treated sewage for use in industry as make up : The treated sewage from S.H.T (4000 m^3/d) is being used in CRM-2 to reduce water consumption	This has helped in making CRM-2 water negative.	Uses MBR technology for sewage treatment
7	The existingHazardous landfill site approved. TSDF facilities in Karnataka are very far away (300km). In view of this, a TSDF facility is being constructed within	Better management of hazardous waste	

Sl No	Details	Environment Impacts	Remarks
	the steel plant to take care of the hazardous waste		
8	Municipal solid waste management : A small 20 tpd MSW plant is being installed to manage the municipal wastes (from gardens, offices canteen waste etc,) within the steel plant	Conversion of waste to energy in the form of RDF	It is intended to sell RDF as fuel to cement plant
9	Recovery of carbon from flue dust, JSW has developed a technology of carbon recovery plant from flue dust : The plant has been setup to recovery carbon. The carbon recovered is used in sinter plant.	Reduction in energy consumption	Another waste utilization projects
10	Technology for weathering of steel slag. JSW has developed a unique technology for weathering of steel slag at mining cast. The weathered steel slag meets the ASTM specification of 2% expansion for aggregates.	This will help in increasing the use of steel in road construction	First time in India & is being patented.
11	Demonstration of road made from slag products through CSR. A 6 km 14m vide concrete road (MDR) has been made as a demonstration project for use of steel slag as an aggregate	Promotion of steel slag in roads. This will facilitate increased use of slag in roads by PWD / NHAI	With Successful performance, it is intended to get the steel slag included in applicable standards.
12	Tree plantation beyond the periphery of steel plant: The area beyond the steel plant has scarce plantation. The peripheral area of 400 acres belonging to the forest department is being planted with trees along	This has improved the green coverage & helped improve the ambience.	It is intended to continue this practice as a regular basis to further expand the green coverage.

Sl No	Details	Environment Impacts	Remarks
	with help from forest department.		
13	Bio diversity study by BNHS: JSW Steel had earlier carried out biodiversity studies surrounding the steel plants. It is now intended to carry out similar study within 10 km area through BNHS	The earlier reports have indicated substantial improvements in terms of biodiversity birds flowers & fauna in the area.	This will becoming a base line. It is intended carryout these studies once every 5 years

7.0 CONCLUSION

The assessment of environmental impact of proposed changes shows;

- No increase of pollution emissions in respect of PM_{10}, SO_2& NOx
- No impact on fresh water consumption.
- No impact on Land environment.
- No additional requirement of land, water for the project.

After the proposed changes in the plant configuration and implementation of pollution control equipment and new technologies , there will be decrease of pollution load when compared with pollution loads due to earlier configuration on the ambient environment.

Annexure

Annexure 1

F. No. J-I 1011/489/2009-IA.II(I)
Government of India
Ministry of Environment, Forest and Climate Change

Indira Paryavaran Bhawan
Jor Bagh Road, Aliganj,
New Delhi - 110003
E-mail: satish.garkoti@nic.in
Tele fax: 011: 24695316

Dated: 1st October, 2015

To

The Director & CEO
M/s JSW Steel Limited,
P.O. Vidyanagar, village Tornagallu,
District Bellary - 583 275,
Karnataka

E-mail: unni.krishnan@isw.in, Ph: 08395-250120 Fax:08395-250138

Subject: Expansion of Integrated Steel Plant (from 10 MTPA to 16 MTPA) along with Captive Power Plant (600 MW) of M/s JSW Steel Limited located near Village Tornagallu, District Bellary in Karnataka - Environmental Clearance regarding.

Sir,

This has reference to your letter No. Nil dated 09.10.2010 along with copies of EIA-EMP report and subsequent communications dated 30.11.2010, 12.01.2011,03.06.2011, 13.06.2011, 16.07.2011, 10.11.2011, 20.01.2014, 12.02.2014, 26.02.2014, 05.03.2014, 02.04.2014, 04.04.2014, 03.06.2014, 05.06.2014, 04.08.2014, 25.08.2014, 30.09.2014, 08.10.2014, 25.10.2014, 22.11.2014, 25.11.2014 and 27.10.2014 regarding project mentioned above. All the Integrated Steel Plants are listed at S.No. 3(a) under Primary Metallurgical Industries under "Category A" of the Schedule of EIA Notification 2006 and appraised at the Central level.

2. The Ministry of Environment, Forest and Climate Change (MoEFCC) has examined the application for the project cited above. It is noted that M/s JSW Steel Limited has proposed to expand the capacity of existing steel plant from 10MTPA to 16MTPA along with Captive Power Plant (600MW), near village Tornagallu, Dist. Bellary Karnataka. The proposed expansion will be carried out within the existing campus. The project site is located 29 km from Bellary and 33 km from Hospet. The Daroji Bear Wildlife Sanctuary is located at a distance of about 5 km from project site. Total project area available is 8000 acres and proposed expansion will be carried out in 700 acres. No forestland is involved. Augmentation of port, road and rail facilities will be carried out for receipt of raw materials and dispatch of products. Total estimated cost of the expansion project is Rs 15,130 crores as on 2009. Expansion from 7 MTPA to 10 MTPA Steel Plant has been commissioned.

S.N.	Name of the Units	Facilities for 4 MTPA project	Facilities for 7 MTPA Project	Facilities for 10 MTPA Project	Facilities proposed for	Total Capacity (MTPA)

					UMTPA project	
1.	Ore Beneficiation Plant (MTPA)	1x4.5	1x2.5 and 1x5	1x7.5	Nil	19.5
2.	Pellet Plant (MTPA)	1x5	-	1x5	-	10
3.	Sinter Plant (MTPA)	2.3	2.3	1x496m3 = 5.75	8.05	18.40
4.	Coke Oven (NR)	Two batteries of 0.64 MTPA = 1.24 MTPA	-	-	-	1.24
5.	Coke Oven (Recovery type) (MTPA)	-	1.5	2	3.65	7.15
6.	Hot Metal Corex (MTPA)	1.6	-	-	-	1.6
7.	Hot Metal Blast Furnace	0.9 + 2.17 = 3.07	3	3	6	15.07
8.	Pig Casting machine (TPD)	1200	3600	3600	3600	12000
9.	Crude Steel-BOF & Auxiliaries (MTPA)	3x130t = 3.8	2x175 = 3	2x175t = 3	4x180t = 6	15.8
10.	Lime Kilns (TPD)	4x300 = 1200	4x300 = 1200	4x600 = 2400	8x300 = 2400	7200 TPD
11.	Slab Caster (MTPA)	3.2	4.8	1x2200mm slab caster of 1.6MTPA	2x2200mm slab caster of 3.2 MTPA	8
12.	Billet Caster	-	1.5	-	6.3	7
13.	HSM (MTPA)	2.8	0.4	5	-	8.2
14.	Plate Mill	-	-	-	-	-
15.	Pipe Mill	-	0.4	-	-	0.4
16.	Wire Rod Mill (MTPA)	-	1x0.6	-	-	0.6
17.	Rebar & section Mills (MTPA)	-	1x1 =1	-	ISBQ mill (0.8 MTPA), 1 section mill (2.1 MTPA), & 1 Beam Mill (2.1 MTPA) = 5	6

18.	Cold Rolling Mill Complex (MTPA)	-	1	2	-	3
19.	Galvanising Lines (MTPA)	-	-	4x0.25 = 1	-	1
20.	Colour Coating	-	-	0.5	-	0.5
21.	Power Plant and Process Steam Boilers (MW)	Gas based CPP - 1x100 MW CPP- 1x130MW = 230 MW	Coal based (1X300MW) 300MW	Coal based (Ix 300MW) 300MW	2x300MW Coal based = 600MW	1430
22.	Incinerator	-	250kg/h	500kg/h	250kg/h	1000kg/h
23.	Slag Grinding & Mixing Unit (outsourced) (MTPA)	1x0.2 = 0.2	1x0.6	1x2	1x2	6.2
24.	Oxygen Plant (outsourced)	1x2500TPD = 2500TPD	1x1800TPD 1800TPD	1x1800TPD + 1x900TPD = 2700TPD	1x1 800TPD = 1800 TPD	8800 TPD
25.	Township	2	1 unit at SG Colony	1 unit	1 unit	5 units

3.0 The PP has separately installed a DRI Plant of 1.2 MTPA capacity in the existing complex of the Steel Plant for which an environmental clearance has been obtained from this Ministry vide letter dated 13.01.2012.

Details of raw Material requirement for the Proposed Expansion of the Steel Plant from 10 MTPA to 16MTPA are given below:

S.N.	RAW MATERIAL	SOURCE	QUANTITY (TPA)	MODE OF TRANSPORT
1.	Iron Ore Fines	Bellary/Hospet	13,375,000	Rail
2.	Coking Coal	Imported/Blended	4,195,000	Rail
3.	Non-Coking Coal	Imported/Blended	700,000	Rail
4.	Limestone Fines for Pellet Plant	Bagalkot/Dronochalam	84,000	Rail
5.	Limestone fines for sinter plant	Bagalkot/Dronochalam	530,000	Rail
6.	Dolomite Fines for sinter plant	Bagalkot/Dronochalam	543,000	Rail
7.	Quartzite for BF	Belgaum Region	78,000	Road
8.	Limestone for SMS	Import ed/Bagalkot/Dronochalam	1,029,000	Road
9.	Dolomite for SMS	Imported/Bagalkot/Dronochalam	415,000	Road
10.	Bentonite for Pellet Plant	Belgaum	30,000	Road
11.	Ferro-Alloy for SMS	Local	93,000	Road
12.	Iron Ore for SMS	Bellary/Hospet Area	124,000	Road

13.	Thermal Coal for CPP (2x300MW)	Imported	350,000	Road

4.0 The 16 MTPA Integrated Steel Plant does not have its own iron ore mines and iron ore will be obtained from various sources. The Government of Karnataka vide letter No.CI 64 MMM 2014 dated 11.09.2014 has informed of sustained availability of 21 MTPA of iron ore through e-auction to meet 80% requirement of the expansion of the steel plant to 16 MTPA on a long-term basis/agreement.

5.0 Recovery type of coke oven will be installed. BF coke will be used in the blast furnace and coke fines/coke breeze will be used in the sinter plant. Sinter will be manufactured in the sinter plant. Hot metal will be provided in blast furnace and transported to the SMS using hot metal ladles. Basic Oxygen Furnace technology will be used for the production of liquid steel. Crude steel will be produced in converter to manufacture beams, planks, blooms and billets. Steel will be converted into billets in Continuous Casting Machine (CCM). Wire rods, special bars, medium section and heavy sections such as beams, chemicals, angles, etc will be produced. Washed coal will be used. Coke oven gases after by-product will be used as supplementary fuel. Top gases from the blast furnace will be cleaned by gas cleaning devices. Dust extraction/fume extraction system with ESPs and stack will be provided to stock house and cast house. Secondary fumes will be captured by fume extraction system generated during hot metal and liquid steel transfer points. Dust emissions from calcining plant will be controlled by bag filters. Emissions of SO2, NOx and CO from re-heating furnace will be controlled. The steam generators will be provided by low NOx burners to reduce NOx emissions. Dust suppression/dust extraction system will be provided to control fugitive emissions. It is proposed to achieve TSP <50mg/Nm^3 and work zone dust levels <50mg/Nm^3.

6.0 Total water requirement for the expansion project from Almatty and Tungabhadra Dam will be 2500m^3/h. Water requirement will be within the 72 MGD allotted by the Government of Karnataka. The wastewater generated from the indirect cooling circuit will be routed through the cooling tower. Coke from the coke oven will be cooled in dry cooling plant to eliminate use of quenching water. The wastewater of gas cleaning plant (GCP) of blast furnace and steel melt shop containing suspended solids will be clarified in the wastewater treatment plant and recycled to the waste gas cleaning units. Wastewater from the CCM will be treated to remove scale and oil and treated water will be recycled after cooling. The domestic wastewater will be treated in a Sewage Treatments plant (STP) and used for dust suppression and green belt development.

7.0 Public Hearing / Public Consultation meeting was conducted by the Karnataka Pollution Control Board on 30.12.2010.

8.0 The proposal was considered by the Reconstituted Expert Appraisal Committee (Industry) in its 3rd meeting held on 23rd-24th September 2009, 17th meeting held on 13th-14th December 2010. A sub-committee of the EAC(I) also undertook a site visit to the unit on 16th- 17th June 2011 and submitted their Report dated 08.07.2011, which was considered in the 27th meeting of EAC(I) held on 26th-27th August 2011. After detailed deliberations, the EAC (I) recommended the project for Environmental Clearance and stipulated Specific Conditions along with other environmental conditions while considering for accord of Environmental Clearance.

9.0 The Ministry of Environment, Forest and Climate Change has considered the application based on the recommendations of the Expert Appraisal Committee (Industry) and

hereby decided to grant Environmental Clearance to the expansion of Integrated Steel Plant (from 10 MTPA to 16 MTPA] along with Captive Power Plant (600 MW) of M/s JSW Steel Limited under the provisions of EIA Notification dated 14th September 2006, subject to strict compliance of the following Specific and General conditions:

A. SPECIFIC CONDITIONS:

i. The project proponent should install 24x7 air and water monitoring devices to monitor air emission and effluent discharge, as provided by CPCB and submit report to Ministry and its Regional Office.

ii. All the conditions stipulated by the Standing Committee of the National Board for Wildlife should be effectively implemented.

iii. The PP shall participate in a Wildlife Conservation Plan for Sloth Bears and other schedule-1 fauna found in the study area and in the Daroji Bear Sanctuary. The Conservation Plan shall be prepared in consultation with the State Wildlife Department. The Plan with various activities including creation of water bodies, elimination of weeds, eco-regeneration plan including regeneration of fruit bearing trees and improvement of ecological habitat and support to the nearby villages to minimize dependency on forest produce for fuel shall contain budgetary support with details of capital and revenue costs for various activities, the details of expenditure made on which shall be regularly submitted as part of the Compliance Report to Regional Office, Bangalore.

iv. The PP shall obtain assured raw materials (particularly iron ore and coal) from designated sources for long-term supply and shall enter into long-term MOUs with producers/sellers of raw materials used in steel making. Washed coal shall be used.

v. All the units of the expansion Project shall operate using state-of-art energy efficient technologies, environmental pollution prevention and control technologies and energy efficient measures including the 4Rs shall be implemented at every step of the plant operation. The old design of the existing plant especially old coke ovens needs a scheduled phasing out for which the proponent shall prepare a detailed time-bound Plan and submit it to the Ministry.

vi. On-line ambient air quality monitoring and continuous stack monitoring facilities for all the stacks shall be provided and sufficient air pollution control devices viz. Electrostatic precipitator (ESP) (to sinter plant) and dust catcher followed by venture scrubbers to blast furnace and bag filters etc. shall be provided to keep the emission levels of particulates below 50 mg/Nm^3 from stacks and also meet level of the 50 mg/Nm^3 in work zone.

vii. Coke oven gases after by-product shall be used as supplementary fuel. Top gases from the blast furnace shall be cleaned by gas cleaning devices. Dust extraction/fume extraction system with ESPs and stack shall be provided to stock house and cast house. Secondary fumes shall be captured by fume extraction system generated during hot metal and liquid steel transfer points. Dust emissions from calcining plant shall be controlled by bag filters. Emissions of SO2, NOx and CO from re-heating furnace shall be controlled. The steam generators shall be provided by low NOx burners to reduce NOx emissions. Dust suppression/dust extraction system shall be provided to control fugitive emissions.

viii. Air Pollution control measures shall include Pulse Jet Bag Filter of Upflow type, pneumatic conveying of dust, transport of materials in closed conveyors, wind screen in yards, DSS in yards.

ix. In-plant control measures like bag filters, de-dusting and dust suppression system shall be provided to control fugitive emissions from all the vulnerable sources. Water sprinkling system shall be provided to control secondary fugitive dust emissions generated during screening, loading, unloading, handling and storage of raw materials etc.

x. Gaseous emission levels including secondary fugitive emissions from all the sources shall be controlled within the latest permissible limits issued by the Ministry vide G.S.R. 414(E) dated 30th May, 2008 and regularly monitored. Guidelines / Code of Practice issued by the CPCB shall be followed.

xi. The plant shall develop rail transport or rail-cum-pipeline transport for iron ore and other major raw materials within a time-bound manner.

xii. Detailed unit-wise Risk Analysis and Assessment and detailed on-site and off-site Emergency Preparedness and Disaster Management Plan (DMP) linked to District-level DMP shall be prepared in consultation with district authorities and mock drills carried out periodically.

xiii. Proper handling, storage, utilization and disposal of all the solid waste shall be ensured and regular report regarding toxic metal content in the waste material and its composition, end use of solid/hazardous waste shall be submitted to the Ministry's Regional Office at Bangalore, SPCB and CPCB.

xiv. A time bound action plan shall be submitted to reduce solid waste, its proper utilization and disposal. These include slag generated during the process of steel making - BOF slag shall be used in construction of slime pond, sludge and bag filter dusts shall be recycled in sinter/pellet plant. A 0.3 MTPA briquetting plant and 0.6 MTPA micro pellet plant shall be set up for use of dusts. All the BF slag shall be sent to cement units and SMS slag produced for construction material. All the other solid wastes including broken refractory mass shall be properly disposed off in an environmentally friendly manner.

xv. Backfilling of mine voids with SMS slag shall be appropriately reflected in the Mine Plan and prior approval obtained thereof from Indian Bureau of Mines.

xvi. All the fly ash shall be provided to cement and brick manufacturers for further utilization and Memorandum of Understanding shall be submitted to the Ministry's Regional Office at Bangalore.

xvii. Total water requirement shall not exceed 29.5MGD to be met from Almatty and Tungabhadra Dam. The water consumption shall not exceed as per the standard prescribed for steel plants. Use of air cooled condensers shall be explored and closed circuit system shall be provided to reduce water consumption and water requirement shall be modified accordingly. All the effluents shall be treated and used for plant processes/operations, dust suppression and green belt development. No effluents shall

be discharged and 'zero' discharge shall be adopted. Domestic wastewater will be treated in the Sewage Treatment Plant.

xviii. The proponent shall adopt water conservation measures to reduce requirement of make-up water. The wastewater generated from the indirect cooling circuit shall be routed through the cooling tower. Coke from the coke oven shall be cooled in dry cooling plant to eliminate use of quenching water. The wastewater of gas cleaning plant (GCP) of blast furnace and steel met shop containing suspended solids shall be clarified in the wastewater treatment plant and recycled to the waste gas cleaning units. Wastewater from the CCM shall be treated to remove scale and oil and treated water shall be recycled after cooling. The domestic wastewater shall be treated in a Sewage Treatments plant (STP) and used for dust suppression and green belt development.

xix. Efforts shall further be made to use maximum water from the rain water harvesting sources to reduce intake of water from Almatty and Tungabhadra Dam. If needed, capacity of the reservoir shall be enhanced to meet the maximum water requirement. Only balance water requirement shall be met from other sources.

xx. Regular monitoring of influent and effluent surface, sub-surface and ground water shall be ensured and treated wastewater shall meet the norms prescribed by the State Pollution Control Board or described under the E(P) Act whichever are more stringent. Leachate study for the effluents generated and analysis shall also be regularly carried out and report submitted to the Ministry's Regional Office at Bangalore, SPCB and CPCB.

xxi. Green belt shall be developed in 33 % of plant area. Selection of plant species shall be as per the CPCB guidelines in consultation with the DFO.

xxii. Power from the CPP of 1430 MW capacity shall be entirely utilized for the plant operations only. The 600 MW expansion Unit of the CPP is coal based and any change in configuration or capacity shall be made only with prior approval of this Ministry.

xxiii. The environment wing of the company and for this Plant as well as of the company shall be strengthened with qualified personnel, state-of-art laboratory, infrastructure, etc and regular records of the environmental data including on-line monitoring of emissions shall be maintained.

xxiv. Company shall develop an HSE Policy. All the permanent workers shall be covered under ESI Scheme. The company shall have the provision for treatment of its workers at the local sub-committee Nursing Homes & Hospitals in case of emergency. Annual Medical Check-up on some medical parameters like Blood test, Chest X-Ray, Eye test. Audiometry, Spirometry etc. shall be regularly conducted amongst the employees of the Company and records maintained thereof.

xxv. A CSR Plan shall be prepared and implemented in consultation with the local villages and administration. Issues raised/covered during public hearing and incorporated in the EMP and CSR Plan. During construction phase of the expansion project, an expenditure of about minimum 5% of the capital expenditure shall be earmarked for CSR activity covering the broad areas of education, health, infrastructure, water and power spread over 5 years/period of construction of project. During operation phase

of the project, the CSR activity will be funded based on *2%* of the profit during operation phase of the project. 70% of the employment shall be made from the local population. The activities shall include skill development, education for the girl child, common infrastructure, alternate livelihood schemes and creation of SHGs, etc. The PP shall as part of the CSR Plan meet the drinking water requirements (pipeline) of neighbouring villages from the State authorities. In addition, villages such as Dharmasagara and Bandri, which have a fluoride problem shall also be provided drinking water. All the commitments made to the public during the Public Hearing/Public Consultation meeting held on 30.12.2010 shall be satisfactorily implemented and details of which shall be furnished as part of CSR. A separate budget for implementing the same shall be allocated made. The annual capital and recurring expenditure on CSR - village-wise and activity-wise shall be uploaded on the company website and also included in the Annual Report of the company to the Ministry's Regional Office at Bangalore.

xxvi. The Company shall submit within three months its policy towards Corporate Environment Responsibility which shall inter-alia address (i) Standard operating process/ procedure to being into focus any infringement/deviation/violation of environmental or forest norms/conditions, (ii) Hierarchical system or Administrative order of the Company to deal with environmental issues and ensuring compliance to the environmental clearance conditions and (iii) System of reporting of non compliance/violation environmental norms to the Board of Directors of the company and/or stakeholders or shareholders.

xxvii. Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, Safe drinking water, medical health care, creche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

B. GENERAL CONDITIONS:

i. No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forest and Climate Change (MoEFCC).

ii. At least four ambient air quality monitoring stations should be established in the downward direction as well as where maximum ground level concentration of PM_{10}, $PM_{2.5}$, SO_2 and NOx are anticipated in consultation with the SPCB. Data on ambient air quality and stack emission shall be regularly submitted to this Ministry including its Regional Office at Bangalore and the SPCB/CPCB once in six months.

iii. Industrial wastewater shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended form time to time. The treated wastewater shall be utilized for plantation purpose.

iv. The overall noise levels in and around the plant area shall be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels should conform to the standards prescribed under EPA Rules, 1989 viz. 75 dBA (daytime) and 70 dBA (nighttime).

v. Vehicular transportation of raw materials and finished products shall be kept to minimum. Dust suppression systems shall be in place at transfer points. All internal roads shall be black topped. The roads shall be regularly cleaned with mechanical sweepers. A 3-tier avenue plantation using native species shall be developed along the roads.

vi. Requisite funds shall be earmarked towards capital cost and recurring cost/annum for environment pollution control measures to implement the conditions stipulated by the Ministry of Environment, Forest and Climate Change (MoEFCC) as well as the State Government. An implementation schedule for implementing all the conditions stipulated herein shall be submitted to the Regional Office of the Ministry at Bangalore. The funds so provided shall not be diverted for any other purpose.

vii. A copy of clearance letter shall be sent by the proponent to concerned Panchayat, Zila Parishad/Municipal Corporation, Urban Local Body and the local NGO, if any, from whom suggestions/representations, if any, were received while processing the proposal. The clearance letter shall also be put on the web site of the company by the proponent.

viii. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and shall update the same periodically. It shall simultaneously be sent to the Regional Office of the MOEFCC at Bangalore. The respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; PM_{10}, SO_2, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects shall be monitored and displayed at a convenient location near the main gate of the company in the public domain.

ix. The project proponent shall also submit six monthly reports on the status of the compliance of the stipulated environmental conditions including results of monitored data (both in hard copies as well as by e-mail) to the Regional Office of MOEFCC, the respective Zonal Office of CPCB and the SPCB. The Regional Office of this Ministry at Bangalore / CPCB / SPCB shall monitor the stipulated conditions.

x. The environmental statement for each financial year ending 31st March in Form-V as is mandated to be submitted by the project proponent to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, shall also be put on the website of the company along with the status of compliance of environmental conditions and shall also be sent to the respective Regional Office of the MOEFCC at Bangalore by e-mail.

xi. The Project Proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the SPCB and may also be seen at Website of the Ministry of Environment, Forest and Climate Change (MoEFCC) at http://envfor.nic.in . This shall be advertised within seven days from the date of issue of the clearance letter, at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional office at Bangalore.

xii. Project authorities shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.

10.0 The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.

11.0 The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions.

12.0 The above conditions shall be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 and the Public (Insurance) Liability Act, 1991 along with their amendments and rules.

01/10/2015

(Dr. Satish C. Garkoti)
Scientist 'F'

Copy to:

1. The Secretary, Department of Environment & Ecology, Govt, of Karnataka, Room No. 708, Gate 2, Multi Storied Building, Dr. Ambedkar Veedhi, Bangalore - 560001
2. The Additional Principal Chief Conservator of Forests, Regional Office (Southern Zone, Bangalore) Kendriya Sadan, 4th Floor, E&F Wing, II Block Koramangala, Banglore-560034.
3. The Chairman, Karnataka State Pollution Control Board, #49, Parisara Bhavana, Church Street, Bangalore-01 (Karnataka).
4. The Chairman, Central Pollution Control Board Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, New Delhi -110 032.
5. The District Collector, District Bellary, Karnataka.
6. Guard File/Monitoring File/Record File.

(Dr. Satish C. Garkoti)
Scientist 'F'

Annexure 2

F. No. J-11011/489/2009-IA II (I)
Government of India
Ministry of Environment, Forest and Climate Change
(I.A. Division)

Indira Paryavaran Bhawan
Jor Bagh Road, Aliganj,
New Delhi - 110003
E-mail: satish.garkoti@nic.in
Tel.: 011-24695316

Dated: 9th June, 2016

To

M/s JSW Steel Ltd.
Village Tornagallu, P.O Vidyanagar
District Ballari Karnataka-583275

Subject: Expansion of Integrated Steel Plant (from 10 MTPA to 16 MTPA) along with Captive Power Plant (600 MW) of M/s JSW Steel Limited located near Village Tornagallu, District Bellary in Karnataka - Amendment in Environmental Clearance regarding.

Sir,

This has reference to your letter No. EMD/GOV/F016/2758 dated 6th November, 2015 seeking amendment in Environment Clearance regarding project mentioned above. It has been noted that the Environment Clearance for expansion of Integrated Steel Plant (from 10 MTPA to 16 MTPA) along with Captive Power Plant (600 MW) of M/s JSW Steel Limited located near Village Tornagallu, District Bellary in Karnataka was accorded by the Ministry vide letter No. J-11011/489/2009 IA.II(I) dated 01st October 2015.

2.0 The project proponent has requested that due to changes in the market situation for steel products and to exploit the potential benefits of new technologies developed over the period, it is proposed to slightly alter the process configuration by modernizing some of the existing units and installing larger capacity "state of the art" equipment without any increase in the approved overall crude steel capacity of 16 MTPA. The changes proposed from the earlier proposal are given below:

Sl. No	Manufacturing facility	Earlier Proposal	Revised
1	Steel Melt Shop (Crude Steel)	4 X 180 T BOF Converters to produce 6.0 MTPA	a: 3 x 200 T BOF converter (4.4 MTPA) (2 operating + 1 Stand by). b: 1 EAF of 1.2 MTPA (1x 150 t). c: Enhance volume of existing 175 T converter BOF in SMS-2 from 175 tons to 187 T (0.4 MTPA)

2	Blast Furnace (Hot Metal)	2 X4019 m3 BF, of capacity each of 3 MTPA	a: 1 X 5500 m^3 BF of 4.4 MTPA b: Upgrade BF-1 from 1250 m^3(0.9 MTPA) to 2300 m^3 (2.5 MTPA)
3	Coke Ovens (Gross Coke)	4 X 69 Ovens of 3.65 MTPA	a: Retire existing Coke Oven 1 &2 of 1.28 MTPA and build 1.5 MTPA Coke b: Additional Coke Oven of 3.00 MTPA c: Tar Distillation Plant of 3,00,000 TPA
4	Sinter Plant (Sinter)	1 Sinter Plant of 8.05 MTPA	1 X 2.3 MTPA Sinter Plant for BF-1. 1 X 7.5 MTPA Sinter Plant for BF-5
5	Lime Kilns	8 X 300 TPD	4X 600 TPD
6	Thermal Power Plant	2 X 300 MW	1 X 660 MW(Super critical)
7	Casters	Billet Caster (1.0 +0.9 MTPA) B.B Caster (2 X2.2 MTPA)	a: Billet Caster (1.2 MTPA) b: Slab Caster (1.6 MTPA + 3.6 MTPA)
8	Rolling Mills	SBQ Mill (0.8 MTPA) Section Mill (2.1 MTPA) Beam Mill (2.1 MTPA)	a: BRM (1.2) b: HSM (3.6 MTPA) c: WRM (1.2 MTPA)
9	Oxygen plants	1x1800 TPD	a: 2x1800 TPD

3.0 It has been envisaged that the revised capital cost of the project is Rs 17, 500 Crores as against 15,130 Crores for the original proposal. This includes additional expenditure of Rs 800 Crores towards additional EMP proposed.

4.0 It has been mentioned that there will be no change in plant capacity for crude steel production. There will be a marginal decrease (-1040 m^3/day) in overall water requirement. Additional raw material is required due to the modifications. Around 242.6 Gcal/hr of Surplus energy will be available to power plant, which will save about 1000 tonnes of coal per day. Generation of power from TRT, CPP and CDQ will increase with reduction in power requirement by 89 MW. There will be a reduction in pollution load in respect of PM, SO_2 and NOx in the overall air emissions to the atmosphere, improving surrounding air quality.

5.0 The proposal was considered by the Expert Appraisal Committee (Industry-I) during its 1st meeting held on 18th – 20th November, 2015 and recommended the project for amendment in the Environment Clearance letter No. J-11011/489/2009-IA.II (I) dated 1st October, 2015 for the changes as mentioned in table at Para 2.0 above.

6.0 The Ministry of Environment, Forest and Climate Change considered to the recommendation of EAC and hereby decided to amend the environment clearance letter No. J-11011/489/2009-IA.II (I) dated 1st October, 2015 for the following change:

Sl. No	Manufacturing facility	Earlier Proposal	Revised
1	Steel Melt Shop (Crude Steel)	4 X 180 T BOF Converters to produce 6.0 MTPA	a: 3 x 200 T BOF converter (4.4 MTPA) (2 operating + 1 Stand by). b: 1 EAF of 1.2 MTPA (1x 150 t). c: Enhance volume of existing 175 T converter BOF in SMS-2 from 175 tons to 187 T (0.4 MTPA)
2	Blast Furnace (Hot Metal)	2 X4019 m3 BF, of capacity each of 3 MTPA	a: 1 X 5500 m^3 BF of 4.4 MTPA b: Upgrade BF-1 from 1250 m^3(0.9 MTPA) to 2300 m^3 (2.5 MTPA)
3	Coke Ovens (Gross Coke)	4 X 69 Ovens of 3.65 MTPA	a: Retire existing Coke Oven 1 &2 of 1.28 MTPA and build 1.5 MTPA Coke b: Additional Coke Oven of 3.00 MTPA c: Tar Distillation Plant of 3,00,000 TPA
4	Sinter Plant (Sinter)	1 Sinter Plant of 8.05 MTPA	1 X 2.3 MTPA Sinter Plant for BF-1. 1 X 7.5 MTPA Sinter Plant for BF-5
5	Lime Kilns	8 X 300 TPD	4X 600 TPD
6	Thermal Power Plant	2 X 300 MW	1 X 660 MW(Super critical)
7	Casters	Billet Caster (1.0 +0.9 MTPA) B.B Caster (2 X2.2 MTPA)	a: Billet Caster (1.2 MTPA) b: Slab Caster (1.6 MTPA + 3.6 MTPA)
8	Rolling Mills	SBQ Mill (0.8 MTPA) Section Mill (2.1 MTPA) Beam Mill (2.1 MTPA)	a: BRM (1.2) b: HSM (3.6 MTPA) c: WRM (1.2 MTPA)
9	Oxygen plants	1x1800 TPD	a: 2x1800 TPD

7.0 The company shall obtain fresh Environment Clearance in case of any change in the scope of the project.

This issues with the approval of the Competent Authority.

07/06/2016

(Dr. Satish C. Garkoti)
Scientist 'F'

Copy to:-

1. The Secretary, Department of Environment, Government of Karnataka, Secretariat, Bangalore.

2. The Chairman, Central Pollution Control Board, Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, New Delhi- 110 032.

3. The Chairman, Karnataka State Pollution Control Board,6,7,8,&9th Floor, (Public Utility Building), Subhas Chandra Bose Building , M.G. Road, Bangalore-560001, Karnataka.

4. The Additional Principal Chief Conservator of Forests (C), Ministry of Environment, Forest and Climate Change, Regional Office (SZ), Kendriya Sadan, 4th Floor, E&F Wings, 17th Main Road, Koramangala II Block, Bangalore – 560034.

5. Guard File / Record File/Monitoring file.

(Dr. Satish C. Garkoti)
Scientist 'F'