JSW Steel Limited

JSWSL/ENVT/MoEF&CC/HYR/2022-23/52
28th June 2022

The Director
Regional office
Ministry of Environment Forest and Climate Change
1st Floor, Additional office block for GPOA,
Shastri Bhawan, Haddows road,
Nungambakkam, Chennai -600006

Dear Sir,

Sub: EC- Six Monthly Compliance status Report to the period October 2021 to March 2022 - Reg.

Ref: Environmental Clearances F.No. J-11011/281/2006-IA. II(I) dated 07.07.2017, EC amendment dated 07.08.2019 and EC dated 10.02.2020

With reference to the above subject, herewith find submitting a Six monthly compliance status report to the Environment Clearances dated 07.07.2017, 07.08.2019 & 10.02.2020 for the period **October 2021 to March 2022.**

Receipt of this letter may please be acknowledged.

Thanking you,

Yours faithfully,

For JSW Steel Limited., Salem works

B. N. S. Prakash Rao
Executive Vice President

Encl: Copies of EC and conditions compliance status report.

Cc:

Regional Directorate, Central Pollution Control Board,
77-A, Padi, Ambattur Industrial Estate Road, Mogappair, Chennai, Tamil Nadu -58

The Member Secretary, Tamil Nadu Pollution Control Board,
100, Anna Salai, Guindy, Chennai – 600 032.

The Joint Chief Environmental Engineer (M), Tamil Nadu Pollution Control Board,
Salem Region, No # 9, 4th Cross Street, Brindhavan road, Fairlands, Salem -16.

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O P Jindal Group

JSW STEEL LTD., Salem Works

Pottaneri, M. Kalipatti Village, Mecheri
Mettur Taluk, Salem – Tamilnadu

Half Yearly Compliance Report for the Environmental Clearance

(F.No.J-11011/281/2006-IA.II (I) dated 07.07.2017 &
F.No.J-11011/281/2006-IA.II (I) dated 10.02.2020)

for the period October 2021 to March 2022
issued for 1.0 to 1.3 MTPA Expansion

Contents

JSW STEEL LTD., SALEM WORKS

COMPLIANCE STATUS REPORT TO ENVIRONMENTAL CLEARANCES (EC)

Compliance status report to the EC dated.10.02.2020 as on 31.03.2022

Status of the approved projects and present status of the EC dated 10.02.2020 expansion detail is given below:

S.No	Facilities	Project status	CTO-EXP-II	CTO-EXP-III
1	COP #1 stack replacement by 2 number of stacks	Completed		√
	COP #2 stack replacement by 2 number of stacks	Yet to start		
2	Sinter plant sinter cooler waste heat diversion to GGBFS	Completed		√
3	Emission reduction project in SP#2-WGF	Under progress		
4	GGBFS	Completed		√
5	LRF#1 stack modification	Completed		√
6	Additional one LRF with VD system (BF gas fired boilers 2 Nos)	Yet to start		
7	Fume exhaust system in CCM#1 & 3	Yet to start		
8	ABGM in CCM#1 & 2	Completed		√
9	Pickling & Annealing Steel	Completed	√	
10	Emission reduction project in CPP#2 coal based boiler	Partially completed	√	
11	DG set - 8 No's (6 Nos for Steel and 2 Nos for CPII)	Completed		√ (6 Nos)
12	Paver block making facility	Completed		√
13	Acid fumes extraction system in Etching lab	Completed		√
14	Slag crushing unit (EC approval obtained and CTE not obtained. Justification given to board)	Completed		√
15	Batching plant (EC approval obtained and CTE not obtained. Justification given to board)	Completed		√
16	Coke cutter dedusting system in COP	Completed		√
17	COP #3 stack modification	Completed		√
18	WHRB#3 stack modification	Completed		√
19	Steam exhaust system#2 in CCM#3	Completed		√
20	Thermic fluid heater for ATFD in pickling plant ETP	Yet to start		

The manufacturing facilities details as per EC dated 10.02.2020 is given in the below table

S.No	Manufacturing Units	Existing Capacity(MTPA)	Proposed Expansion(MTPA)	Total Capacity after Expansion(MTPA)	Project execution phase and current status
1	Coke Oven Plant -1(Non–Recovery Type)	0.50	-	0.5	Nil
2	Sinter Plant–1(20SquareMeter)	0.175	-	0	Nil
3	Sinter Plant–2(90SquareMeter)	1.06	-	1.06	Nil
4	Sinter Plant–3(90SquareMeter)	-	1.06	1.06	Phase#2
5	Blast Furnace – 1 (402 to 650CubicMeter)	0.367	0.316	0.683	Phase#2
6	Blast Furnace–2(550to650CubicMeter)	0.578	0.105	0.683	Completed in phase#1 and under operation
7	Energy Optimizing Furnace–1(65T)	0.41	0.23	0.64	Completed in phase#1 and under operation
8	Energy Optimizing Furnace – 2 (65T)	0.62	-	0.62	Nil
9	LadleFurnace-1withCommonVD (45Tto65T)	45T/heat	20T/heat	65T/heat	Completed in phase#1 and under operation
10	Ladle Furnace–2(65T)	65T/heat	-	65T/heat	Nil
11	LadleFurnace-3 commonVD(65 T)	65T/heat	-	65T/heat	Nil
12	LadleFurnace-4(65T)	65T/heat	-	65T/heat	Nil
13	ContinuousCastingMachine-1	0.35	-	0.35	Nil
14	ContinuousCastingMachine-2	0.50	-	0.50	Nil
15	ContinuousCastingMachine-3	-	0.45	0.45	Completed in phase#1 and under operation
16	Bar & Rod Mill Augmentation	0.4	0.08	0.48	Completed in phase#1 and under operation
17	Blooming Mill Augmentation	0.36	0.12	0.48	Completed in phase#1 and under operation
18	Pickling and Annealing Steel unit	-	0.06	0.06	Completed in phase#1 and under operation
19	Peeled and ground	-	0.04	0.04	Phase #2 (0.01 MTPA completed in phase #1)
20	AirSeparationPlant1	150T/day	-	150T/day	Nil
21	AirSeparationPlant2	390T/day	-	390T/day	Nil
22	AirSeparationPlant3	-	250T/day	250T/day	Phase #2
23	CaptivePowerPlant-1	7 MW	-	7 MW	Power generation has been stopped from 01.10.2021 and the product will be withdrawn from the consent
24	CaptivePowerPlant-2	2 x 30 MW		2 x30 MW	In operations
25	CaptivePowerPlant-3 (Unit 3 of CPP#2)	-	1 x 30 MW	1 x 30 MW	Completed in phase#1 and under operation

The production details for the period October 2021 to March 2022 is given in **Annexure–A.**

A. Specific Conditions		
S.No	**Condition**	**Compliance Status**
i.	Particulate emission from the rod mill of slag grinding unit shall be less than 10 mg/Nm^3.	Complied. The establishment activity is completed and air pollution control measures are installed in such way to meet the emission level of 10 mg/Nm3. Awaiting CTO approval from the Board.
ii.	Green belt shall be developed in an area of 85 ha (210 acres) in and around the plant in a time frame of two years.	Being complied. The existing greenbelt developed is around 252165 Nos with area cover of about 91.24 Ha of the total area which is about 34.04 %.
B. General Conditions		
I. Statutory Compliance		
S.No	**Condition**	**Compliance Status**
i.	The project proponent shall obtain Consent to Establish / Operate under the provisions of Air (Prevention & Control of Pollution) Act, 1981 and the Water (Prevention & Control of Pollution) Act, 1974 from the concerned State Pollution Control Board / Committee.	Abide by the order
ii.	The project proponent shall obtain the necessary permission from the Central Ground Water Authority, in case of drawl of ground water / from the competent authority concerned in case of drawl of surface water required for the project.	Abide by the order
iii.	The project proponent shall obtain authorization under the Hazardous and other Waste Management Rules, 2016 as amended from time to time.	Being complied. The existing authorization is valid till 31.03.2026 and time to time compliance will be done as per the amendments.
II. Air quality monitoring and preservation		
S.No	**Condition**	**Compliance Status**
i.	The project proponent should install 24x7 continuous emission monitoring system at process stacks to monitor stack emission with respect to standards II. Air Quality Monitoring and Preservation prescribed in Environment (Protection) Rules 1986 vide G.S.R. 277(E) dated 31st March 2012 (Integrated iron & Steel); G.S.R. 414 (E) dated 30th May 2008 (Sponge Iron) as amended from time to time; S.O. 3305 (E) dated 7th December 2015 (Thermal Power Plant) as amended from time to time and connected to SPCB and CPCB online servers and calibrate these system from time to time according to equipment supplier specification through labs recognized under Environment (Protection) Act, 1986 or NABL accredited laboratories.	Being complied. There are 40 nos. of Dust analyzers & 23 Nos Gaseous emission monitoring systems are installed as per CTO condition and the real time data of SPM, SO2, NOx and CO are transmitted to the Care Air Centre of TNPCB and CPCB servers Apart from the above, TNPCB is conducting bi-annual survey and Manual monitoring is being conducted by a NABL accredited external laboratory on a monthly basis. The monitoring results are attached as **(Annexure-B**) and values are well within the permissible limits. The latest TNPCB survey conducted (19.01.2022 to 25.01.2022) and the results are well within the standards issued by the Board.

S.No	Condition	Compliance Status
ii.	The project proponent shall monitor fugitive emissions in the plant premised at least once in every quarter through labs recognized under Environment (Protection) Act, 1986.	Being complied. Fugitive emissions in the plant are being monitored on monthly basis and as and when required basis by a NABL accredited external laboratory and the monitoring reports are being submitted to TNPCB on monthly basis. Also, Biannual survey is being conducted by AEL, TNPCB for fugitive emissions and the results are also well within the standards.
iii.	The project proponent shall install system to carryout Continuous Ambient Air Quality monitoring for common/criterion parameters relevant to the main pollutants released (e.g. PM_{10} and $PM_{2.5}$ in reference to PM emission, and SO_2 and NO_x in reference to SO_2 and NO_x emissions) within and outside the plant area at least at four locations (one within and three outside the plant area at an angle of 120° each), covering upwind and downwind directions.	Complied. 4 Nos of Continuous Ambient Air Quality monitoring to carry out the ambient air quality, considering within and outside the plant area. The PA informed that the installations one within the plant and three outside the plant area at an angle of 120° each and covering with the wind and downwind directions and the real time parameters are connected with CAC, TNPCB, Chennai. Apart from the above, A NABL accreditation laboratory is engaged to conduct Ambient Air Quality in the nearby villages on monthly basis. TNPCB also conducting AAQ survey in the nearby villages every 6 months once and the survey results are well within the NAAQ standards and the same is submitted along with the six monthly compliance report.
iv.	The cameras shall be installed at suitable locations for 24x7 recording of battery emissions on the both sides of coke oven batteries and videos shall be preserved for at least one-month recordings.	Complied. Our coke oven plant is non recovery type. The coke oven process works on negative pressure and stamped wet coal is being charged to the ovens which is side loading and thereby no visible emission is noticed. There are Three coke oven batteries which are installed adjacent to each other. An IP camera has been installed in the top of the COP area to monitor battery emissions on the both sides with recording option and the minimum preservation time is one month.
v.	Sampling facility at process stacks and at quenching towers shall be provided as per CPCB guidelines for manual monitoring of emissions.	Being complied. Sampling facilities at process stacks and quenching towers are provided for manual monitoring of emissions as per the guidelines. However, there is no dust is anticipated through the stack emission.
vi.	The project proponent shall submit monthly summary report of continuous stack emission and air quality monitoring and results of manual stack monitoring and manual monitoring of air quality/fugitive emissions to Regional Office of MoEF&CC, Zonal Office of CPCB and Regional Office of SPCB along with six-monthly monitoring report.	Being complied. Monthly summary report of continuous stack emission and ambient air quality monitoring and results of manual stack monitoring and manual monitoring of air quality/fugitive emissions are being submitted along with six monthly compliance reports to Regional Office of MoEF&CC, Zonal Office of CPCB and Regional Office of SPCB. The six –monthly continuous stack emission & air quality monitoring report is given in **Annexure - C** and the manual stack emission monitoring results are given in **Annexure – B**
vii.	Appropriate Air Pollution Control (APC) system shall be provided for all the dust generating points including fugitive dust from all vulnerable sources, so as to comply prescribed	Complied. Adequate Air Pollution Control measures are installed in the respective process and raw material handling areas. Water sprinklers, dry & wet fog systems, GI sheets (as dust barrier)

	stack emission and fugitive emission standards.	are provided in raw material handling areas to control fugitive emission. The stack emissions and fugitive emission values are well within the standards.
viii.	The project proponent shall provide leakage detection and mechanized bag cleaning facilities for better maintenance of bags.	Complied. Appropriate leakage detection systems and mechanized bag cleaning facilities are provided in respective bag filter systems.
ix.	Secondary emission control system shall be provided at SMS converters.	Complied. Dedicated secondary de-dusting systems are provided at EOF & LRF processes to control the secondary fugitive emission.
x.	Pollution control system in the steel plant shall be provided as per the CREP guidelines of CPCB.	Complied. As per the CREP guidelines of CPCB, Pollution control systems are provided. The CREP guide lines and its status of compliance is given in **Annexure G** of this report
xi.	Sufficient number of mobile or stationery vacuum cleaners shall be provided to clean plant roads, shop floors, and roofs regularly.	Complied. 3 Numbers of road sweeping machines are dedicatedly deployed for road cleaning applications and Mobile vacuum cleaners are also provided to clean shop floors, roofs regularly.
xii.	Recycle and reuse iron ore fines, coal and coke fines, lime fines and such other fines collected in the pollution control devices and vacuum cleaning devices in the process after briquetting/agglomeration.	Being complied. Iron ore fines, coal and coke fines, lime fines, and such other fines collected in the pollution control devices are being reused in the sinter plant for agglomeration processes which is basically a wealth from the waste to minimize the resource depletion.
xiii.	The project proponent use leak proof trucks/dumpers carrying coal and other raw materials and cover them with tarpaulin.	Being complied. Trucks/dumpers carrying coal and other raw materials are covered with tarpaulin. Leak proof trucks are used for fly ash transportation and other materials.
xiv.	Facilities for spillage collection shall be provided for coal and coke on wharf of coke oven batteries (Chain conveyors, land based industrial vacuum cleaning facility).	Being complied. Coking coal is transferred through closed conveyor system to stamping station. The stamped coal (wet condition) is charged into coke oven batteries through a dedicated coal charging system. Hence spillage of coal is not anticipated. Coke pushing car facility is provided in COP for coke pushing to avoid any spillage of coke and cleaning activity is periodically done in case of any minor spillages.
xv.	Land-based APC system shall be installed to control coke pushing emissions.	**Representation:** Land-based APC systems are mainly applicable to recovery type coke ovens to control the coke pushing emissions, where oven will be operated under positive pressure and vertical loading. Our coke oven plant is non-recovery type and installed in the year 2007. These are heat recovery coke ovens which are operating in high negative pressure and no visible emission is anticipated/noticed. Hence, it is not anticipated to install Land-based APC system in to the existing non-recovery type coke ovens. The same has been communicated to MoEF&CC dated 26.09.2020. However, a dedicated dedusting system is installed in the one number of coke pushing car

		and in operations from FY22. The horizontal deployment will be done in one more pusher car.
xvi.	Monitor CO, HC and O_2 in flue gases of the coke oven battery to detect combustion efficiency and cross leakages in the combustion chamber.	**Representation:** Our coke oven plant is non-recovery type. The heat for carbonisation is provided by the radiation heat by burning of evolved gases from the bottom and top of the coal mass. The requirement of monitoring of HC, CO and O_2 were intended for recovery type of coke ovens. However, the monitoring of parameters CO and O2 are installed at Waste Heat recover boilers which are directly connected with flue gas of coke ovens. The same has been communicated to MoEF&CC dated 26.09.2020.
xvii.	Vapor absorption system shall be provided in place of vapor compression system for cooling of coke oven gas in case of recovery type coke ovens.	**Not applicable:** Our Coke oven is non-recovery type.
xviii.	In case concentrated ammonia liquor is incinerated, adopt high temperature incineration to destroy Dioxins and Furans, Suitable NOx control facility shall be provided to meet the prescribed standards.	**Not applicable:** Our Coke oven is non-recovery type.
xix.	The coke oven gas shall be subjected to desulphurization if the Sulphur content in the coal exceeds 1%.	Being Complied. The coal usage in coke oven contains Sulphur content less than 1%.
xx.	Wind shelter fence and chemical spraying shall be provided on the raw material stock piles.	Complied. GI sheets cover (as dust barrier), wind nets, water sprinkler systems and dry/wet fog systems are provided on the raw material stock piles and there is no fugitive emission observed with the process.
xxi.	Design the ventilation system for adequate air changes as per ACGIH document for all tunnels, motor houses, Oil cellars.	Being complied. The ventilation system for adequate air changes for all tunnels, motor houses, Oil cellars are being complied as per the CEIG rules.
xxii.	The project proponent shall install Dry Gas Cleaning Plant with bag filter for Blast Furnace and SMS converter.	**Representation:** with reference to the EC dated 10.02.2020 there is no planning to the installation of new Blast Furnace and Steel Making process and also the existing steel plant consist of small capacity Blast Furnaces (BF#1 402 m3 with 0.367 MTPA & BF#2 650 m3 with 0.683 MTPA capacity) in Iron Zone and EOFs (EOF#1 with the capacity of 0.64 & EOF#2 with the capacity of 0.62 MTPA) in SMS zone. The BF#1 & EOF#1 were installed in the year 1998 with wet type gas cleaning system and BF#2 & EOF#2 were installed in 2007. BF#2 installed with Dry type gas cleaning system during establishment stage itself and EOF#2 installed with wet type gas cleaning system. The same has

		been communicated to your good office dated 26.09.2020.
xxiii.	Dry quenching (CDQ) system shall be installed along with power generation facility from waste heat recovery from hot coke.	**Representation:** The existing coke oven (Non-recovery type) has installed with wet quenching in line with the EC approved in 2007. There is no modification proposed in the existing coke ovens in the recently approved EC dated 10.02.2020. However, the installation of CDQ matter has been taken up with the OEM and it is reported that installation of CDQ within the existing capacity of 0.5 MTPA Coke Oven is not technically feasible and viable and it has been communicated to MoEF&CC via mail dated 26.09.2020 as representation.
III. Water Quality Monitoring and Preservation		
S.No	**Condition**	**Compliance Status**
i.	The project proponent shall install 24x7 continuous effluent monitoring system with respect to standards prescribed in Environment (Protection) Rules 1986 vide G.S.R. 277(E) dated 31st March 2012 (Integrated iron & Steel); G.S.R. 414 (E) dated 30th May 2008 (Sponge Iron) as amended from time to time; S.O. 3305 (E) dated 7th December 2015 (Thermal Power Plant) as amended from time to time and connected to SPCB and CPCB online servers and calibrate these system from time to time according to equipment supplier specification through labs recognized under Environment (Protection) Act, 1986 or NABL accredited laboratories. The project proponent shall monitor regularly ground water quality at least twice a year (pre and post monsoon) at sufficient numbers of piezometers/sampling wells in the plant and adjacent areas through labs recognized under Environment (Protection) Act, 1986 and NABL accredited laboratories.	Complied. Flow meters for continuous monitoring system of effluent flow are provided at the Guard pond inlet & outlet and the real time values are connected to TNPCB & CPCB server. A dedicated EMFM is installed in the ETP discharge point along with IP camera (with PTZ option). Analysers are installed with respect to the standards related to Iron & Steel and Thermal Power Plant and the real time parameters are connected to TNPCB/CPCB servers from Aug'2020. EMFM and sensors are being calibrated from time to time according to equipment supplier specification. Apart from this, treated waste water quality is also monitored by NABL accredited laboratory & TNPCB on monthly basis and reports are periodically submitted to TNPCB. Ground water quality around the peripheral of the plant is being monitored by TNPCB and NABL accredited laboratory on monthly/quarterly basis. Piezo metric sampling bore well is provided inside the plant premises and the water quality is being monitored on monthly basis by NABL laboratory.
ii.	The project proponent shall submit monthly summary report of continuous effluent monitoring and results of manual effluent testing and manual monitoring of ground water quality to Regional Office of MoEF&CC, Zonal Office of CPCB and Regional Office of SPCB along with six-monthly monitoring report.	Complied. Monthly summary reports of continuous effluent monitoring, results of manual effluent testing and manual monitoring of ground water quality by TNPCB & NABL accredited laboratory are being submitted to the Regional Office of MoEF&CC, Zonal Office of CPCB and Regional Office of SPCB along with the six-monthly monitoring report is given in **Annexure-D.**

iii.	The project proponent shall provide the ETP for coke oven and by-product to meet the standards prescribed in G.S.R. 277(E) dated 31st March 2012 (Integrated iron & Steel); G.S.R. 414 (E) dated 30th May 2008 (Sponge Iron) as amended from time to time; S.O. 3305 (E) dated 7th December 2015 (Thermal Power Plant) as amended from time to time.	**Not applicable**. Our Coke Oven plant is non-recovery type. **Not applicable**. Sponge iron plant not installed in our plant. In Thermal Power Plant ZLD provided to the additional 1 x 30 MW which was installed in the FY 2018 -19.
iv.	Adhere to 'Zero Liquid Discharge'	Complied. Wastewater generated from the various process of steel plant and CPP II (2 x 30 MW) is collected in a guard pond at steel plant and after the pretreatment treated water is 100 % reused in steel plant process to the application of Slag Granulation plant of BF, gas cleaning plant of BF & EOF, slag quenching, coke quenching, dust suppression systems and green belt. To treat the effluent arising out of the pickling plant a dedicated ETP is installed with the facility of Pretreatment, Ultra filter, Multistage RO plant, MEE and ATFD. The treated water is reused in pickling process. No wastewater is discharged outside the plant premises and to ensure the same, dedicated EMFMs and IP camera are installed in the Guard Pond facility and the real time details are connected to TNPCB & CPCB server. However, during rainy monsoon rainwater along with surface runoff is being collected in a rainwater harvesting pond.
v.	Sewage Treatment Plant shall be provided for treatment of domestic wastewater to meet the prescribed standards.	Being complied. Sewage Treatment Plants are provided for treatment of domestic wastewater and treated water is meeting the prescribed standards. Treated water sample is being collected by TNPCB & NABL accredited laboratory on monthly basis and the results are well within the prescribed standards. The six months monitoring result ROA is given in **Annexure –E.**
vi.	Garland drains and collection pits shall be provided for each stock pile to arrest the run-off in the event of heavy rains and to check the water pollution due to surface run off.	Complied. Various collection pits are provided to arrest the run-off and ensure there is no water pollution due to surface run off.
vii.	Tyre washing facilities shall be provided at the entrance of the plant gates.	Being complied. Tyre washing unit is provided at the entrance of the plant gate to control the fugitive emission from vehicular movement.
viii.	CO_2 injection shall be provided in GCP of SMS to reduce pH in circulating water to ensure optimal recycling of treated water for converter gas cleaning.	Being Complied. Alkalinity of existing circulating water of GCP is the range of 250 to 300 mg/L. Due to the minimum alkalinity, addition of CO_2 injection is not required to maintain the pH in the recycling water and it may lead to severe corrosion. Hence, optimum level of Soda ash is being used to control pH in the GCP cooling water circuit.

ix.	The project proponent shall practice rainwater harvesting to maximum possible extent.	Being Complied. Rain water harvesting ponds are provided near at township (East side) with the capacity of 17500 KL, West side of Township STP with the capacity of 33000 KL, Near RO plant area 15000 KL and plant guest house backside 4000 KL. The overall collection capacity is 69500 KL.The collected water is being recharged, reused in steel plant. Capacity of the rain water harvesting ponds will be enhanced based on the needs and requirement.
x.	Treated water from ETP of COBP shall not be used for coke quenching.	Not Applicable: Our Coke oven plant is non-recovery type.
xi.	Water meters shall be provided at the inlet to all unit processes in the steel plants.	Being complied. Water meters are provided at the inlet to all unit processes in our steel plant.
xii.	The project proponent shall make efforts to minimize water consumption in the steel plant complex by segregation of used water, practicing cascade use and by recycling treated water.	Being complied. Segregation of used water according to the quality characteristics treated and utilized accordingly. We have taken efforts to minimize water consumption by installation of RO plant, maximize cooling water COCs and adopting the Best Available Technologies (BAT) like installation of Air Cooled Condenser Instead Water cooled condenser, etc.,
IV. Noise Monitoring And Preservation		
S.No	**Condition**	**Compliance Status**
i.	Noise level survey shall be carried as per the prescribed guidelines and report in this regard shall be submitted to Regional Officer of the Ministry as a part of six-monthly compliance report.	Being complied. Noise level is being monitored on regular basis by a NABL accredited laboratory &TNPCB and the results are well within the standards and reports are being submitted to the Regional Officer of the Ministry as a part of six-monthly compliance report. The details are given in **Annexure -F** of the report.
ii.	The ambient noise levels should conform to the standards prescribed under E(P)A Rules, 1986 viz.75 dB(A) during day time and 70 dB(A) during night time.	Complied. The ambient noise levels are being monitored monthly basis and the results are well within the prescribed limit of limits 75 dB(A) during day time and 70 dB(A) during night time and reports are being submitted to the Regional Officer of the Ministry as a part of six-monthly compliance report. The details are given in **Annexure -F** of the report
V. Energy Conservation Measures		
S.No	**Condition**	**Compliance Status**
i.	The project proponent shall provide TRTs to recover energy from top gases of Blast Furnaces.	**Representation:** The capacity of the existing furnaces is very small and operating at low top pressure (< 1.3 bar). it is not technically feasible to install TRT in the existing blast furnaces. There is no modification in the existing BFs in the EC approved now. The same has been communicated to your good office via mail dated 26.09.2020.

ii.	Coke Dry quenching (CDQ) shall be provided for coke quenching for both recovery and non-recovery type coke ovens.	**Representation:** The existing coke oven (Non-recovery type) has installed with wet quenching in line with the EC approved in 2007. There is no modification proposed in the existing coke ovens in the recently approved EC dated 10.02.2020. However, the installation of CDQ matter has been taken up with the OEM and it is reported that installation of CDQ within the existing capacity of 0.5 MTPA Coke Oven is not technically feasible and viable and it has been communicated to MoEF&CC via mail dated 26.09.2020 as representation.
iii.	Waste heat shall be recovered from Sinter Plants coolers and Sinter Machines.	Being complied. Waste heat from Sinter plant cooler is diverted to the BF Slag grinding unit to recover sensible heat and presently waiting for the TNPCB board's approval for CTO.
iv.	Use torpedo ladle for hot metal transfer as far as possible. If ladles not used, provide covers for open top ladles.	**Not applicable**. Usage of torpedo ladle is mostly applicable to bigger size capacity of BF and our BF capacity is smaller one. Ladle covering is done by means of heat insulating compounds such as dry rice husk.
v.	Use hot charging of slabs and billets/blooms as far as possible.	Being Complied. Based on the product specification, hot charging is done by the industry for billets/blooms and slabs are not produced in their facility.
vi.	Waste heat recovery systems shall be provided in all units where the flue gas or process gas exceeds 300°C.	Being complied. Waste heat recovery boilers are in operation to recover maximum heat from flue gas and produce energy. Waste heat from Sinter plant cooler is diverted to the BF Slag grinding unit to recover sensible heat and presently waiting for the TNPCB board's approval for CTO.
vii.	Explore feasibility to install WHRS at Waste Gases from BF stoves; Sinter Machine; Sinter Cooler, and all reheating furnaces and if feasible shall be installed.	Being complied. Waste gas utilization from BF stoves not feasible and Sinter machine waste heat being utilized. Waste heat from Sinter plant cooler is diverted to the BF Slag grinding unit to recover sensible heat and presently waiting for the TNPCB board's approval for CTO and BF gas is utilized in Mills operations, BF stoves as fuel and CPPs for power generation. Also, in view of waste heat and energy conservation measures power generation through the existing CPP#1 (7 MW) is stopped from 01.10.2021 and the existing 2 Nos of boilers will be used for process steam supply with the capacity of 1 Number with 25 TPH and 1 Number with 8 TPH. In this connection a written letter is submitted to TNPCB.
viii.	Restrict Gas flaring to < 1%	Being complied. BF waste gas is maximum used in all the shop floors as gaseous fuel where by usage of fossil fuel is optimized. To the effective utilization online monitoring system(SCADA) is installed to maximize the BF gas utilization

ix.	Provide solar power generation on roof tops of buildings, for solar light system for all common areas, street lights, parking around project area and maintain the same regularly.	Being Complied. Solar panel is installed with the capacity of 60 KW (50 KW at Canteen and 10 KW at R& D building) and the average power generation is in the range of 12 Kwhr and further installations will be done in phased manner.
x.	Provide LED lights in their officers and residential areas.	Being Complied. LED based lightings are provided in the offices and township area and the replacement of sodium vapour lamp to LED is increased from 650 KW to 800 KW. Further they are having the plan to install LED lights every year in a phased to manner.
xi.	Ensure installation of regenerative type burners on all reheating furnaces.	Being complied. BF gas is used as fuel and regenerative type burners are installed in reheating furnaces (Mills).
VI. Waste Management		
S.No	**Condition**	**Compliance Status**
i.	An attrition grinding unit to improve the bulk density of BF granulated slag from 1.0 to 1.5 kg/l shall be installed to use slag as river sand in construction industry.	Complied. BF slag grinding unit installation is completed to produce ground granulated BF slag which will be sold to cement industries and open market as a value addition byproduct.
ii.	In case of Non-Recovery coke ovens, the gas main carrying hot flue gases to the boiler shall be insulated to conserve heat and to maximize heat recovery.	Being complied. The gas main carrying hot flue gases to the boilers is completely insulated to conserve heat and to maximize heat recovery.
iii.	Tar Sludge and waste oil shall be blended with coal charged in coke ovens (applicable only to recovery coke ovens).	**Not applicable**: We have installed Non Recovery type coke oven and hence the general condition not applicable.
iv.	Carbon recovery plant to recover the elemental carbon present in GCP slurries for use in Sinter plant shall be installed.	Complied. After clarification and thickener treatment GCP slurry is treated in sludge handling unit and the carbon recovery is reused in sinter plant.
v.	Waste recycling Plant shall be installed to recover scrap, metallic and flux for recycling to sinter plant and SMS.	Being complied. Scrap and metallic contents are recovered and recycled in the SMS where by certain level of GHG emission is offset.
vi.	Used refractories shall be recycled as far as possible.	Being complied. Refractories are selected to withstand high temperature whose self-life is longer and generations of used refractories are lesser. The same is recycled in downstream applications.
vii.	SMS slag after metal recovery in waste recycling facility shall be conditioned and used for road making, railway track ballast and other applications. The project proponent shall install a waste recycling facility to recover metallic and flux for recycle to sinter plant. The project proponent shall establish linkage for 100% reuse of rejects from Waste Recycling Plant.	Being Complied. SMS slag is sent for metal recovery system and the crushed slag with various sizes is reused in internal applications like sinter plant, EOF as hearth layer and cooling media respectively and to cement industries. Portion of crushed slag will be used in paver block facility as replacement to the natural aggregate. With this 100 % reuse of rejects being ensured.

viii.	100% utilization of fly ash shall be ensured. All the fly ash shall be provided to cement and brick manufacturers for further utilization and Memorandum of Understanding in this regard shall be submitted to the Ministry's Regional Office.	Being Complied. A coal based boiler is installed in 2006 and imported coal with low ash is used as fuel and the boiler is being operated with flexible load to cater the captive power requirement. Fly ash generated from the coal based boilers is 100% sent to local fly ash brick manufacturers
ix.	Oil collection pits shall be provided in oil cellars to collect and reuse/recycle spilled oil. Oil collection trays shall be provided under coils on saddles in cold rolled coil storage area.	Being complied. Oil collection pits are provided in oil cellars to collect and reuse the spilled oil. Cold rolled products are not applicable to our plant.
x.	The waste oil, grease and other hazardous waste like acidic sludge from pickling, galvanizing, chrome plating mills etc. shall be disposed of as per the Hazardous & Other waste (Management & Transboundary Movement) Rules, 2016. Coal tar sludge / decanter shall be recycled to coke ovens.	Being complied. The waste oil, grease and other hazardous waste like acidic sludge from pickling will be disposed as per the Hazardous & Other waste (Management & Transboundary Movement) Rules, 2016. Our coke oven plant is Non Recovery Type. Hence, Coal tar sludge / decanter not applicable.
xi.	Kitchen waste shall be composted or converted to biogas for further use. Being complied.	Being Complied. Biogas plant is installed and kitchen waste is being converted in to biogas and about 50 kg food waste per day is digested in bio gas plant and 5 -6 kg LPG equivalent bio gas is produced per day.
VII. Green Belt		
S.No	**Condition**	**Compliance Status**
i.	Green belt shall be developed in an area equal to 33% of the plant area with native tree species in accordance with CPCB guidelines. The greenbelt shall inter alia cover the entire periphery of the plant.	Being complied. The existing greenbelt developed is around 252165 Nos with area cover of about 91.24 Ha of the total area which is about 34.04 %.
ii.	The project proponent shall prepare GHG emissions inventory for the plant and shall submit the programme for reduction of the same including carbon sequestration including plantation.	Being complied. GHG emissions inventory for the plant and carbon sequestration including plantation are prepared and being submitted every year. Now, the report to the FY22 is being submitted as **Annexure – O**
VIII. Public Hearing and Human health issues		
S.No	**Condition**	**Compliance Status**
i.	Emergency prepared plan based on the Hazard identification and Risk Assessment (HIRA) and Disaster Management Plan shall be implemented.	Being complied. Emergency prepared plan based on the Hazard identification and Risk Assessment (HIRA) and Disaster Management Plan is being implemented and periodic review is also being conducted.
ii.	The project proponent shall carry out heat stress analysis for the workmen who work in high temperature work zone and provide Personal Protection Equipment (PPE) as per the norms of Factory Act.	Being Complied. OHC team periodically conduct Heat stress analyses for the workmen working in high temperature work zone and suitable Personal Protection Equipment (PPE)s and other adequate requirements are provided as per the norms of Factory Act.
iii.	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, crèche etc. The housing may be in the form of	Being complied. Provisions are made for the expansion project activities and as per the condition temporary structure will be removed after the completion of expansion activities.

	temporary structures to be removed after the completion of the project.	
iv.	Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.	Being complied. Health surveillance (Annual Health Check-up) as per the Factories Act for all employees on yearly basis and records are being maintained in the Occupational Health Centre. Recently the OHC received Health leadership award among the JSW group.
IX. Corporate Environmental Responsibility		
S.No	**Condition**	**Compliance Status**
i.	The project proponent shall comply with the provisions contained in this Ministry's OM vide F.No. 22-65/2017-IA.III dated 1st May 2018, as applicable, regarding Corporate Environmental Responsibility.	Being complied. With respect to the Corporate Environmental Responsibility all the actions are being implemented and progress report is being submitted **(Annexure – M)** regularly along with the six monthly compliance reports. The changes with respect to the needs of surrounding villages are reviewed and accordingly the ESC revised action plan status was communicated through to the MoEF&CC vide their letter dated 26.09.2020
ii.	The company shall have a well laid down environmental policy duly approved by the Board of Directors. The environmental policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/deviation/violation of the environmental/forest/wildlife norms/conditions. The company shall have defined system of reporting infringements/deviation/violation of the environmental / forest / wildlife norms / conditions and / or shareholders' / stake holders. The copy of the board resolution in this regard shall be submitted to the MoEF&CC as a part of six-monthly report.	Complied. Environmental policy duly approved by the Board of Directors is in place. Systems for reporting deviation/violation of environmental norms/conditions exists and are being followed.
iii.	A separate Environmental Cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly to the head of the organization.	Complied. Environmental cell is in place with qualified personnel under the control of Senior Executive, who is reporting directly to the head of the organization.
iv.	Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional office along with the Six Monthly Compliance Report.	Being complied. EMP implementation with action plan and environmental conditions along with responsibility matrix is implemented and year wise funds (CAPEX) earmarked for environmental protection measures are kept as separate account and not be diverted for any other purpose.
v.	Self-environmental audit shall be conducted annually. Every three years third party environmental audit shall be carried out.	Being complied. Self-environmental audit is being conducted monthly/annually. Environment Audit is being carried out by external agencies once in

		year and confirming with the standard of ISO 14001:2015.
vi.	All the recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the Iron and Steel plants shall be implemented.	Being complied. All the recommendations of the Charter on the Corporate Responsibility for the Environmental Protection (CREP) issued for the steel plants are implemented and the compliance status report **Annexure –G** is being submitted along with six monthly compliance reports.
X. Miscellaneous		
S.No	**Condition**	**Compliance Status**
i.	The project proponent shall make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising in at least in two local newspapers of the District or State of which one shall be in the vernacular language within seven days and in addition, this shall also be displayed in the project proponent's website permanently.	Being complied. Environmental Clearance accorded from MoEF&CC dated on 10.02.2020 and the same was advertised in two local newspapers on 14.02.2020 (Dinamani and The New Indian Express) which are widely circulated in the region of which Tamil is the vernacular language of the locality concerned. EC accorded is displayed in our website. Copy of the same is attached as **Annexure –H.**
ii.	The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.	Complied. Copy of the environmental clearance dated.10.02.2020 is submitted to the Heads of local bodies on 30.05.2020 and Panchayats on 20.02.2020.Copy of the same is attached as **Annexure –I.**
iii.	The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and update the same on half-yearly basis.	Complied. The compliance of the stipulated environment clearance conditions including results of monitored data is uploaded on our website at half-yearly basis and the latest one updated on to website on 25.01.2022
iv.	The project proponent shall monitor the criteria pollutants level namely; PM_{10}, SO_2, NO_X (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects and display the same at a convenient location for disclosure to the public and put on the website of the company.	Complied. The criteria pollutant levels namely; PM_{10}, $PM_{2.5,}$ SO_2, $NO_{X,}$ CO are displayed near the entrance of main gates of our company in the public domain & also uploaded in our website as **Annexure - C** in the six monthly compliance report.
v.	The project proponent shall submit six-monthly reports on the status of the compliance of the stipulated environmental conditions on the website of the ministry of Environment, Forest & Climate Change at environmental clearance portal.	Being complied. Six-monthly reports on the status of the compliance of the stipulated environmental conditions are being uploaded on the website of the ministry of Environment, Forest & Climate Change at environmental clearance portal.
vi.	The project proponent shall submit the environmental statement for each financial year in Form-V to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently and put on the website of the company.	Being complied. The environmental statement as prescribed under the Environment (Protection) Rules, 1986, for each financial year ending 31st March in Form-V is being submitted every year and displayed on the website of the company. To the FY 2020-21 the report has been submitted on 29.06.2021 and the FY2021-22 report preparation is under progress and the same will be submitted before the timeline.
vii.	The Project authorities shall inform the Regional Office as well as the Ministry, the	Complied. Date of financial closure and land development work has been informed to the JCEE

	date of financial closure and final approval of the project by the concerned authorities, commencing the land development work and start of production operation by the project.	of TNPCB, Salem dated 25.11.2020 and the same has been communicated through six months compliance report.
viii.	The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board and the State Government.	Abide by the order
ix.	The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Expert Appraisal Committee.	Abide by the order
x.	No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change (MoEF&CC).	Abide by the order
xi.	Concealing factual data or submission of false/fabricated data may result in revocation of this environmental clearance and attract action under the provisions of Environment (Protection) Act, 1986.	Abide by the order
xii.	The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.	Abide by the order
xiii.	The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions.	Abide by the order
xiv.	The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information / monitoring reports	Abide by the order
xv.	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 and Other Wastes (Management and Transboundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other orders passed by the Hon'ble Supreme Court of India / High Courts and any other Court of Law relating to the subject matter.	Abide by the order
xvi.	Any appeal against this EC shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010	Abide by the order

Compliance status to the EC (Amendment) dated 07.08.2019

Subject: Expansion of integrated Steel Plant (1.0 MTPA to 1.3 MTPA) of M/s. JSW Steel Ltd., Located at Mecheri, Taluk Mettur, District Salem, Tamil Nadu – Amendment in Environmental Clearance issued dated 07.07.2017 – Reg.

1.This refers to the application of M/s. JSW Steel Limited made vide proposal no. IA/TN/IND/26508/2015 dated 15th March, 2019 along with Form I and sought for amendment in the **specific condition no. vii pertaining to zero liquid discharge of the Environmental Clearance accorded by the Ministry vide letter no. F.No. J-11011/281/2006-lA-11(1) dated 7th July, 2017.**

2.As per specific condition no. vii. "no effluent shall be discharged outside the plant premises and Zero discharge shall be adopted". Project proponent sought amendment in the condition as "Zero discharge for the complete steel plant complex including CPPs".

The compliance status for the EC conditions to the Amendment dated 07.08.2019 is given in below table.

i	The specific condition no. vii given at paragraph no.26 of the EC accorded vide letter dated 7 /07/2017 shall read as below: "No effluent shall be discharged outside the plant premises and 'zero' discharge for the complete steel plant complex including Captive Power Plants (CPPs) shall be adopted	Complied. There is no discharge any effluent outside the plant premises and Zero wastewater discharge for the complete steel plant completed including Captive Power Plants is implemented. As per the latest CTO of CPP II the entire wastewater from the CPP II (3 x 30 MW) is being connected with Steel plant guard pond for collection, treatment and reuse in Steel plant for cooling, dust suppression and gardening purpose.

Compliance status to the EC dated 07.07.2017

A.	SPECIFIC CONDITIONS	COMPLIANCE STATUS
i.	The occupational health survey of the active workmen involved shall be carried as per the ILO guidelines and all the employees shall cover in every 5 years @ 20% every year.	Being Complied : Occupational health survey of the active workmen involved is being carried out as per the ILO guidelines and all the employees are being covered in health survey by 100% every year. All the medical records are available in OHC for ready reference.
ii.	The amount allocated for ESC i.e. Rs.13 Crores shall be provided as CAPEX and the ESC shall be treated as project and monitored annually and the report of same shall be submitted to Regional office of MoEF&CC.	Being Complied: The amount allocated for ESC i.e. Rs.13 Crores is provided as CAPEX and as the action plans are being implemented. The expansion activity has planned in a phased manner (Viz Phase-I: 1.0 MTPA to 1.15 MTPA and Phase-II: 1.15 MTPA to 1.3 MTPA) at an estimated cost of Rs. 1025 Cr. Phase-I expansion activities have been completed and the cost involvement is about Rs.650 Crs and till date the amount spent towards ESC is about 4.37 Crs. Due to the present steel market condition and the present pandemic (COVID19) situation the phase-II expansion activity is postponed and the same will be established with in the time line of EC validity. Based on the above and Phase II activities the ESC will be spent. JSW assures that the commitments made shall be fulfilled. The details are given in **Annexure –J** of this report. The same has been communicated to your good office via mail dated 26.09.2020.
iii.	The project proponent shall provide for solar light system for all common areas, street lights, villages, parking around project area and maintain the same regularly.	Complied. Solar panel is installed with the capacity of 60 KW (50 KW at Canteen and 10 KW at R& D building) and the average power generation is in the range of 12 Kwhr and the PA informed that further installations will be done in phased manner.
iv.	The project proponent shall provide for LED lights in their offices and residential areas.	Complied. LED based lightings are provided in the offices and township area and the replacement of sodium vapour lamp to LED is increased from 650 KW to 800 KW. Further they are having the plan to install LED lights every year in a phased to manner.
v.	The project proponent should install 24X7 air monitoring devices to monitor air emission and submit report to Ministry and its Regional Office.	Being Complied: There are 40 nos. of Dust analyzers & 23 Nos Gaseous emission monitoring systems are installed as per CTO condition and the real time data of SPM, SO2, NOx and co are transmitted to the Care Air Centre of TNPCB and CPCB servers Apart from the above, TNPCB is conducting bi-annual survey and Manual monitoring is being conducted by a NABL accredited external laboratory on a monthly basis. The monitoring results are attached as **(Annexure-B)** and values are well within the permissible limits. The latest TNPCB survey

		conducted (19.01.2022 to 25.01.2022) results are well within the standards issued by the Board.
vi.	The ETP for Blast furnace effluent should be designed to meet Cyanide standards as notified by the MoEF&CC.	Complied: There are two blast furnaces in our plant. BF#1 is having wet type gas cleaning plant and BF#2 is having dry type GCP. Presence of Cyanide level is not detected in Blast Furnace #1 effluent and the same is periodically ensured with external NABL accredited lab analysis.
vii.	No effluent shall be discharged outside the plant premises and 'zero' discharge shall be adopted. "Zero discharge for the complete steel plant complex including CPPs" as amended in EC dated.07.08.2019.	Being Complied: Wastewater generated from the various process of steel plant & partially treated water from CPPII is collected to the guard pond and after pretreatment (clarification), the treated water is 100 % reused in steel plant process to the application of BF slag granulation, gas cleaning plant of BF & EOF, BF slag quenching, coke quenching, dust suppression systems and green belt development. No effluent is discharged outside the plant premises and to ensure the same, dedicated EMFMs and an IP camera are installed in the waste water treatment facility and the real time details are connected to TNPCB & CPCB server.
viii.	The ETP for coke oven by-product should be designed to meet EPA notified standards especially the cyanide and phenol.	**Not Applicable:** Our Coke oven plant is non-recovery type. Hence, ETP plant is not envisaged.
ix.	Coke oven plant should meet visible emission standards notified by the MoEF&CC.	Being complied: As per EPA notification, visible emissions are prescribed to by-product type coke oven. Our plant is non recovery type and also the coke oven process works on i) negative pressure ii) stamped wet coal is being charged to the ovens which is side loading and thereby no visible emission is noticed.
x.	The standards issued by the Ministry vide G.S.R. 277(E) dated 31st March 2012 shall be strictly adhered to and the standards prescribed for the Coke oven plant shall be monitored and the report should be submitted along with the six-monthly compliance report.	Being Complied: The standards issued by the Ministry vide G.S.R. 277(E) dated 31st March 2012 are related to emission standards of Iron and Steel plant. As per the standard the emission related to coke oven plant is applicable to by product type and our Coke Oven plant is of non-recovery type. Emission standards with respect to stack (COP waste gas is used for steam generation and COP stacks are functioning as emergency stack) and fugitive emissions to the COP are being monitored and the results are submitted along with the six-monthly compliance report. Since, our plant is non-recovery type ETP is not anticipated for COP. All other emissions & effluent parameters related to sinter plant, blast furnace, steel making shop, mills are being monitored monthly and the values are well within the standard prescribed. The six months monitoring results (maximum, minimum and average) by TNPCB and NABL accredited laboratory for stack emissions are given in **Annexure - B** and Effluent quality monitoring results are given in Annexure-D.

A.	SPECIFIC CONDITIONS	COMPLIANCE STATUS
xi.	The emission standards specified in the Environmental (Protection) Amendment Rules, 2015 issued by vide S.O. 3305 (E) dated 7th December 2015 for the Thermal Power Plant shall be strictly adhered to.	Being Complied: At present CPP-II power generation capacity is 90 MW (2x30 MW and additional 1x30 MW). The emission standards specified in the Environmental (Protection) Amendment Rules, 2015 issued by vide S.O. 3305 (E) dated 7thDecember 2015 for Thermal Power Plant is applicable to a coal-based boiler which is installed in CPP II. The boiler has installed in the year 2006 and the parameters of SPM, SO2, Mercury are in the range of 35-40, 500-550, BDL against the norms of 50, 600, 0.03 mg/Nm3 respectively. Specific water consumption is 3.1 m3/Mwh against the norms of 3.5 m3/Mwh. As per the revised notification the NOx compliance to be met before 31.12.2023. To comply at present no proven technology is not available and actions are being initiated to explore BAT. Fly ash generated is 100% disposed to local fly ash brick manufacturers. In the additional 1 x 30 MW CPP, an air cooled condenser is installed and the specific water consumption is about 0.3 m3/Mwh.
xii.	The National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November 2009 shall be followed.	Being Complied: To meet the National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November 2009 Continuous Ambient Air Quality monitoring stations of four numbers are installed in the plant peripheral. One station is installed to monitor PM10, PM2.5, SO2, NOx and CO and other 3 stations are installed to monitor PM10, PM2.5, SO2 as per the CTO condition. The real time data are connected to Care Air Centre of TNPCB& CPCB. Apart from this, ambient air quality is monitored in the surrounding villages by TNPCB during the bi- annual survey and also monitored by a NABL accredited laboratory to the defined locations to the parameters issued by the Ministry vide G.S.R. No. 826(E) dated 16th November 2009. The monitored results (maximum, minimum & average) is enclosed in **Annexure -C.**
xiii.	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), and bag filters etc. shall be provided.	Being Complied: Continuous Ambient Air Quality monitoring stations of four numbers are installed in the plant peripheral. One station is installed to monitor PM10, PM2.5, SO2, NOx and CO and other 3 stations are installed to monitor PM10, PM2.5, SO2 as per the CTO condition. The real time data are connected to Care Air Centre of TNPCB& CPCB. Online continuous monitoring systems are installed in process and non-process stacks as per the CTO condition to monitor SPM, SO_2 & NOx. The real time data is connected with TNPCB & CPCB servers. Adequate Air Pollution Control measures are installed in the respective processes and to control the fugitive emissions secondary de-dusting systems are installed in BF & SMS. The details of APC measures installed are given in **Annexure -K.**

A.	SPECIFIC CONDITIONS	COMPLIANCE STATUS
xiv.	A statement on carbon budgeting including the quantum of equivalent CO2 being emitted by the existing plant operations, the amount of carbon sequestered annually by the existing green belt and the proposed green belt and the quantum of equivalent CO2 that will be emitted due to the proposed expansion shall be prepared by the project proponent and submitted to the Ministry and the Regional Office of the Ministry. This shall be prepared every year by the project proponent. The first such budget shall be prepared within a period of 6 months and subsequently it should be prepared every year.	A statement on carbon budgeting is prepared as per the condition and detailed report is submitted to Ministry dated on 15.02.2018, 11.06.2019 and 23.09.2020. The quantum of equivalent CO2 being emitted by the existing plant operations in FY22 is 30,28,872 MT/year. The amount of carbon sequestered in FY22 by the existing green belt is 4539 MT. The proposed green belt for FY23 is 15000 Nos. The quantum of equivalent CO2 that will be emitted due to the proposed expansion would be calculated during phase II expansion. As per the condition the compliance report is submitted periodically. The statement report for the financial year 2022 is attached herewith as **Annexure – O.**
xv.	For the employees working in high temperature zones falling in the plant operation areas, the total shift duration will be 4 hrs or less per day where the temperature is more than 50oC. Moreover, the jobs of these employees will be alternated in such a way that no employee is subjected to working in high temperature area for more than 1 hr continuously. Such employees would be invariably provided with proper protective equipment, garments and gears such as head gear, clothing, gloves, eye protection etc. There should also be an arrangement for sufficient drinking water at site to prevent dehydration etc.	Being Complied: Employees working in high temperature zones are in the range of 450 deg"c and of those employees are alternated to other jobs and ensure that no employee is subjected to work in high temperature area for more than 1 hr continuously. They are provided with proper protective equipment, garments and gears such as head gear, clothing, gloves, eye protection, etc., and arrangements are made for sufficient drinking water, butter milk and lime juice at plants to prevent dehydration.
xvi.	In-plant control measures and dust suppression system shall be provided to control fugitive emissions from all the vulnerable sources. Dust extraction and suppression system shall be provided at all the transfer points, coal handling plant and coke sorting plant of coke oven plant. Bag filters shall be provided to hoods and dust collectors to coal and coke handling to control dust emissions. Water sprinkling system shall be provided to control secondary fugitive dust emissions generated during screening, loading, unloading, handling and storage of raw materials etc.	Being Complied: Dust suppression systems are provided to control fugitive emissions from all the vulnerable sources like raw material unloading and storage yards. Bag filters and Dry & Wet fog systems are provided in raw material transfer points, coal handling and coke sorting plant of coke oven. To control dust emission bag filters are provided in coal handling area of COP. Water sprinkler systems are provided in various locations to control secondary fugitive dust emissions generated during screening, loading, unloading, handling and storage of raw materials. A tyre washing unit is installed in the main gate entry to control vehicular movement dust emission.

A.	SPECIFIC CONDITIONS	COMPLIANCE STATUS
xvii.	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.	**Not applicable:** The G.S.R. 414(E) dated 30th May, 2008 is related to sponge iron plant. In this connection, a representation is submitted to MoEF&CC dated 22.07.17.
xviii.	Hot gases from DRI Kiln should be passed through dust settling chamber (DSC) to remove coarse solids and After Burning Chamber (ABC) to burn CO completely and used in Waste Heat Recovery (WHRB). The gas then shall be cleaned in ESP before dispersion out into the atmosphere through ID fan and stack. ESP shall be installed to control the particulate emission from WHRB.	**Not applicable:** The existing and expansion of the steel plant is following blast furnace route and there is no DRI process in our operations. In this connection, a representation is submitted to MoEF&CC dated 22.07.17.
xix.	Efforts shall further be made to use maximum water from the rain water harvesting sources. If needed, capacity of the reservoir shall be enhanced to meet the maximum water requirement.	Being Complied. Rain water harvesting ponds are provided near at township (East side) with the capacity of 17500 KL, West side of Township STP with the capacity of 33000 KL, Near RO plant area 15000 KL and plant guest house backside 4000 KL. The overall collection capacity is 69500 KL. The collected water is being recharged, reused in steel plant. Capacity of the rain water harvesting ponds will be enhanced based on the needs and requirement
xx.	Risk and Disaster Management Plan along with the mitigation measures shall be prepared and a copy submitted to the Ministry's Regional Office, SPCB and CPCB within 3 months of issue of environment clearance letter.	Complied: Study on Risk and Disaster Management Plan was conducted and the detailed report with summary is submitted to Ministry's Regional Office, SPCB, and CPCB on 01.02.2018 and the same is periodically reviewed and updated.
xxi.	All the blast furnace (BF) slag shall be granulated and provided to cement manufacturers for further utilization. Flue dust from sinter plant and SMS and sludge from BF shall be re-used in sinter plant. Coke breeze form coke oven plant shall be used in sinter and pellet plant. SMS slag shall be given for metal recovery and properly utilized. All the other solid waste including broken refractory mass shall be properly disposed-off in environment-friendly manner.	Being Complied: All the Blast Furnace Slag is converted to Granulated slag and sold to cement industries. Flue dust from blast furnace, sludge from BF & EOF, Coke breeze from coke oven plant are re-used in sinter plant. Pellet plant is not installed in our process. SMS slag is sent for metal recovery system and the crushed slag is reused in internal applications like sinter plant, EOF as hearth layer and cooling media respectively and to cement industries. Based on the R&D initiative trail runs are being conducted to make paver from crushed EOF slag. Refractories are selected to withstand high temperature whose self-life is longer and generation of used refractories are lesser. The same will be recycled in downstream applications/disposed to recycling vendors.

A.	SPECIFIC CONDITIONS	COMPLIANCE STATUS
xxii.	Coal and coke fines shall be recycled and reused in the process. The breeze coke and dust from the air pollution control system shall be reused in sinter plant. The waste oil shall be properly disposed of as per the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.	Being Complied: Coal and coke fines are recycled and reused in the Sinter plant and Blast Furnace. Coke breeze and dust from the air pollution control systems are collected and reused in the Sinter Plant. The waste oil generated from the process is being disposed to authorized vendor as per the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.
xxiii.	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.	Being complied. The existing greenbelt developed is around 252165 Nos with area cover of about 91.24 Ha of the total area which is about 34.04 % and most of the sapling are planted native species in consultation with Forest department. The tree plantation details are given in **Annexure – L.**
xxiv.	All the recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the Steel plants and Coke Oven Plants shall be implemented.	Complied. All the recommendations of the Charter on the Corporate Responsibility for the Environmental Protection (CREP) issued for the steel plants are implemented. Updated Compliance status report of CREP is enclosed vide **Annexure – G.**
xxv.	At least 2.5% of the total cost of the project shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues, locals need and item-wise details along with time bound action plan shall be prepared and submitted to the Ministry's Regional Office. Implementation of such program shall be ensured by constituting a Committee comprising of the proponent, representatives of village Panchayat and District Administration. Action taken report in this regard shall be submitted to the Ministry's Regional Office.	Being Complied: As per the EC Specific condition ii, Rs.13 Crores is allotted towards ESC have been earmarked. Public Hearing issues, locals need and item-wise details along with time bound action plan is prepared and actions are being taken in a time bound manner. The proposed expansion activity is planned in a phased manner (Viz Phase-I: 1.0 MTPA to 1.15 MTPA and Phase-II: 1.15 MTPA to 1.3 MTPA) at an estimated cost of Rs. 1025 Cr. Phase-I expansion activities were completed and the cost involvement is about Rs.650 Crs and till date the amount spent towards ESC is about 4.37 Crs. Due to the steel market condition and the present pandemic (COVID19) situation the phase-II expansion activity is postponed and the same will be established with in the time line EC validity. Based on the above, Phase II activities are rescheduled towards ESC. JSW assures that the commitments made shall be fulfilled. The details are attached in **Annexure –J** of this report. The same has been communicated to your good office via mail dated 26.09.2020.

xxvi.	The proponent shall prepare a detailed CSR plan for every year for the next 5 years for the existing-cum-expansion project, which includes village-wise, sector-wise (Health, Education, Sanitation, Health, Skill Development and infrastructure requirements such as strengthening of village roads, avenue plantation, etc) activities in consultation with the local communities and administration. The CSR plan will include the amount of 2% retain annual profits as provided for in Clause 135 of the Companies Act, 2013 which provides for 2% of the average net profits of previous 3 years towards CSR activities for life of the project. A separate budget head shall be created and the annual capital and revenue expenditure on various activities of the plan shall be submitted as part of the compliance report to RO. The details of the CSR plan shall also be uploaded on the company website and shall also be provided in the Annual Report of the company. The plan so prepared shall be based on SMART (Specific, Measurable, Achievable, Relevant and Time bound) concept. The expenditure should be aimed at sustainable development and direct free distribution and temporary relief should not be included.	Complied: CSR plan for 5 years (from 2017 to 2022) is prepared which includes village-wise, sector-wise (Health, Education, Sanitation, Health, Skill Development and infrastructure requirements such as strengthening of village roads, avenue plantation, etc,.) activities in consultation with the local communities and administration considering and actions are initiated for compliance. As per the Companies Act, 2013 under clause 135, 2% of the average net profits of previous 3 years is earmarked as separate budget head towards CSR activities. The various activities of the plan are submitted to Ministry's Regional Office as part of the RO compliance report and the details of the CSR plan and Actual is uploaded in our company website and also provided in our company Annual Report. All the activities were executed based on SMART (Specific, Measurable, Achievable, Relevant and Time bound) concept. The expenditures were aimed at sustainable development and direct free distribution. The updated details are enclosed vide **Annexure - M.**
xxvii	All the commitments made to the public during the Public Hearing /Public Consultation meeting shall be satisfactorily implemented and a separate budget for implementing the same shall be allocated and information submitted to the Ministry's Regional Office at Chennai.	Complied: Commitments made to the public during the Public Hearing is satisfactorily implemented.
xxvii i.	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, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.	Being complied: Provisions are made for the expansion project activities and as per the condition temporary structure will be removed after the completion of expansion activities.
B.	**GENERAL CONDITIONS**	
i.	The project authorities must strictly Adhere to the stipulations made by the concerned State Pollution Control Board and the State Government.	Being complied: Stipulations made by the Tamil Nadu Pollution Control Board and the State Government is strictly adhered to compliance.
ii.	No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change (MoEF&CC).	Being Complied: There is no further expansion or modification in the plant is carried out without prior approval of Ministry of Environment, Forests and Climate Change (MoEF&CC)

iii.	At least four ambient air quality monitoring stations should be established in the downward direction as well as where maximum ground level concentration of PM10, PM2.5, SO2 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 Chennai and the SPCB/CPCB once in six months.	Being Complied: With the consultation of TNPCB four numbers of Continuous Ambient Air Quality monitoring stations are installed in the plant premises where maximum ground level concentration of PM10, PM2.5, SO2 and NOx is taking place. Data on Ambient Air Quality and Stack emission reports are being submitted to Ministry, MoEF&CC, Regional Office at Chennai and the SPCB/CPCB once in six months.
iv.	Industrial waste water 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 from time to time. The treated waste water shall be utilized for plantation purpose.	Being Complied: Industrial wastewater is being collected, treated and reused 100 % in the processes for cooling application and plantation purpose. Quality parameters are conformed to the prescribed standards under GSR 422 (E) dated 19th May, 1993 and 31st December 1993. The treated waste water analysis report given by TNPCB & NABL accredited laboratory is given in **Annexure -D.**
v.	The overall noise levels in and around the plant shall be kept well within the standards (85 dB(A)) 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 dB(A) during day time and 70 dB(A) during night time.	Being Complied: Source and Ambient noise levels are measured in and around the plant areas on monthly basis and control measures like acoustic hoods, silencers, and enclosures are provided wherever required. The noise levels of source and ambient are well within the standards prescribed under EPA Rules, 1989. Apart from this visual display boards are displayed to wear earplug, ear muff as PPE wherever required. The noise monitoring results by NABL accredited laboratory is enclosed in **Annexure –F.**
vi.	Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.	Being Complied: Health surveillance (Annual Health Check-up) is being conducted for all employees on yearly basis and records are being maintained in the Occupational Health Centre.
vii.	The company shall develop rain water harvesting structures to harvest the rain water for utilization in the lean season besides recharging the ground water table.	Being Complied. Rain water harvesting ponds are provided near at township (East side) with the capacity of 17500 KL, West side of Township STP with the capacity of 33000 KL, Near RO plant area 15000 KL and plant guest house backside 4000 KL. The overall collection capacity is 69500 KL.The collected water is being recharged, reused in steel plant. Capacity of the rain water harvesting ponds will be enhanced based on the needs and requirement.
viii.	The project proponent shall also comply with all the environmental protection measures and safeguards recommend in the EIA/EMP report. Further, the company must undertake socio-economic development activities in the surrounding villages like community development programmes, educational programmes, drinking water supply and health care etc.	Complied: To comply the environmental protection measures and safeguards as per the recommendation of EIA/EMP report, dust suppression systems like water sprinklers and dry fog systems for control of fugitive emissions arising from material handling. Bag filters are provided in the Sinter plant for dust control during crushing of raw materials. ESPs are

		provided for dust control in the Sintering process and Coal based boiler. Cast house de-dusting systems are installed in both the Blast Furnace I & II for fugitive dust control in the casting process. Wet Gas cleaning systems are provided in Blast Furnace I and Dry Gas cleaning systems are provided in Blast Furnace II. Quenching tower with grit arrestor is provided to control emission during coke quenching (wet type). Secondary de-dusting system (bag filters) are provided in Energy Optimizing Furnaces I & II, Ladle Refining Furnaces. Apart from the above we undertake socio-economic development activities in the surrounding villages like community development programmes, educational programmes, drinking water supply and health care etc. The details are given (**Annexure – M)** the six months' report of CSR.
ix.	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 (MoEF&CC) 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 Chennai. The funds so provided shall not be diverted for any other purpose.	Complied: For environment pollution control measures capital cost and recurring cost/annum for environment pollution control measures are being implemented to the completed projects. Till March 2022 the cost of Rs.84.03 crores (appx) has been spent for environment pollution control measures as capital cost. Recurring cost/annum to the environment pollution control measures of Rs.8.24 crores (appx) has been spent. The details are given in **Annexure -N**.
x.	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 website of the company by the proponent.	Complied: Copy of clearance letter is submitted to local administration on 14.07.2017. The copy of clearance letter is uploaded in our website.
xi.	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 MoEF&CC at Chennai. The respective Zonal Office of CPCB and the SPCB. The criteria pollutant levels namely; PM10, SO2, 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.	Complied: The compliance of the stipulated environment clearance conditions including results of monitored data is uploaded in our website once in six months. Simultaneously the compliance reports are being submitted (email) to the Regional Office of the Mo EF&CC at Chennai and the Zonal Office of CPCB, Bangalore and the TNPCB, Chennai. The criteria pollutant levels namely; PM10, PM2.5, SO2, NOX, CO (real time values) and stack emissions (manually monitored values) are displayed near both entrance of our company in the public domain.

xii.	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 MoEF&CC, the respective Zonal Office of CPCB and the SPCB. The Regional Office of this Ministry at Chennai/CPCB/SPCB shall monitor the stipulated conditions.	Complied: Environmental conditions and compliance status report including results of monitored data is being submitted once in six months to the Regional Office of MoEF&CC, Chennai (by email), and Zonal Office of CPCB, Bangalore and TNPCB, Chennai.
xiii.	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 MoEF&CC at Chennai by e-mail.	Being Complied: As prescribed under the Environment (Protection) Rules, 1986, as amended subsequently, the environmental statement for each financial year ending 31st March in Form-V and status of compliance of environmental conditions is being submitted to the Regional Office of the MoEF&CC at Chennai. To the FY 2020-21 the report has been submitted on 29.06.2021 and to the FY2021-22 report will be submitted before the time line. The same is uploaded on our company website.
xiv	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 sent at website of the Ministry of Environment, Forests, and Climate Change (MoEF&CC) 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 Chennai.	Complied: Environmental Clearance accorded from MoEF&CC dated on 07.07.2017 and the details have been advertised in Dinamani and The Indian Express on 14.07.2017. The same was advertised two local newspapers (Dinamani and The Indian Express) which are widely circulated in the region of which Tamil is the vernacular language of the locality concerned. A copy of the same is submitted to the MoEF&CC Regional office at Chennai on 15.07.2017.
xv	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.	Complied: Date of financial closure and land development work is informed to Regional Office vide letter dated 12.10.2017.

Annexure –A

Production details for the period of

Oct’21 – Mar’22

Annexure -A

I. Production details for the period of Oct '21 – Mar '22

Month	Steel Plant							CPP-II
	Products		By product				Intermediate product	Product
	Steel production	Power Generation (By Blast Furnace gas)	Ferrous Sulfate	Liquid Oxygen	Liquid Nitrogen	Liquid Argon	Pig Iron	Power generation
UoM	**MT**	**MW (Avg load)**	**Million TPA**				**MT**	**MW (Avg load)**
Oct-21	96395	0.00	0.000047	0.000333	0	0.00022	268	70.6
Nov-21	94461	0.00	0.000048	0.000295	0	0.00022	189	63.9
Dec-21	82191	0.00	0.000045	0.000459	0	0.00028	607	61.5
Jan-22	98100	0.00	0.000056	0.000384	0	0.00024	414	64.14
Feb-22	89547	0.00	0.000055	0.000384	0	0.00024	118	64.46
Mar-22	96148	0.00	0.000058	0.000395	0	0.00027	221	63.7
Total	**556843**	**0**	**0.000309**	**0.002251**	**0.0000**	**0.00146**	**1817**	**64.7**
Consented quantity per Annum	**1150000**	**7.0**	**0.0012**	**0.015**	**0.00200**	**0.00800**	**300000**	**90.0**

Note:

- **MT – Metric Ton**
- **MW – Mega watt**

Annexure -A1

II. Waste generation details for the period of Oct'21 – Mar'22

Month	Steel Plant & CPP#2									
	Hazardous Waste	BF granulated Slag	SMS Slag	GCP sludge	Mill scale	Fly Ash	APC dust	E - waste	Bio medical waste	Battery waste
UoM	**MT/Month**							**Kg/Month**		
Oct-21	5.4	40376	21267	3223	1257	1153	587	560	1.45	3300
Nov-21	4.0	38813	20849	3104	1303	906	474	160	0.85	1020
Dec-21	11.6	34256	18148	2706	1111	987	459	750	0.58	580
Jan-22	18.0	40114	21651	3203	1273	1109	572	0	0.54	1240
Feb-22	4.8	35062	19741	2962	1150	623	445	0	0.68	680
Mar-22	5.1	39749	21229	3194	1312	680	593	1270	0.46	2040
Total	**49**	**228369**	**122886**	**18391**	**7404.62**	**5459**	**3130**	**2740**	**4.55**	**3960**

Annexure –B

Stack emission monitoring report of TNPCB & NABL accredited laboratory for the period of

Oct’21 – Mar’22

Annexure -B

Stack emission monitoring report of TNPCB & NABL accredited laboratory for the period Oct 21 to Mar '22.

I. Stack emission monitoring results of TNPCB					
Sl. No	Stack attached to	Discharge rate in (Nm^3/Hr)	Pollutants Concentration (mg/Nm^3)		
			PM	SO_2	NO_x
1	Sinter Plant - I - Sinter Machine	73924	85	27	9
2	Sinter Plant – I - Cooling System	76668	92	26.6	9.1
3	Sinter Plant – I Dedusting System	113827	40	_	_
4	Sinter Plant – I RMHS	17019	67	_	_
5	Sinter Plant - II - Sinter Machine	506990	67	32	7
6	Sinter Plant - II - Cooling & De-dusting System	387291	54	_	_
7	Sinter Plant - II - RMHS	67755	46	_	_
8	Blast Furnace - I - Hot stove	50224	27	38	15
9	Blast Furnace - I - Stock House	41394	50	_	_
10	Blast Furnace - I - RMHS	15236	46	_	_
11	Blast Furnace - I - Cast House	243863	92	13	6.2
12	Blast Furnace - II - Hot stove	102510	46	38	22
13	Blast Furnace - II - Stock House	204191	45	_	_
14	Blast Furnace - II - Cast House	450389	59	13	6
15	Blast Furnace - II - PCI	31908	48	27	7
16	CPP - I - Boiler	45910	28	80	64
17	VD boiler	12597	31	48	17
18	Energy Optimizing Furnace -I	68353	48	62	13
19	Energy Optimizing Furnace -II	58035	40	38	17
20	EOF Secondary dedusting system I & II	344959	84	_	_
21	Ladle Refining Furnace - 1	22620	38	21	15
22	Ladle Refining Furnace - 2,3,4	48922	71	28	11
23	CCM-I Steam Exhaust	25836	62	_	_
24	CCM-II Steam Exhaust - II	21373	66	_	_
25	CCM-II Cut fumes Exhaust	45066	42	_	_
26	BRM – Re Heating Furnace	40754	58	64	17
27	BLM – Re Heating Furnace -I	27387	86	80	5
28	LRF –secondary de dusting system	234092	44	28	11
29	Coke Oven - WHRB -II	33428	42	132	7
30	Coke Oven - WHRB -III	46255	47	128	9.1
31	Coke Oven - WHRB -IV	48784	39	169	7.1
32	BF Gas Fired Boiler	29241	30	91	7.1
33	AFBC - Boiler	124116	21	175	25
34	DG Set -I (625 KVA)	475	23	21	6.2
35	DG Set - II (625 KVA)	499	24	23	7
36	CCM-III Steam Exhaust	21663	36	_	_
37	COAL CRUSHER CPP 2	3911	78	_	_
38	CPP II COAL SCREENING SECTION	15772	56	_	_
39	PICKLING PLANT - ACID FUMES EXHAYST SYSTEM SATACK	22760	16	13	<0.05
40	PICKLING PLANT - ACID - HOT WATER GENERATOR SATACK	843	18	21	4.4

II. Stack emission monitoring report of NABL accredited Laboratory					
Stack No.	Source name	Stack emission Average (mg/Nm^3)			Discharge (Nm^3/hr)
		SPM	SO_2	NO_x	
1	Sinter Machine (Sinter Plant I)	73	153	42	94741
2	Cooling System (Sinter Plant I)	48	27	24	85382
3	Dedusting System (Sinter Plant I)	27	_	_	116788
4	Dust Extraction System For RMHS (Sinter Plant I)	17	_	_	19474
5	Hot Stove (Blast Furnace I)	21	79	40	48805
6	GCP Flare (Blast Furnace I) -Emergency stack	9	21	_	5587
7	Stock House Dedusting System (Blast Furnace I)	32	_	_	68854
8	Dust Extraction System for RMHS (Blast Furnace I)	23	_	_	19234
9	Cast House Dedusting System (Blast Furnace I)	24	_	_	259060
10	CPP I Boiler 2 Nos of 25 TPH each (Common Stack)	22	28	43	21895
11	Energy Optimizing Furnace (Steel Melting Shop I)	73	51	45	47243
12	Ladle Furnaces (Steel Melting Shop I)	26	33	28	19895
13	Continuous Casting Machine (Steel Melting Shop I)	20	_	_	24894
14	Energy Optimizing Furnace (Steel Melting Shop II)	53	53	49	48686
15	Secondary Dedusting System EOF I&II (Combined SMS II)	18	_	_	391282
16	Sec. Dedusting System of LRF IV(Common) (SMS II)	41	_	_	400676
17	Ladle Furnaces(Common Stack) (Steel Melting Shop II)	29	44	38	50930
18	Vacuum Degasing Unit (Boiler) (Steel Melting Shop II)	29	42	36	18733
19	Steam Exhaust System (2 Nos) (Bloom Caster	23	_	_	22148
20	Cut Fumes Exhaust System (Bloom Caster)	27	_	_	63101
21	Reheating Furnace (Furnace 1 No2 Chimney) (BLM)	32	44	47	25669
22	Reheating Furnace (Furnace 1 No1 Chimney) (BLM)	17	55	38	24210
23	Coke Oven Chimney I (Coke Oven) -Emergency stack	_	_	_	_
24	Coke Oven Chimney II (Coke Oven) -Emergency stack	_	_	_	_
25	Coke Oven Chimney III (Coke Oven) -Emergency stack	_	_	_	_
26	Waste Heat Recovery Boiler I (Coke Oven)	25	235	263	56687
27	Waste Heat Recovery Boiler II (Coke Oven)	27	189	247	57313
28	Waste Heat Recovery Boiler III (Coke Oven)	30	196	237	58511
29	Waste Heat Recovery Boiler IV (Coke Oven)	30	320	240	56710
30	Waste Heat Recovery Boiler V (Coke Oven)	29	313	235	56557
31	BF Gas Fired Boiler	29	27	23	38801
32	Reheating Furnace (Bar & Rod Mill)	24	335	282	107969
33	Sinter Machine (Sinter Plant II)	66	175	44	544373
34	Plant Dedusting and Cooling (Sinter Plant II)	27	_	_	441926
35	Crushing of Fuel & Raw Materials (Sinter Plant II)	25	_	_	108506
36	Hot Stove (Blast Furnace II)	15	32	24	72222
37	GCP Flare (Blast Furnace II) -Emergency stack	9	20	_	14569
38	Stock House Dedusting & RMHS (Blast Furnace II)	22	_	_	271371
39	Cast House Dedusting System (Blast Furnace II)	19	_	_	446053
40	Pulverized Coal Injection (Blast Furnace)	22	17	28	38552
41	Steam exhaust system -2	30	_	_	21782
42	Steam Exhaust System - CCM-III	37	_	_	32332
43	Pickling Plant- Acid Fumes exhaust system stack	26	21	21	1669
44	Pickling Plant- Acid - Hot water Generator Stack	25	_	_	19244
45	CPPII-AFBC Boiler	24	335	282	107969
46	CPPII-Coal crusher	42	_	_	6701
47	CPP-IICoal screening	43	_	_	15606

Annexure –C

Online stack emission monitoring & Ambient air quality monitoring report for the period of

Oct’21 – Mar’22

Annexure -C

Online stack emission monitoring & Ambient air quality monitoring report for the period OCT'21 to MAR'22

I. Online stack emission monitoring summary report (Oct '21 to Mar'22)

Stack No.	Source name	Parameter	UoM	Stack emission monthly average					
		Month		Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
1	Sinter Machine (Sinter Plant I)	SPM	mg/m^3	5	24	26	62	81	61
		SO_2	mg/m^3	27	37	80	105	154	188
2	Cooling System (Sinter Plant I)	SPM	mg/m^3	5	27	30	40	53	41
3	Dedusting System (Sinter Plant I)	SPM	mg/m^3	1	42	13	24	25	20
4	Dust Extraction System For RMHS (Sinter Plant I)	SPM	mg/m^3	8	29	2	7	8	7
5	Hot Stove (Blast Furnace I)	SPM	mg/m^3	20	23	8	12	12	10
		SO_2	mg/m^3	0	16	50	63	71	46
		NOx	mg/m^3	0	0	15	21	24	14
		CO	ppm	0	44	630	1593	1745	1389
6	GCP Flare (Blast Furnace I) -Emergency stack	NA	NA	_	_	_	_	_	_
		NA	NA	_	_	_	_	_	_
7	Stock House Dedusting System (Blast Furnace I)	SPM	mg/m^3	23	16	13	6	4	9
		SO_2	mg/m^3	8	6	6	6	7	7
8	Dust Extraction System for RMHS (Blast Furnace I)	SPM	mg/m^3	37	16	10	12	9	18
		SO_2	mg/m^3	5	6	5	6	6	5
9	Cast House Dedusting System (Blast Furnace I)	SPM	mg/m^3	14	17	10	18	24	7
		SO_2	mg/m^3	6	6	4	6	9	14
10	CPP I Boiler 2 Nos of 25 TPH each (Common Stack)	SPM	mg/m^3	11	19	15	18	18	18
		SO_2	mg/m^3	34	20	14	18	21	21
11	Energy Optimizing Furnace (Steel Melting Shop I)	SPM	mg/m^3	22	70	65	75	75	70
12	Ladle Furnaces (Steel Melting Shop I)	SPM	mg/m^3	12	23	20	19	22	20
13	Continuous Casting Machine (Steel Melting Shop I)	SPM	mg/m^3	2	2	2	3	22	31
14	Energy Optimizing Furnace (Steel Melting Shop II)	SPM	mg/m^3	57	48	43	55	49	48
15	Secondary Dedusting System EOF I&II (Combined SMS II)	SPM	mg/m^3	4	5	6	12	17	19
16	Sec. Dedusting System of LRF IV(Common) (SMS II)	SPM	mg/m^3	38	26	34	42	41	41
17	Ladle Furnaces(Common Stack) (Steel Melting Shop II)	SPM	mg/m^3	22	8	19	27	41	20
18	Vacuum Degasing Unit (Boiler) (Steel Melting Shop II)	SPM	mg/m^3	32	36	33	24	18	27
19	Steam Exhaust System 1 (Bloom Caster	SPM	mg/m^3	0	0	0	0	1	0
19	Steam Exhaust System 2 (Bloom Caster	SPM	mg/m^3	3	12	11	3	9	1
20	Cut Fumes Exhaust System (Bloom Caster)	SPM	mg/m^3	7	8	9	10	11	12
21	Reheating Furnace (Furnace 1 No2 Chimney) (BLM)	SPM	mg/m^3	18	11	12	12	11	9
		SO_2	mg/m^3	52	38	30	35	34	33
22	Reheating Furnace (Furnace 1 No1 Chimney) (BLM)	SPM	mg/m^3	28	6	11	24	42	12
		SO_2	mg/m^3	63	78	48	27	32	31
23	Coke Oven Chimney I (Coke Oven) -Emergency stack	NA	NA	Emergency stack no flow					
		NA	NA						
24	Coke Oven Chimney II (Coke Oven) -Emergency stack	NA	NA						
		NA	NA						
25	Coke Oven Chimney III (Coke Oven) -Emergency stack	NA	NA						
		NA	NA						

Stack No.	Source name	Parameter	UoM	Stack emission monthly average					
		Month		Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
26	Waste Heat Recovery Boiler I (Coke Oven)	SPM	mg/m^3	31	30	20	20	16	26
		SO_2	mg/m^3	176	225	225	224	178	214
27	Waste Heat Recovery Boiler II (Coke Oven)	SPM	mg/m^3	23	25	25	29	27	25
		SO_2	mg/m^3	126	124	204	224	193	203
28	Waste Heat Recovery Boiler III (Coke Oven)	SPM	mg/m^3	31	36	35	29	12	25
		SO_2	mg/m^3	124	98	82	98	135	212
29	Waste Heat Recovery Boiler IV (Coke Oven)	SPM	mg/m^3	_	_	_	_	_	_
		SO_2	mg/m^3	_	_	_	_	_	_
30	Waste Heat Recovery Boiler V (Coke Oven)	SPM	mg/m^3	_	_	_	_	_	_
		SO_2	mg/m^3	_	_	_	_	_	_
31	BF Gas Fired Boiler	SPM	mg/m^3	25	32	32	24	28	21
32	Reheating Furnace (Bar & Rod Mill)	SPM	mg/m^3	28	23	32	8	11	10
		SO_2	mg/m^3	14	24	22	18	11	9
33	Sinter Machine (Sinter Plant II)	SPM	mg/m^3	3	53	49	44	47	45
		SO_2	mg/m^3	140	131	161	180	192	201
34	Plant Dedusting and Cooling (Sinter Plant II)	SPM	mg/m^3	14	23	33	23	21	14
35	Crushing of Fuel & Raw Materials (Sinter Plant II)	SPM	mg/m^3	18	20	21	19	9	8
36	Hot Stove (Blast Furnace II)	SPM	mg/m^3	6	5	11	9	12	15
		SO_2	mg/m^3	33	32	16	16	44	54
		NOx	mg/m^3	6	8	10	17	17	23
		CO	ppm	2086	1801	1129	2064	1841	2032
37	GCP Flare (Blast Furnace II) -Emergency stack	NA	NA	_	_	_	_	_	_
		NA	NA	_	_	_	_	_	_
38	Stock House Dedusting & RMHS (Blast Furnace II)	SPM	mg/m^3	2	10	10	10	17	15
		SO_2	mg/m^3	4	6	4	5	6	4
39	Cast House Dedusting System (Blast Furnace II)	SPM	mg/m^3	3	4	5	6	7	8
		SO_2	mg/m^3	4	6	4	5	6	4
40	Pulverized Coal Injection (Blast Furnace)	SPM	mg/m^3	2	5	4	10	16	23
		SO_2	mg/m^3	5	4	4	3	3	4
41	Steam Exhaust System - CCM-III	SPM	mg/m^3	CEMS Not applicable					
		NA	NA						
42	CPPII-AFBC Boiler	SPM	mg/m^3	21	22	22	17	18	14
		SO_2	mg/m^3	518	291	121	178	406	245
		NOx	mg/m^3	327	261	281	246	253	194

II. Continuous Ambient Air Quality Monitoring Results (Oct'21 to Mar'22)

Month	CAAQMS#1					CAAQMS#2		
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	CO	PM_{10}	$PM_{2.5}$	SO_2
UoM	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	mg/m^3	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
Oct-21	34	19	6	4	0.6	21	19	17
Nov-21	31	22	6	4	0.8	31	18	17
Dec-21	44	32	10	6	0.4	48	33	19
Jan-22	35	17	7	5	0.6	24	14	15
Feb-22	48	32	8	5	0.5	48	31	16
Mar-22	97	58	15	7	0.6	56	35	20

Month	CAAQMS#3			CAAQMS#4		
	PM_{10}	$PM_{2.5}$	SO_2	PM_{10}	$PM_{2.5}$	SO_2
UoM	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$
Oct-21	33	14	21	34	16	41
Nov-21	36	18	24	33	20	11
Dec-21	41	23	30	53	23	30
Jan-22	35	10	22	47	31	39
Feb-22	48	12	19	50	35	34
Mar-22	50	26	28	51	34	31

Tolerance limit: PM10: 100 $\mu g/m^3$, PM2.5: 60 $\mu g/m^3$, NOx: 80 $\mu g/m^3$, SO_2: 80 $\mu g/m^3$, CO: 1 hr avg - 4 mg/m^3 , 8 hr avg - 2 mg/m^3

The results are well within the prescribed standards.

III. Ambient Air Quality Monitoring results of NABL Accredited laboratory								
Month	AQ-1				AQ-2			
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	PM_{10}	$PM_{2.5}$	SO_2	NO_2
Oct-21	52.4	24.2	6.1	16	49.2	20.3	6	15.8
Nov-21	41.4	19	5.5	13.1	41	18.6	5.3	13
Dec-21	49.7	22.3	5.9	19.3	49.7	20.8	6	15.2
Jan-22	52.9	22.3	6.1	16.6	50.3	19.3	6	15.9
Feb-22	53.3	22.1	6.2	16.4	45.3	17	6.5	15.8
Mar-22	52.9	23.9	6.6	16.4	45.1	17.9	5.7	15.7
Month	AQ-3				AQ-4			
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	PM_{10}	$PM_{2.5}$	SO_2	NO_2
Oct-21	47.9	20.3	5.7	15.3	45.1	17.9	5.7	15.7
Nov-21	34.8	14.2	4.9	12.9	40.8	19.2	4.9	12.7
Dec-21	43.3	16.4	5.5	14.6	52	16.4	5.9	15.3
Jan-22	49.8	22.3	6.2	16.2	54.6	22.3	6.6	16.5
Feb-22	45.1	18.8	6.3	15.7	55.6	18.8	6.7	16.3
Mar-22	49.2	20.4	6	15.7	51.3	20.4	5.8	16.2
Month	AQ-5				AQ-6			
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	PM_{10}	$PM_{2.5}$	SO_2	NO_2
Oct-21	52.9	23.9	6.5	16.3	51.3	21	5.7	16.2
Nov-21	39.6	18.4	5	12.6	39.4	16.9	4.9	12.8
Dec-21	44.4	16.4	5.7	14.6	50.6	21	5.9	15.1
Jan-22	52.4	23.9	6.4	16.4	50.8	22	6.3	16.2
Feb-22	52	22.4	6.4	16.7	54.4	24.1	6.5	16.3
Mar-22	47.7	20.1	5.7	15.3	53.3	23.9	6.6	16.3
Month	AQ-7				AQ-8			
	PM_{10}	$PM_{2.5}$	SO_2	NO_2	PM_{10}	$PM_{2.5}$	SO_2	NO_2
Oct-21	53.3	23.9	6.6	16.3	51	21	5.7	16.1
Nov-21	33.4	13.4	4.1	12.9	37.2	16.1	4.5	13.6
Dec-21	48.8	20.1	5.9	14.9	50	20.8	6.1	15.5
Jan-22	50.1	21.4	6.3	16.2	53.4	23.4	6.6	16.2
Feb-22	51.9	21.6	6.7	15.8	52.9	25.3	6.9	16
Mar-22	51.3	21	5.7	16.1	52.4	24.2	6.2	16

Tolerance limit: PM10: 100 µg/m^3, PM2.5: 60 µg/m^3, NO_2: 80 µg/m3, SO_2: 80 µg/m^3

AQ1- Udayanur, AQ2-Temple Gate, AQ3-Township STP, AQ4- Kuttapattipudur

AQ5- Parry Nagar, AQ6- Guest House, AQ7- Pottaneri, AQ8- Pump House

IV. Analysis of Ambient Air Quality Monitoring results

PM_{10} in µg/m^3								
Location	**AQ-1**	**AQ-2**	**AQ-3**	**AQ-4**	**AQ-5**	**AQ-6**	**AQ-7**	**AQ-8**
Minimum	41.40	41.00	34.80	40.80	39.60	39.40	33.40	37.20
Maximum	52.40	49.70	49.80	55.60	52.90	51.30	53.30	53.40
Average	47.83	46.63	45.02	49.90	45.63	47.10	48.13	49.48
Standard deviation	5.73	4.89	5.59	5.78	6.74	6.68	7.38	6.15
98th Percentile	52.29	49.68	49.74	55.50	52.56	51.27	53.16	53.35

$PM_{2.5}$ in µg/m^3								
Location	**AQ1**	**AQ-2**	**AQ-3**	**AQ-4**	**AQ-5**	**AQ-6**	**AQ-7**	**AQ-8**
Minimum	19.00	18.60	14.20	16.40	16.40	16.90	13.40	16.10
Maximum	24.20	20.80	22.30	22.30	23.90	21.00	23.90	25.30
Average	21.83	19.90	18.73	19.17	19.57	19.63	20.23	21.80
Standard deviation	2.63	1.15	2.96	2.04	3.88	2.37	3.58	3.31
98th Percentile	24.12	20.78	22.11	22.11	23.68	21.00	23.67	25.19

SO_2 in µg/m^3								
Location	**AQ-1**	**AQ-2**	**AQ-3**	**AQ-4**	**AQ-5**	**AQ-6**	**AQ-7**	**AQ-8**
Minimum	5.50	5.30	4.90	4.90	5.00	4.90	4.10	4.50
Maximum	6.10	6.00	6.30	6.70	6.50	5.90	6.70	6.90
Average	5.83	5.77	5.77	5.93	5.73	5.50	5.88	6.00
Standard deviation	0.31	0.40	0.52	0.66	0.75	0.53	0.96	0.84
98th Percentile	6.09	6.00	6.29	6.69	6.47	5.89	6.69	6.87

NO_2 in µg/m^3								
Location	AQ-1	AQ-2	AQ-3	AQ-4	AQ-5	AQ-6	AQ-7	AQ-8
Minimum	13.10	13.00	12.90	12.70	12.60	12.80	12.90	13.60
Maximum	19.30	15.80	16.20	16.50	16.30	16.20	16.30	16.20
Average	16.13	14.67	15.07	15.45	14.50	14.70	15.37	15.57
Standard deviation	3.10	1.47	1.19	1.42	1.85	1.73	1.31	0.99
98th Percentile	19.17	15.78	16.15	16.48	16.23	16.16	16.29	16.19

Tolerance limit: PM10: 100 µg/m^3, PM2.5: 60 µg/m^3, NO_2: 80 µg/m3, SO_2: 80 µg/m^3
AQ1- Udayanur, AQ2-Temple Gate, AQ3-Township STP, AQ4- Kuttapattipudur
AQ5- Parry Nagar, AQ6- Guest House, AQ7- Pottaneri, AQ8- Pump House

The results are within the norms prescribed by CPCB.

Annexure –D

Online effluent monitoring report and effluent & ground water quality manual monitoring report of TNPCB & NABL accredited laboratory

Annexure -D

Online effluent monitoring report and effluent & ground water quality manual monitoring report of NABL accredited laboratory

I.Online effluent monitoring report

S.No	Description	UoM	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
1	Effluent Inlet flow	m^3	65641	43373	56189	61365	69716	85734
2	Treated effluent water reuse in process	m^3	60103	44549	51953	60973	65649	91838
3	ETP outlet discharge flow	m^3	0	0	0	0	0	0

Note; Consented Trade effluent generation 2960 KLD

II.Treated trade effluent of Steel by NABL Accredited laboratory

S.No	Parameter	Unit	TNPCB Tolerance Limit	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
1	pH @ 25°C	--	5.5 - 9.0	7.25	7.18	7.09	7.28	7.52	7.38
2	Temperature	°C	Shall not exceed 5 °C above the receiving water temperature	28	27	29	28	29	30
3	Particle size of suspended solids	--	pass 850 u I.S Sieve	passes through 850 u I.S Sieve	passes through 850 u I.S Sieve	passes through 850 u I.S Sieve	passes through 850 u I.S Sieve	passes through 850 u I.S Sieve	passes through 850 u I.S Sieve
4	Total Dissolved solids (Inorganic)	mg/l	2100	726	642	696	512	524	710
5	Total Suspended solids	mg/l	100	9	8	9	8	6	9
6	Chloride as Cl	mg/l	1000	168	140	168	96	102	154
7	Sulphate as SO_4	mg/l	1000	52	47	50	21	29	47
8	BOD @ 27°C for 3 Days	mg/l	30	7	6	7	8	9	8
9	Oil & Grease	mg/l	10 (DL: 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)
10	COD	mg/l	250	42	34	40	52	70	40
11	Arsenic as As	mg/l	0.2 (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)
12	Mercury as Hg	mg/l	0.01 (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)
13	Lead as Pb	mg/l	0.1 (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
14	Zinc as Zn	mg/l	1.0 (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)
15	Copper as Cu	mg/l	3.0 (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
16	Cadmium as Cd	mg/l	2.0 (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)	BDL (DL : 0.005)
17	Nickel as Ni	mg/l	3.0 (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
18	Cyanide as CN	mg/l	0.2 (DL : 0.01)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
19	Phenolic compounds as C_6H_5OH	mg/l	1.0 (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
20	Percent Sodium	%	--	36	34	36	34	36	35
21	Residual Sodium Carbonate	mg/l	--	NIL	NIL	NIL	NIL	NIL	NIL
22	Sulphide as S	mg/l	2.0 (DL : 0.5)	BDL (DL : 0.5)	BDL (DL : 0.5)	BDL (DL : 0.5)	BDL (DL : 0.5)	BDL (DL : 0.5)	BDL (DL : 0.5)
23	Boron as B	mg/l	2.0 (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
24	Total Chromium as Cr	mg/l	2.0 (DL : 0.03)	BDL (DL : 0.03)	BDL (DL : 0.03)	BDL (DL : 0.03)	BDL (DL : 0.03)	BDL (DL : 0.03)	BDL (DL : 0.03)
25	Hexavalent Chromium (Cr^{6+})	mg/l	0.1 (DL : 0.03)	BDL (DL : 0.03)	BDL (DL : 0.03)	BDL (DL : 0.03)	BDL (DL : 0.03)	BDL (DL : 0.03)	BDL (DL : 0.03)
26	Fluoride as F	mg/l	2.0 (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
27	Dissolved Phosphate as P	mg/l	5.0	1.76	1.41	1.6	1.42	1.39	1.77
28	Total Residual Chlorine	mg/l	1.0 (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
29	Free ammonia as NH_3	mg/l	5.0	0.35	0.31	0.37	0.28	0.3	0.3
30	Ammonical Nitrogen as N	mg/l	50	3.86	3.12	3.74	3.05	2.78	2.96
31	Total kjeldahl Nitrogen as N	mg/l	100	6.38	5.09	6.32	5.89	4.92	5.38

V.Result of analysis of ground water by NABL accredited laboratory

S.No	Parameter	Unit	Permissable Limits as for IS : 10500: 1991 R.2012	Oct-21		Nov-21			Dec-21	
				OPEN WELL /VENKATESAN/ POTTANERI	Govt bore well KARAPAATTI PALLAM	Bore well mr.kaliammal teacher pottaneri	govt bore well parrynagar	open well kuttapati pudur mr. govindraj	Govt bore well moorthipatti	Open well mr.Rajamani / kuttapattipudur
1	$_{P}$H @ 25°C	--	15	7.38	7.49	7.17	7.55	7.12	7.41	7.15
2	Total Suspended solids	mg/l	Unobjectionable	3	3	3	2	2	2	3
3	Total Dissolved solids (Inorganic)	mg/l	Agreeable	1498	1114	1986	1482	2412	1476	1658
4	Chloride as Cl	mg/l	5	142	228	382	296	710	334	252
5	Sulphate as SO_4	--	6.5--8.5	624	102	698	464	784	217	230
6	Oil & Grease	mg/l	1000	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)
7	BOD @ 27°C for 3 Days	mg/l	600	BDL (DL : 2.0)	BDL (DL : 2.0)	BDL (DL : 2.0)	BDL (DL : 2.0)	BDL (DL : 2.0)	BDL (DL : 2.0)	BDL (DL : 2.0)
8	COD	mg/l	200	14	15	12	10	13	10	13
9	Ammonical Nitrogen as N	mg/l	100	1.21	1.56	1.14	1.37	1.72	1.45	1.57
10	Total kjeldahl Nitrogen as N	mg/l	2000	1.86	1.98	1.7	1.89	2.05	1.98	2.01
11	Fluoride as F	mg/l	400	1.478	1.38	1.3	1.17	1.57	1.26	1.04
12	Phenolic compounds as C_6H_5OH	mg/l	1.50	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)
13	Percent Sodium	%	0.3	32	38	34	36	38	39	40
14	Cyanide as CN	mg/l	0.3	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)
15	Free ammonia as NH_3	mg/l	45	0.35	0.4	0.35	0.37	0.32	0.27	0.31
16	Boron as B	mg/l	1.5	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
17	Hexavalent Chromium (Cr^{6+})	mg/l	0.002	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)
18	Free Residul Chlorine	mg/l	0.001	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
19	Residual Sodium Carbonate	mg/l	0.0	1.37	1.28	1.37	1.34	1.41	1.12	1.25
20	Total Chromium as Cr	mg/l	0.01	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
21	Copper as Cu	mg/l	0.05	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)
22	Zinc as Zn	mg/l	0.05	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)
23	Lead as Pb	mg/l	0.01	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
24	Nickel as Ni	mg/l	15.0	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
25	Temperature	C	0.05	28	28	27	27	27	29	29
26	Particle size of suspended solids	--	1.0	shall pass 850	shall pass 850	shall pass 850	shall pass 850	shall pass 850	shall pass 850	shall pass 850
27	Arsenic as As	mg/l	600.0	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
28	Mercury as Hg	mg/l	0.20	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)
29	Selenium as Se	mg/l	1.0	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
30	phosphate as PO4	mg/l	0.5	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
31	Sulphide as S	mg/l	0.0	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)
32	Pesticides	mg/l	0.1	Nil	Nil	Nil	Nil	Nil	Nil	Nil
33	Cadmium as Cd	mg/l	0.003	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)
34	Feacal Coliform MPN/100ml	--	Absence	Absence	Absence	Absence	Absence	Absence	Absence	Absence
35	Total Hardness as CaCO3	mg/l	600.00	651	516	1010	796	1182	575	818
36	Total Alkalinity as CaCO3	mg/l	200	218	232	235	265	305	200	294
37	Turbudity	NTU	5	1.4	1.3	0.9	0.7	1	1	1.5
38	Total iron as Fe	mg/l		0.09	0.1	0.07	0.09	0.11	0.06	0.08
39	Barium as Ba	mg/l	--	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
40	Sodium Adsorption Ratio (vmillimole/L			1.3	2.6	1.42	1.98	1.86	3.86	4.37

S.No	Parameter	Unit	Permissable Limits as for IS : 10500: 1991 R.2012	Jan-22		Feb-22		Mar-22	
				open well mr. vellaiyan moorthipatti	Govt hand pump Eravati	Govt bore well /Kavadanur	Open well mr.Balan/pudur,panankadu	OPEN WELL /VENKATESAN/ POTTANERI	Govt bore well KARAPAATTI PALLAM
1	pH @ 25°C	--	15	7.65	7.48	7.52	7.31	7.35	7.55
2	Total Suspended solids	mg/l	Unobjectionable	2	2	4	3	3	2
3	Total Dissolved solids (Inorganic)	mg/l	Agreeable	1380	3714	1824	2386	1402	1088
4	Chloride as Cl	mg/l	5	326.0	1121.0	474.0	632.0	136.0	210.0
5	Sulphate as SO_4	--	6.5--8.5	178	1105	185	252	588	92
6	Oil & Grease	mg/l	1000	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)	BDL (DL : 1.0)
7	BOD @ 27°C for 3 Days	mg/l	600	BDL (DL : 2.0)	BDL (DL : 2.0)	BDL (DL : 2.0)	BDL (DL : 2.0)	BDL (DL : 2.0)	BDL (DL : 2.0)
8	COD	mg/l	200	12	17	10	11	13	12
9	Ammonical Nitrogen as N	mg/l	100	2.1	2.9	2.0	2.2	1.3	1.7
10	Total kjeldahl Nitrogen as N	mg/l	2000	2.8	3.8	2.1	3.3	1.8	2.1
11	Fluoride as F	mg/l	400	1.9	1.8	1.6	1.9	1.4	1.5
12	Phenolic compounds as C_6H_5OH	mg/l	1.50	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)
13	Percent Sodium	%	0.3	40	37	42	45	34	37
14	Cyanide as CN	mg/l	0.3	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)
15	Free ammonia as NH_3	mg/l	45	0.25	0.29	0.28	0.25	0.37	0.43
16	Boron as B	mg/l	1.5	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
17	Hexavalent Chromium (Cr^{6+})	mg/l	0.002	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)
18	Free Residul Chlorine	mg/l	0.001	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
19	Residual Sodium Carbonate	mg/l	0.0	0.91	1.07	1.44	1.4	1.4	1.28
20	Total Chromium as Cr	mg/l	0.01	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
21	Copper as Cu	mg/l	0.05	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)
22	Zinc as Zn	mg/l	0.05	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)
23	Lead as Pb	mg/l	0.01	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
24	Nickel as Ni	mg/l	15.0	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
25	Temperature	C	0.05	28	28	29	28	30	30
26	Particle size of suspended solids	--	1.0	shall pass 850	shall pass 850	shall pass 850	shall pass 850	shall pass 850	shall pass 850
27	Arsenic as As	mg/l	600.0	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
28	Mercury as Hg	mg/l	0.20	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)
29	Selenium as Se	mg/l	1.0	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
30	phosphate as PO4	mg/l	0.5	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)	BDL (DL : 0.01)
31	Sulphide as S	mg/l	0.0	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)	BDL (DL : 0.05)
32	Pesticides	mg/l	0.1	Nil	Nil	Nil	Nil	Nil	Nil
33	Cadmium as Cd	mg/l	0.003	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)	BDL (DL : 0.001)
34	Feacal Coliform MPN/100ml	--	Absence	Absence	Absence	Absence	Absence	Absence	Absence
35	Total Hardness as CaCO3	mg/l	600.00	558	1810	691	1062	628	482
36	Total Alkalinity as CaCO3	mg/l	200	245	252	510	446	196	210
37	Turbudity	NTU	5	1.2	1.8	1.7	1.5	1.5	1.2
38	Total iron as Fe	mg/l		0.08	0.06	0.09	0.07	0.13	0.09
39	Barium as Ba	mg/l	--	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)	BDL (DL : 0.1)
40	Sodium Adsorption Ratio (vmillimole/L			3.96	4.42	5.1	4.9	1.8	2.4

VI. Result of analysis of ground water by TNPCB

S.No	Parameter	Unit		Thiru .Venkatesan, Pottaneri	Thiru .Rajamani, Kuttapatti Pudur	Thiru.Govindaraju Kuttapatti Pudur	GOVT. Bore well , Kavundanoor	Tmt.Kaliamma l teacher , Pottaneri	Thiru .Balan, Pudur Panankadu	Jan-22	Feb-22	Mar-22
			Oct-21	Nov-21			Dec-21					
1	Turbidity	NTU	SAMPLE NOT TAKEN	2.9	2	2.2	3.9	3.6	3.5	Sample Not Taken		
2	Colour	ml		<5	<5	<5	<5	<5	<5			
3	Conductivity at 25° C	µmhos/cm		6170	3170	3200	4780	2476	6230			
4	pH at 25° C	Number		7.02	7.24	7.41	7.14	7.34	7.37			
5	TSS at 25° C	mg/L		4	4	4	4	4	4			
6	Total Dissolved Solids at 180° C	mg/L		4132	2144	2056	3148	1604	4164			
7	Chloride as Cl	mg/L		1470	600	480	790	215	1440			
8	Sulphate as SO4	mg/L		612	419	267	462	243	1104			
9	O&G	mg/L		<4	<4	<4	<4	<4	<4			
10	BOD (at 27° C for 3 days	mg/L		<2	2.1	<2	<2	<2	<2			
11	COD	mg/L		16	16	16	16	16	24			
12	Mangnese	mg/L		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
13	Ammonical Nitrogen as NH3 -N	mg/L		1.68	1.12	1.12	1.12	2.24	1.12			
14	Total Kjeldhal Nitrogen	mg/L		3.36	2.24	2.24	2.24	3.36	3.36			
15	Fluoride as F	mg/L		0.35	0.539	0.261	0.594	0.783	0.744			
16	Ph Compounds	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
17	% Sodium	%		23.00	53.00	44.00	42.00	38.00	20.00			
18	Total Hardness as CaCO3	mg/L		2280.00	770.00	830.00	1160.00	670.00	2600.00			
19	Alkalinity as CaCO3	mg/L		412.00	470.00	460.00	550.00	580.00	390.00			
20	Ph. Alkalinity	mg/L		56.00	80.00	60.00	60.00	90.00	80.00			
21	Nitrate Nitrogen as NO3	mg/L		0.74	0.85	0.90	2.29	0.57	2.92			
22	Nitrite Nitrogen as NO2	mg/L		0.19	0.04	0.25	0.49	0.03	0.16			
23	Phosphate as PO4	mg/L		0.15	0.06	0.10	0.23	0.22	0.28			
24	Cyanide	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
25	Calcium as Ca	mg/L		305.00	100.00	76.00	156.00	52.00	196.00			
26	Magnesium as Mg	mg/L		369.00	126.00	155.00	187.00	131.00	513.00			
27	Sodium as Na	mg/L		316.00	401.00	303.00	2399.00	206.00	301.00			
28	Potassium as K	mg/L		26.00	6.00	6.30	32.00	43.00	28.00			
29	Iron Total as Fe	mg/L		0.03	<0.05	<0.05	<0.05	<0.05	<0.05			
30	Free Ammonia	mg/L		0.89	0.60	0.60	0.60	1.19	0.60			
31	Boron	mg/L		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002			
32	Hexavalent Chromium	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
33	Total Residule Chlorine	mg/L		<1	<1	<1	<1	<1	<1			
34	SAR	mg/L		2.80	6.30	4.60	5.10	3.50	2.60			
35	Residule Sodium Carbonate	-		(-)	(-ve)	(-ve)	(-)	(-)	(-)			
36	Total Chromium	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			
37	Copper	mg/L		<0.2	<0.0015	<0.0015	<0.2	<0.2	<0.2			
38	Zinc	mg/L		<0.1	<0.0015	<0.0015	<0.1	<0.1	<0.1			
39	Lead	mg/L		<0.5	<0.015	<0.015	<0.5	<0.5	<0.5			
40	Cadmium	mg/L		<0.1	<0.0008	<0.0008	<0.1	<0.1	<0.1			
41	Nickel	mg/L		<0.2	<0.006	<0.006	<0.2	<0.2	<0.2			

Annexure –E

Treated sewage quality monitoring report of NABL accredited laboratory for the period of

Oct’21 – Mar’22

Annexure -E

Treated sewage quality monitoring report of TNPCB & NABL accredited laboratory for the period of OCT'21 to MAR '22

Result of analysis of treated sewage by TNPCB (Plant STP)

S.No	Parameter	Unit	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
1	pH @ 25°C	Number	SAMPLE NOT TAKEN	6.96	7.11	SAMPLE NOT TAKEN	6.29	6.34
2	TSS at 103°C - 105°C	mg/l		8	4		8	4
3	BOD (at 27°C for 3 days)	mg/l		<2	2.4		5	<2

Result of analysis of treated sewage by TNPCB (Township STP)

S.No	Parameter	Unit	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
1	pH @ 25°C	Number	SAMPLE NO	6.84	7.18	7.04	6.75	6.3
2	TSS at 103°C - 105°C	mg/l		8	4	16	16	8
3	BOD (at 27°C for 3 days)	mg/l		<2	2.6	<2	<2	<2

Result of analysis of treated sewage by NABL accredited laboratory (Plant STP)

S.No	Parameter	Unit	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
1	PH@25 C	--	7.68	6.93	7.14	6.65	7.35	7.41
2	Total suspended solids	mg/l	7.5	4.1	4.9	10	7.8	6.7
3	BOD at 27 C for 3 days	mg/l	9	5.3	6.1	6.6	5.3	8.4
4	COD	mg/l	46	28	32	20	22	45
5	Ammonical Nitrogen as N	mg/l	2.6	1.06	1.25	1.58	1.5	2.17
6	Total Kjeldhal Nitrogen as N	mg/l	3.07	1.78	1.89	2.17	2.14	2.98
7	Sodium Absorption Ratio	vmillimole/L	1.53	1.56	1.41	1.37	1.27	1.46
8	Fecal Coliform	MPN/100ml	65	30	40	37	35	62
9	Total Coliform	MPN/100ml	98	62	76	64	68	*90*

Result of analysis of treated sewage by NABL accredited laboratory (Township STP)

S.No	Parameter	Unit	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22
1	PH@25 C	--	7.41	7.05	7.29	6.74	7.09	7.68
2	Total suspended solids	mg/l	6.7	5.9	6.4	9.6	8.6	7.5
3	BOD at 27 C for 3 days	mg/l	8.4	7.6	8.9	5.4	6	9
4	COD	mg/l	45	31	40	17	25	46
5	Ammonical Nitrogen as N	mg/l	2.17	1.86	1.94	1.96	1.94	2.6
6	Total Kjeldhal Nitrogen as N	mg/l	2.98	2.43	2.75	2.53	2.36	3.07
7	Sodium Absorption Ratio	vmillimole/L	1.46	1.39	1.3	1.44	1.21	1.53
8	Fecal Coliform	MPN/100ml	62	48	58	30	40	65
9	Total Coliform	MPN/100ml	90	75	84	58	72	98

Annexure –F

Ambient & Source Noise level monitoring report of NABL accredited laboratory for the period of

Oct’21 – Mar’22

Annexure -F

Ambient Noise level monitoring report of NABL accredited laboratory for the period of Oct'21 to Mar '22

I. Ambient Noise Monitoring results (Oct'21 to Mar '22)

S.No	Location	Day Time Noise Level in dB(A)									
		Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Maximum	Minimum	Average	STD Deviation
1	Main Gate	69.8	69.1	68.9	69.5	69.1	68.5	69.8	68.5	69.2	0.5
2	Near Guest House	67	66.4	67.4	66.7	67.8	66.1	67.8	66.1	66.9	0.6
3	Near ground Hopper area – BF II	68.2	67.8	68.2	64	66.2	69	69.0	64.0	67.2	1.8
4	Near ASP I & II	68.5	69	69.7	67.2	65.9	67.4	69.7	65.9	68.0	1.4
5	Temple Gate	66.1	65.3	63.4	69.1	67.7	65.3	69.1	63.4	66.2	2.0
6	Near New Reservoir	69	67.9	68.3	69.4	68	66.9	69.4	66.9	68.3	0.9
7	Near RS Gate	67.4	68.5	69.1	68.8	67.3	69.2	69.2	67.3	68.4	0.8
8	Near Raw Water Pump House	65.3	67.1	65.8	69.3	68.4	67.6	69.3	65.3	67.3	1.5
9	Near Railway Quarters	66.9	68	69.5	66.8	65.5	68.1	69.5	65.5	67.5	1.4
10	SE Corner of the Plant	69.2	69.7	69	65.6	68.3	69.8	69.8	65.6	68.6	1.6
11	Near Rail end	67.6	68.6	69.8	68.1	67.6	67	69.8	67.0	68.1	1.0
12	Wagon Tippler Area	68.1	69.3	70.3	69.9	68	68.2	70.3	68.0	69.0	1.0

S.No	Location	Night Time Noise Level in dB(A)									
		Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Maximum	Minimum	Average	STD Deviation
1	Main Gate	61.7	62.9	61.7	58.4	57.9	61.4	62.9	57.9	60.7	2.0
2	Near Guest House	58.5	60.7	58.9	57.8	56.4	60.4	60.7	56.4	58.8	1.6
3	Near ground Hopper area – BF II	60.8	59.4	60.6	57.2	59.2	58.9	60.8	57.2	59.4	1.3
4	Near ASP I & II	59.2	61.6	62.4	59.1	58.5	57.3	62.4	57.3	59.7	1.9
5	Temple Gate	61.4	58.3	56	54.9	55.3	58.2	61.4	54.9	57.4	2.5
6	Near New Reservoir	60.6	61.5	60.8	59.6	54.9	63.5	63.5	54.9	60.2	2.9
7	Near RS Gate	58.9	60.2	62.3	56.5	57	61.8	62.3	56.5	59.5	2.4
8	Near Raw Water Pump House	57.3	59.8	58.1	60.7	59.6	62	62.0	57.3	59.6	1.7
9	Near Railway Quarters	58.2	56.5	58.1	54.3	53.1	61.7	61.7	53.1	57.0	3.1
10	SE Corner of the Plant	63.5	61.1	60.2	53.1	59.9	58.5	63.5	53.1	59.4	3.5
11	Near Rail end	61.8	60.4	62.6	60	60.4	60.8	62.6	60.0	61.0	1.0
12	Wagon Tippler Area	62	63.7	64	57.9	56.7	59.2	64.0	56.7	60.6	3.1

Standard limit for Ambient noise level at Daytime is 75 dB (A), Standard limit for Ambient noise level at Nighttime is 70 dB (A).
The ambient noise level monitoring results are within the CPCB norms.

Annexure –G

Compliance status report for the CREP conditions

Annexure -G

Compliance status report for the conditions prescribed in the Corporate Responsibility for Environmental Protection (CREP) to our plant

S.No	Condition	Compliance status/Action taken
1	**Coke Oven Plant:** To meet the parameters PLD (% leaking doors), PLL (% leaking lids), PLO (% leaking off take) of the notified standards under EPA. To rebuild at least 40% of the coke oven batteries* in next 10 years by December 2012.	Our COP Non-recovery type coke oven and this requirement is not applicable.
2	**Steel Melting Shop** **Fugitive Emission Status** To reduce 30% by March 2004 and 100% by March 2008 (including installation of secondary de-dusting facilities).	SMS comprises of an Energy Optimizing Furnace wherein a "wet scrubbing system" comprising of a Down comer, quench chamber, venturi scrubber and cyclone separator and the cleaned gas sent through a chimney. The secondary steel making unit viz. Ladle Furnace is already equipped with a dry scrubbing system comprising of bag filters, belt conveyors and dust silo. The dust is being collected and reused in the Sinter Plant. Dedicated secondary dedusting systems are installed in EOF & LRF and fugitive emissions are significantly reduced. Dedicated dust monitoirng systems are installed in the respective stacks and the real time parameters are connected with CA,TNPCB
3	**Blast Furnace** - Direct inject of reducing agents in blast furnace.	Pulverized Coal injection system installed and commissioned along with bag filter as an air pollution control measures (bag filter with stack) to reduce emission during direct injection. The rate of pulverised coal injection is increased (to till 150 - 160 kg/THM) and the implementation resulted in reduction of coke consumption in BF which leads to energy saving.
4	**Solid Waste/Hazardous Waste Management** Utilization of Steel Melting Shop (SMS) / Blast Furnace (BF) slag as per the following. • By 2004 – 70% • By 2006 – 80% and • By 2007 – 100% **Hazardous Waste:** - Charge of tar sludge/ETP sludge to coke oven by June 2003. - Inventorization of Hazardous waste as per Hazardous waste (M & H) Rules, 1989 as amended in 2000 and implementation of the rules by December 2003. (Tar sludge, acid sludge, waste lubricating oil and type fuel fall in the category of HZ).	All the Blast Furnace Slag is converted to Granulated slag and sold to cement industries. Flue dust from sinter plant, BF, SMS, sludge from BF & EOF and coke breeze from coke oven plant is re-used in sinter plant. Pellet plant is not installed in our operation. SMS slag is sent for metal recovery system and after crushing reused internal applications & sent cement industries. Refractories are selected to withstand high temperature whose shelf life is longer and generation of used refractories are lesser. The same will be recycled in downstream applications and also sold to customers involved with recycling and the disposal is in environment friendly manner. Our coke oven plant is non-recovery type and hence Tar sludge & ETP sludge is not applicable. The waste oil and other hazardous wastes generated is being disposed to authorized vendors as per the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.
5	**Water Conservation / Water Pollution** - To reduce specific water consumption to 5 m3/ t for long products and 8 m^3/ t for flat products by December 2005.	We are presently manufacturing only long products and our specific water consumption is well within the prescribed limit
6	Installation of continuous stack monitoring	There are 29 nos. of Process stacks. Dust & Gaseous emission monitoring systems are installed as per CTO condition and the real time data of SPM, SO2 & NOx are transmitted to the Care Air Centre of TNPCB and CPCB servers. There are 26 nos. of Non-process stacks. Dust emission monitoring systems are installed as per CTO condition and the real time data of SPM are transmitted to the Care Air Centre of TNPCB and CPCB servers. Apart from the above, TNPCB is conducting bi-annual survey and Manual monitoring is being conducted by a NABL accredited external laboratory on a monthly basis. The monitoring results are well within the permissible limits.

S.No	Condition	Compliance status/Action taken
7	The unit shall operate the existing pollution control equipment efficiently and to keep proper record of run hours, failure time and efficiency with immediate effect. Compliance report in this regard be submitted to TNPCB every three months.	The existing pollution control equipments are being operated efficiently and proper records are maintained for running hours, failure time and efficiency. Any failure leads to APC is resulted exceedance alarm from TNPCB server and justification along with corrective action reports are being submitted to TNPCB on monthly basis.
8	To implement the recommendations of Life Cycle Assessment (LCA) Study sponsored by MoEF by December 2003.	Being Complied.
9	The industry will initiate the steps to adopt the following clean technologies/measures to improve the performance of industry towards production, energy and environment.	
	✔ Energy recovery of top blast furnace (BF) gas.	Our BF gas pressure (plant capacity is 0.683 MTPA only) is not adequate to install TRT.
	✔ Use of tar-free runner linings.	Our coke oven plant is non-recovery type and hence not applicable.
	✔ De-dusting of cast house at tap holes, runners, skimmers ladle and charging points.	The de-dusting system commissioned at BF-I & II cast house covering tap holes, runners, skimmers ladles and charging points.
	✔ Suppression of fugitive emissions using nitrogen gas or other inert gas.	Water sprinkling system, Dry & Wet fog systems and the compressed air are used for suppression of fugitive emissions.
	✔ To study the possibility of slag and fly ash transportation back to the abandoned mines, to fill up the cavities through empty railway wagons while they return back to the mines and its implementation.	Since we are purchasing raw materials from outside sources, it is not applicable.
	✔ Processing of the waste containing flux & ferrous wastes through waste recycling plant.	The waste containing flux & ferrous waste is utilized to the maximum extent possible in the sinter plant. 100 % of waste containing flux and ferrous is utilized in the plant.
	✔ To implement rainwater harvesting.	Four rain water harvesting ponds are provided. Two are in the plant premises and Tow are in township.
	✔ Reduction of green house gases by,	Various initiatives and measures are being taken to reduce the GHG emissions and present level of GHG emission is 2.69 MT of CO2/TCS. Major focus are being given to maximise the waste heat utilisation, Renewable energy and resource conservation.
	• Reduction in power consumption.	To reduce the power consumption VFDs are being installed whereever possible. LED lights are installed to replace the sodium vapor lamps and many Kaizens are implemented to conserve power.
	• Use of by-products gases for power generation.	By product BF gas is being used as fuel in Power Plant for power generation.
	• Promotion of energy optimization technology including energy audit.	All the upcoming projects are wetted to the best energy consumption through selection of equipments. Energy audit is being carried out and implementations are done in phased manner to minimize the energy consumption of GCal.
	• To set targets for resource conservation such as raw material, energy and water consumption to match International Standards.	Raw material, Energy and water consumption targets are being fixed as a key performance indicator and actions are being implemented to match the international standards through Best Available Technology.
	• Up-gradation in the monitoring and analysis facilities for air and water pollutants. Also to impact elaborate training to the manpower so that realistic data is obtained in the environmental monitoring laboratories.	A separate Environment cell is already available and full-fledged lab set up and need based training is being imparted to the monitoring personnels as and when required. Presently the monitoring and analysis being done through M/s Green Chem Solution Pvt. Ltd. Chennai, certified by NABL.
	• To improve over all house keeping.	5S system is being followed to maintain and improve housekeeping throughout the plant. Due to the implementation, saving in area, inventory control, retrieval time period and standardization practices are well improved.

Annexure –H

Copy of advertisement in local newspaper for EC dated. 10.02.2020

Annexure -H

Copy of advertisement in local newspaper for EC dated. 10.02.2020

THE NEW INDIAN EXPRESS TAMIL NADU

05 DHARMAPURI FRIDAY 14.02.2020

NOTICE

We would like to inform you that the Ministry of Environment, Forest and Climate change accorded Environmental Clearance vide letter no. F.No. J-11011/281/2006-IA. II (I) Dated 10.02.2020 for the installation of 0.8 MTPA slag grinding unit and new facilities related to value addition and technological upgradation within the existing 1.3 MTPA capacity Integrated Steel Plant at JSW Steel Limited, Salem. The copy of Environmental Clearance is available at State Pollution Control Board and at MoEF&CC website: http://environmentclearance.nic.in.

This is issued as per the directives of MoEF&CC.

JSW Steel Limited, Salem

வெள்ளிக்கிழமை, 14 பிப்ரவரி 2020 ★★ தினமணி தருமபுரி 3

அறிவிப்பு

தி/வா. ஜே.எஸ். டபுள்யூ ஸ்டீல் லிமிடெட் நிறுவனத்திற்கு 0.8 MTPA ஸ்லாக் அரைக்கும் அலகு நிறுவுதல் மற்றும் மதிப்பு கூட்டல் தொடர்பான புதிய வசதிகள் மற்றும் தொழில்நுட்ப மேம்பாடு வசதிகளை தற்போதுள்ள 1.3 MTPA திறன் ஒருங்கிணைந்த எஃகு ஆலைக்குள் நிறுவ சுற்றுச்சூழல், வனம் மற்றும் பருவநிலை மாற்ற அமைச்சகம் கடித எண். (F.No. J–11011/281/2006–IA. II (I) 10.02.2020 தேதியிட்டது) அனுமதி வழங்கி உள்ளது. மேற்காணும் விபரத்தை தமிழ்நாடு மாசுக்கட்டுப்பாடு வாரியம் மற்றும் இணையத்தளம் http://environmentclearance.nic.in மூலம் தெரிந்து கொள்ளலாம்.

MoEF&CC அறிவுறுத்தலின் பேரில் இந்த அறிவிப்பு வெளியிடப்படுகிறது.

ஜே.எஸ். டபுள்யூ. ஸ்டீல் லிமிடெட், சேலம்

Annexure –I

Copy of acknowledgement of EC copy submission to Heads of local bodies & Panchayats

Annexure -I

Copy of acknowledgement of EC copy submission to Heads of local bodies & Panchayats

JSW Steel Limited

JSW Steel

20th Feb 2020

The District Collector

Salem District

Dear sir,

We enclose herewith the environmental clearance letter dated 10-02-2020 issued by the Environment, Forest and Climate change (Impact Assessment Division), Government of India for the installation of 0.8 MTPA Slag grinding unit and new facilities related to value addition and Technological upgradation within the existing 1.3 MTPA Integrated Steel Plant premises by M/s JSW Steel Limited for your information please .

Thanking you,

Yours Truly,

For JSW Steel Ltd, Salem Works,

Brigadier S .Thakur (Rtd)

AVP (PR, Admin and Security)

Encl : EC for Slag Grinding Unit

ஆட்சித்தலைவர் அலுவலகம் சேலம் 30 MAY 2020

Salem Works
P.O. Pottaneri, Mecheri,
Mettur - Tk, Salem - Dt. Pin : 636 453
Tamilnadu, India.
CIN No L27102MH1994PLC152925
T +91 4298 272000
www.jsw.in

Registered Office
JSW Centre
Bandra Kurla Complex
Bandra East, Mumbai 400 051
T +91 22 4286 1000
F +91 22 4286 3000

JINDAL
O P Jindal Group

JSW Steel Limited
Salem Works : P.O.Pottaneri,
Mecheri, Mettur - Tk,
Salem - Dt. Pin : 636 453
Tamilnadu, India.
CIN No : L27102MH1994PLC152925
GSTIN : 33AAACJ4323N1ZN
Phone : +91 4298 272000
Fax : +91 4298 272272
Website : www.jsw.in

20th Feb 2020

The President

Pottaneri Panchayath

Pottaneri 636453

Dear Madam,

We enclose herewith the environmental clearance letter dated 10-02-2020 issued by the Environment, Forest and Climate change (Impact Assessment Division), Government of India for the installation of 0.8 MTPA Slag grinding unit and new facilities related to value addition and Technological upgradation within the existing 1.3 MTPA Integrated Steel Plant premises by M/s JSW Steel Limited for your information please .

Thanking you,

Yours Truly,

For JSW Steel Ltd, Salem Works,

JSW STEEL LTD. POTTANERI SALEM(DT)

Authorized Signatory,

Copy Received !

தலைவர்
பொட்டனேரி ஊராட்சி,
மேச்சேரி ஒன்றியம்.

Registered Office : JSW Centre
Bandra Kurla Complex,
Bandra (East), Mumbai - 400 051.
Phone : +91 22-4286 1000
Fax : +91 22-4286 3000

JINDAL Part of O.P. Jindal Group

JSW Steel Limited
Salem Works : P.O.Pottaneri,
Mecheri, Mettur - Tk,
Salem - Dt. Pin : 636 453
Tamilnadu, India.
CIN No : L27102MH1994PLC152925
GSTIN : 33AAACJ4323N1ZN

Phone : +91 4298 272000
Fax : +91 4298 272272
Website : www.jsw.in

20th Feb 2020

The President

M Kalipatty Panchayath

M Kalipatty 636453

Dear Sir ,

We enclose herewith the environmental clearance letter dated 10-02-2020 issued by the Environment, Forest and Climate change (Impact Assessment Division), Government of India for the installation of 0.8 MTPA Slag grinding unit and new facilities related to value addition and Technological upgradation within the existing 1.3 MTPA Integrated Steel Plant premises by M/s JSW Steel Limited for your information please.

Thanking you,

Yours Truly,

For JSW Steel Ltd, Salem Works,

JSW STEEL LTD POTTANERI SALEM(DT)

Authorized Signatory,

Received Copy

PANCHAYAT SECRETARY
M.Kalipatty Panchayat
Mecheri Union .

Registered Office : JSW Centre
Bandra Kurla Complex,
Bandra (East), Mumbai - 400 051.

Phone : +91 22-4286 1000
Fax : +91 22-4286 3000

Annexure –J

Report of ESC fund allocation & spent for the period Oct'21 – Mar'22 with cumulative

Annexure -J

ESC - Fund Allocation & Spent (in Crs.)																
S.No	**Description of activities**	**No's**	**Year I (Jul'17 to Dec'17)**		**Year II (Jan'18 to Dec'18)**		**Year III (Jan'19 to Dec'19)**		**Year IV (Jan'20 to Dec'20)**		**Year V (Jan'21 to Sep'21)**		**Year V (Oct'21 to March'22)**		**Total Rs . (in Crs)**	
			Committed	**Spent**	**Committed**	**Spent**	**Committed**	**Spent**	**Committed**	**Spent**	**Committed**	**Spent**	**Committed**	**Spent**	**Committed**	**Spent**
1	Toilets	2000	0.50	0.32	0.75	0.19	0.75	0.04	0.50	0.00	0.25	0.00	0.25	0.00	**3.00**	**0.55**
2	Health center	1	0.25	0.00	0.25	0.00	0.25	0.22	0.25	0.25	0.00	0.06	0.00	0.09	**1.00**	**0.62**
3	Community hall	2	0.00	0.00	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.03	0.00	0.11	**1.00**	**0.14**
4	Hospital	1	0.50	0.00	0.50	0.00	0.50	0.00	0.25	0.25	0.13	0.01	0.13	0.05	**2.00**	**0.31**
5	Modern school New with GYM and Play ground	1	0.00	0.00	0.00	0.00	1.00	0.00	0.50	0.00	0.25	0.00	0.25	0.00	**2.00**	**0.00**
6	Watershed program	1	0.00	0.24	0.25	0.00	0.25	0.21	0.25	0.00	0.13	0.00	0.13	0.03	**1.00**	**0.48**
7	Water body strengthening/ Drinking water bore well drilling		0.00	0.00	0.25	0.20	0.25	0.20	0.25	0.23	0.13	0.00	0.13	0.00	**1.00**	**0.63**
8	Drainage		0.25	0.00	0.25	0.39	0.25	0.10	0.25	0.00	0.00	0.10	0.00	0.05	**1.00**	**0.64**
9	Government school improvement	1	0.00	0.47	0.25	0.34	0.25	0.17	0.25	0.02	0.13	0.00	0.13	0.00	**1.00**	**1.00**
Total			**1.50**	**1.03**	**3.00**	**1.12**	**4.00**	**0.94**	**2.50**	**0.75**	**1.00**	**0.20**	**1.00**	**0.33**	**13.00**	**4.37**

Note:
At present many projects are under progress towards the ESC spent and the committed allocation will be completed as per the timeline

Annexure –K

Details of APC measures provided in Steel & CPPII

Annexure -K

Details of Air Pollution Control measures provided in Steel & CPPII

Stack No	Stack attached to	Stack Type	Air Pollution Control Equipment (APC)
1	Sinter Machine (Sinter Plant I)	Process	ESP with stack
2	Cooling System (Sinter Plant I)	Process	Multicyclone with stack
3	Dedusting System (Sinter Plant I)	Non- Process	Bag Filters with stack
4	Dust Extraction System for RMHS (Sinter Plant I)	Non- Process	Bag Filters with stack
5	Hot Stove (Blast Furnace I)	Process	Stack
6	GCP Flare (Blast Furnace I) -Emergency stack	Non- Process, Standby - Emergency Stack	Venturi Scrubber with stack
7	Stock House Dedusting System (Blast Furnace I)	Non- Process	Bag Filters with stack
8	Dust Extraction System for RMHS (Blast Furnace I)	Non- Process	Bag Filters with stack
9	Cast house dedusting system (Blast Furnace I)	Non- Process	Bag Filters with stack
10	Power Plant Boiler 2 Nos. of 25 TPH each	Process	Common Stack
11	Energy Optimizing Furnace (SMS-I)	Process	Venturi Scrubber with stack
12	Ladle Furnaces (SMS-I)	Process	Bag Filters with stack
13	CCM1- Steam Exhaust system stack (SMS-I)	Process	Stack
14	Energy Optimizing Furnace (SMS-II)	Process	Venturi Scrubber with stack
15	Secondary dedusting system of Energy Optimizing Furnace I & II (Common stack)	Non- Process	Bag Filter with stack
16	Secondary dedusting system of Ladle Refining Furnace I to IV (Common Stack)	Non- Process	Bag Filter with stack
17	Ladle Furnaces 2,3,4 (Common Stack)	Process	Bag Filter with stack
18	Vacuum Degasing Unit (Boiler)	Process	Stack
19	CCM2 - Steam Exhaust system stack (2 Nos)	Process	Stack
20	Cut Fumes Exhaust System	Non Process	Stack
21	Reheating Furnace (Furnace -1 No - 1 Chimney) - BLM	Process	Stack
22	Reheating Furnace (Furnace -1 No - 2 Chimney) - BLM	Non Process (Air)	Stack
23	Coke Quenching Tower (Wet type)	Process	Grit Arrester stack
24	Coke Oven Chimney - I -Emergency stack	Process - Standby - Emergency Stack	Stack
25	Coke Oven Chimney - II -Emergency stack	Process - Standby - Emergency Stack	Stack
26	Coke Oven Chimney - III -Emergency stack	Process - Standby - Emergency Stack	Stack
27	Waste Heat Recovery Boiler - I	Process	Stack
28	Waste Heat Recovery Boiler - II	Process	Stack
29	Waste Heat Recovery Boiler - III	Process	Stack

Stack No	Stack attached to	Stack Type	Air Pollution Control Equipment (APC)
30	Waste Heat Recovery Boiler - IV	Process	Stack
31	Waste Heat Recovery Boiler - V	Process	Stack
32	BF Gas Fired Boiler	Process	Stack
33	Limekiln - Lime Calcining Plant (Not in Operation)	Process	bag filter with Stack
34	Re-heating Furnace (Bar & Rod Mill)	Process	Stack
35	Intermediate Furnace (Bar & Rod Mill)	Process	Not in operation
36	Sinter Machine (Sinter Plant II)	Process	ESP with stack
37	Plant De-dusting and Cooling (Sinter Plant II)	Non- Process	ESP with stack
38	Crushing of fuel and Raw materials (Sinter Plant II)	Non- Process	Bag Filters with stack
39	Hot Stove (Blast Furnace II)	Process	Stack
40	GCP Flare (Blast Furnace II) -Emergency stack	Non- Process, Standby - Emergency Stack	Bag Filters with stack
41	Stock House Dedusting & RMHS (Blast Furnace II)	Non- Process	Bag Filters with stack
42	Cast house dedusting system (Blast Furnace II)	Non- Process	Bag Filters with stack
43	Pulverised Coal Injection (Blast Furnace)	Non- Process	Bag Filters with stack
44	625 KVA (DG set)	Non- Process -Emergency stack	Stack
45	625 KVA (DG set)	Non- Process -Emergency stack	Stack
46	625 KVA (DG set)	Non- Process -Emergency stack	Stack
47	Steam Exhaust System (CCM-3)	Process	Stack
48	1250 KVA (DG set)	Non- Process -Emergency stack	Stack
49	Pickling Plant- Acid Fumes exhaust system stack	Non- Process	Wet scrubber with stack
50	Pickling Plant- Acid - Hot water Generator Stack (HSD based)	Process	Stack
51	Pickling Plant- ARP - Hot water Generator Stack (LPG based)	Process	Stack
52	Pickling Plant- MEE – Thermic fluid Heater Stack (HSD based)	Process	Stack
53	Coal fired Boiler (127 TPH)	Process	ESP with stack
54	Coal crusher house	Non- Process	Bag filters with stack
55	Coal screening section	Non- Process	Bag filters with stack
56	Raw material transfer & discharge point	Non- Process	Bag filters with stack
57	Flyash storage silo	Non- Process	Bag filters with stack
58	Bottom ash storage silo	Non- Process	Bag filters with stack
59	DG set 500 KVA	Non- Process -Emergency stack	Stack

Annexure –L

Details of greenbelt development

Annexure -L

Details of Greenbelt Development

Sl.No.	Period	Quantity
1	1997 - 99	30600
2	1999 - 00	15000
3	2000 - 01	20000
4	2001 - 02	4940
5	2002 - 03	10400
6	2003 - 04	13400
7	2004 - 05	100
8	2005 - 06	1100
9	2006 - 07	200
10	2007 - 08	4395
11	2008 - 09	5120
12	01.04.2009 to 30.06.2009	820
13	01.07.2009 to 31.12.2009	2240
14	01.01.2010 to 30.06.2010	5590
15	01.07.2010 to 31.12.2010	9250
16	01.01.2011 to 30.06.2011	4000
17	01.07.2011 to 31.12.2011	4930
18	01.01.2012 to 30.06.2012	3700
19	01.07.2012 to 31.12.2012	5500
20	01.01.2013 to 30.06.2013	2410
21	01.07.2013 to 31.12.2013	3300
22	01.01.2014 to 30.06.2014	6300
23	01.07.2014 to 31.12.2014	7300
23	01.01.2015 to 31.06.2015	9600
24	01.07.2015 to 31.12.2015	10000
25	01.01.2016 to 30.06.2016	1400
26	01.07.2016 to 31.12.2016	4600
27	01.01.2017 to 30.06.2017	700
28	01.07.2017 to 31.12.2017	3250
29	01.01.2018 to 30.06.2018	3650
30	01.07.2018 to 31.12.2018	11385
31	01.01.2019 to 30.06.2019	4490
32	01.07.2019 to 31.12.2019	5864
33	01.01.2020 to 30.06.2020	5660
34	01.07.2020 to 31.12.2020	14466
35	01.01.2021 to 30.06.2021	4449
36	01.07.2021 to 31.09.2021	5364
37	01.10.2021 to 31.03.2022	6692
Total		**252165**

Annexure –M

Report of CSR activities for the period of

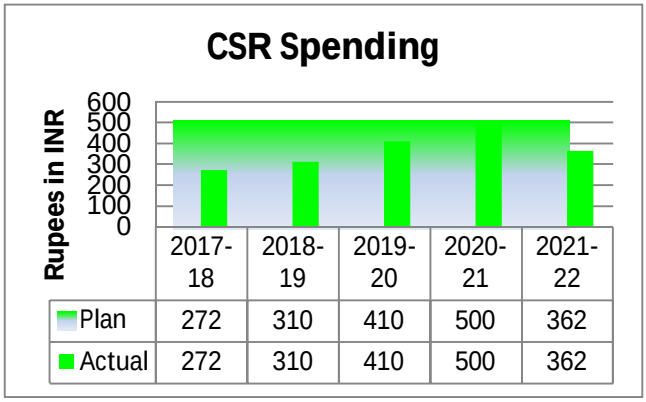
Oct’21 – Mar’22 with cumulative

CSR REPORT FOR THE PERIOD of October 2021to March 2022

Background

JSW is deeply conscious of its vision and responsibilities to the community around the plant. Empowering citizen with better health, education and employment opportunities is JSW's mission.JSWis committed to improve the quality of life of surrounding community through Corporate Social Responsibility (CSR) programmes. We have well laid down community development program under CSR.Our focus is on

- Health
- Education
- Environment
- Women Empowerment
- Sports and
- Rural Infrastructure Development.



People in Pottaneri, M.Kalipatti, Kuttapatti, Viruthasampatti, Gonur Panchayats and Mecheri Town are covered under CSR projects. Our CSR spending for the financial year 2022 is Rs. 3.62 Crores.

LIVELIHOOD – Trained 30 womens

We have trained 30 female candidates and they have gained knowledge of more than 30 Jute products making such as: Shopping bags, fancy handbags, file folders, pencil pouches, purses, mobile pouches and so forth. All the candidates who have attended the training are very new to sewing machines but after completion of the training, they have become experts in handling normal and power machines. And all 30 of them have completed the training successfully. Now the candidates can make the jute products making on their own. We have encouraged to continue their work in jute product making the same they have showed willingness.

WOMEN EMPOWERMENT PROGRAME - BPO

JSW – CSR has initiated BPO with 30 female candidates. We are empowering women to be economically independent. We have recruited candidates from economically weaker section families.

HEALTH – Yoga Education

We aremobilsing 600 people from Pottaneri Panchayat, Savadiyur village. The main objective is to physical, mental & social health of the village by creating awareness through yoga, preventive health care, counseling & environment awareness. Most importantly educating mind and stress management through yoga practice. So far we have touched 600 people irrespective of their age and gender. Also conducted 12 homeobathic heath camps for the benefit of the people.

HEALTH – Eye Camp

In order to prevent vision issues in the surrounding community, we are conducting eye camps and distributing free spectacles based on people vision requirements in surrounding villages. Through this initiative we have targeted 7000 individuals members this year. So far we have screened 5314 individuals and 2720 spectacles have distributed. And 35 village camps were being conducted in 4 panchayats (M.Kalipatti, Pottaneri, Virudhasampatti & Kuttapatti panchayats). People are getting enormous support from this initiatives.

EDUCATION – JSW ASPIRE Program

To improve life skills among young generation. We have initicated life skill training program, through this initiatives targeted 1200 students from 7 government schools within radiation of 5 km. Enhancing the children's life skills, carrier counsiling, problem solving & critical thinking. This initiative is not only targeted schools children but also educating their parents regarding the importance of education. Also established Community Learning Center (CLC) at community level to reach children as well their parents.

RURAL DEVELOPMENT – Rural Mart

JSW Foundation has constructed the "Rural Mart" as part of rural development projects at Pottaner Panchayat (DIZ). There are 3000 households in Pottaneri panchyat also encompasses its cluster villages. This initiative is to avoid inconvenient & small risks to public during the weekly market. Especially targeted women's group to get their daily needs in a comfortable & hygienic place. Also this initiative would give a platform to small scale farmers to sell their products in the weekly market. The worth of this initiative is RS. 1700000/-

COMMUNITY DEVELOPMENT – Haqdarshak Program

The Community development project has initiated on August, 2021. We are supporting to the needy community members in availing the government welfare schemes such as: Citizenship Cards, widow certificate, income certificate, old age pension and so forth. Last two years we have received 19008 applications and availed facilities for the same. The multiple camps are being conducted in every Panchayat to reach out every individual from our DIZ. This year we have reached out 20000 beneficiaries.

ENVIRONMENT - Greening Initiative

Every year JSW is planting 5000 saplings in and around villages to increase green cover and to control air politions.

ENVIRONMENT – Mhavanam Project

We have established the Mhavanam forest in three public locations by following the method of Miyawaki. Miyawaki method to increase green cover in Salem. Developing miyawaki method would contribute significantly to control human pollution and contribute towards the global climate change; JSW-CSR is indented to bring sustainable change in surrounding environment by involving in the development of forest to increase green cover at around plant and Salem. On average, one acre of new forest can sequester about 2.5 tons of carbon annually. In one year, an acre of forest can absorb twice the CO2 produced by the average car's annual mileage.

EDUCATION – Model School Development

We have adopted Amarathanoor Government Middle school to develop as Model School by sponsoring needed supports for the development of school.

EDUCATION – Classroom Renovated at 2 Govt Schools

This year we have renovated 2 government school clasrrom & installed paver block in school ground on request basis from the school head masters.An unused classroom converted into accustomed classrooms for the benefit of rural children. Creating good learning admoshphear to government school children is our primary focus. Through this intervention 295 children are getting benefit by accessing the schools and play grounds.

EDUCATION – Early Intervention center

We have constructed a Early Intervention Center at Nangavalli. For the benefit of special children and constructed woth of Rs.1200000/- building with the facilitiy of child user friendly toilet. Every year 77 children are accessing this center and children's parents and teachers are gleeful with our intervention.

WATER – Installed 2 RO Plants

We have installed 2 RO plants in M.Kalipatti and Virudhasampatti Panchayats worth of Rs.1200000/-. To ensure quality and clean water for community members. Through this initiative we are addressing 3000 households.

ENVIRONMENT SOCIAL COMMITMENT : HALF YEARLY REPORT October 2021 to March 2022

JSW steel Ltd., Salem works is the only Integrated steel plant in Tamil Nadu and presently operating with production capacity of 1.15 MTPA. JSW Steel Limited, Salem works is highly committed to protect the environment with distinctive focus on Triple bottom growth for sustainable development. The organization has always maintained Statutory and Regulatory compliances and believes in maintaining harmony with all the stake holders and contributes to societal support activities like:

- Water shed programmes
- Supplying drinking water
- Sanitation facilities
- Road repair/constructions
- Health camps
- Education activities, etc.

HEALTH – Covid Care Center

Salem district is reporting more number of Covid cases and the district administration is taking all efforts to control the spread and treat every COVID affected patient with utmost care. To tackle the present scenario, we have supported district administration for setting up of permanent 1000 bedded Covid Care Center at Salem District. This intervention is immensely supportive to treat Covid affected patients equally regardless of their economic status. Also this center is helping to mitigate COVID-19 spread.

COMMUNITY SUPPORT - Pongal Sports

We have sponsored to conduct rural sports at Pottaneri village. The Rural Sports conducted to encourage young children to upbring their talents, the rural sports included a number of competitions like Rangoli, Athletics, running race etc., every year during Pongal Festival. We are sponsoringsince 2013, This year have directed to sponsor theprizes.

Advanced Printer and Television Sponsored by JSW

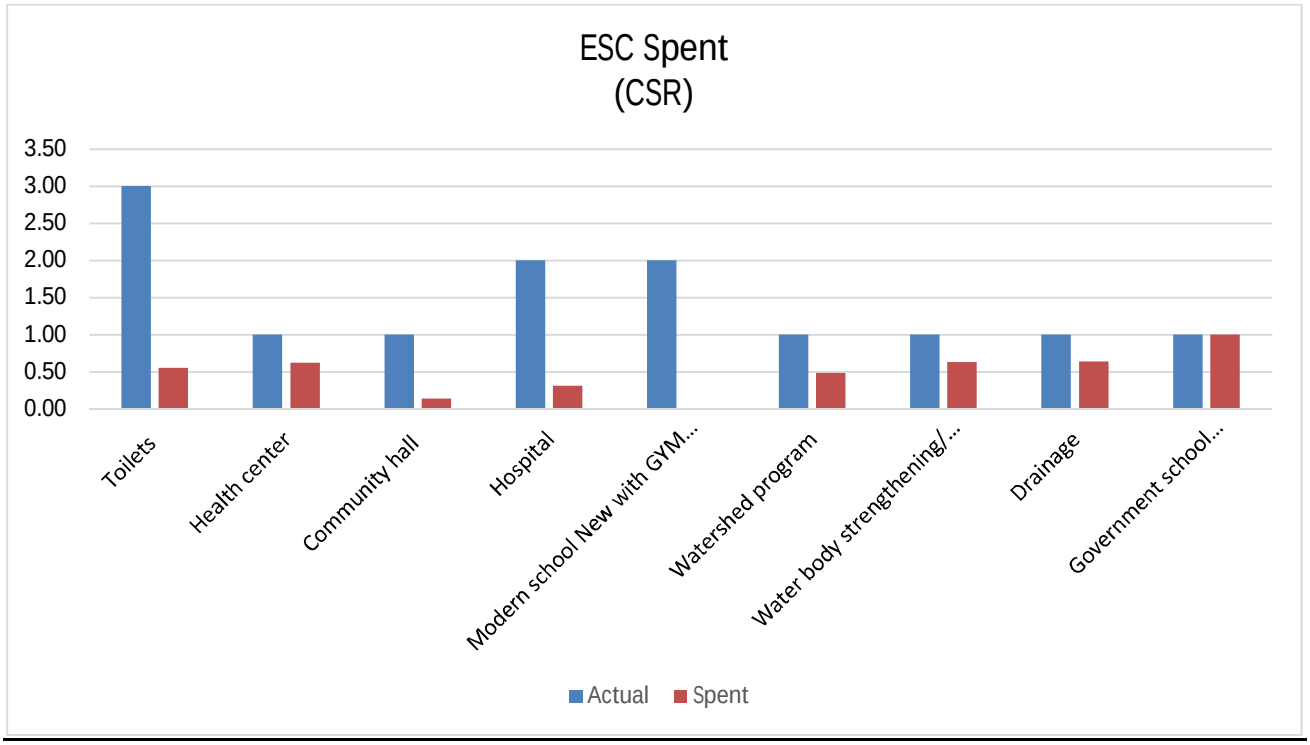
JSW sponsored a advanced printers and TV to Salem District Collector Office worth of Rs. 100000/-

Sponsored Cement/Steel RCC pipe

We have sponsored cement/steel RCC pipe to Pottaneri Panchaya to control the overflow of water during rainy season.

Almera & Chairs Sponsored to Anganwadi & Schools by JSW

JSW sponsored 10 Almeras and 30 Chairs to the surrounding selected Anganwadi centers and Mecheri Girls' School.



Annexure –N

Cost details of capital & recurring cost for pollution control measures for phase –I expansion activities

Annexure -N

Cost details of capital & recurring cost for pollution control measures for phase –I expansion activities

I. Capital cost of pollution control & monitoring measures (From FY18 to 31.03.2022)

ENVIRONMENTAL POLLUTION CONTROL							ENVIRONMENTAL & POLLUTION MONITORING		
Sl.No	**Expansion activity**	**Air pollution Control**	**Water pollution control**	**Solid waste Management**	**Noise Control**	**Occupational Health**	**Envt.Survey and sampling**	**CSR**	**Green belt**
1	COP - Coal storage yard Dust suppression	0.00	0.00	0.00	1.39	0.00	0.00	0.00	0.00
2	COP - Noise control	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Wagon tippler dust suppression systems	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Sinter plant dust suppression systems	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	BF#1 augmentation	0.00	0.00	0.00	0.38	0.00	0.00	0.00	0.00
6	BF#2 augmentation	12.40	0.50	2.00	0.59	0.00	0.00	0.00	0.00
7	Blast furnace dust suppression systems	2.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	EOF #1 capacity 45 to 65 T	3.82	2.09	0.00	0.00	0.00	0.00	0.00	0.00
9	LRF#1 capacity 45 to 65	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	CCM#3	0.79	4.45	0.00	0.00	0.00	0.00	0.00	0.00
11	Blooming Mill augmentation(0.36 to 0.48)	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00
12	BRM augmentation (0.40 to 0.48 MTPA)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Pickling & Annealing plant (0.06 MTPA)	1.61	10.73	0.30	0.00	0.00	0.00	0.00	0.00
14	Peeled and ground (0.04 MTPA)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	CPP-II - Coal storage yard Dust suppression	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16	CPP II - Unit # 3	0.00	18.66	0.00	0.02	0.00	0.00	0.00	0.00
17	Civil (concrete road)	5.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	Utility	1.76	5.66	0.00	0.00	0.00	0.00	0.00	0.00
19	Tyre washing unit	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	Shredder machine	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
21	Biogas plant	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
22	OHC	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00
23	Envt.Survey and sampling	0.00	0.00	0.00	0.00	0.00	4.15	0.00	0.00
24	Plant STP renovation	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00
25	Rain Water Harvesting pond capacity enhancement	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00
26	CSR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50
27	Greenbelt	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60
Total Rs. In Crs		**31.01**	**42.76**	**2.37**	**2.46**	**0.18**	**4.15**	**0.00**	**1.10**
Commitment Rs. In Crs (as per EC)		**30.0**	**1.0**	**10.0**	**2.0**	**3.0**	**5.0**	**0.0**	**0.00**

II. Recurring cost/annum (laks)

ENVIRONMENTAL POLLUTION CONTROL							ENVIRONMENTAL & POLLUTION MONITORING		
Sl.No	**PLANT**	**Air pollution Control**	**Water pollution control**	**Solid waste Mangement**	**Noise Control**	**OHC**	**Environmental survey & Sampling**	**Green belt development**	Total
1	Coke oven plant	10.00	0.60	0.60		5.00			16.20
2	Sinter plant	40.00	0.00	1.50					41.50
3	BF#2	50.00	2.40	2.00					54.40
4	EOF #1	5	96.00	360.00					461.00
5	LRF#1	5.00							5.00
6	CCM#3	5.00							5.00
7	BRM	1.00	0.11	0.09					1.20
8	Blooming Mill	1.00	0.06	0.05					1.11
9	Pickling & Annealing plant	2.00	103.20	0.10					105.30
10	Peeled and ground	0.00	0.00	0.00					0.00
11	CPP II - Unit # 3	0.00	1.20	0.00					1.20
12	Environmental survey & Sampling			0.00			66.00	10.00	76.00
13	Corporate Social Responsibility								0.00
14	Greenbelt development		12.00	0.00					12.00
15	Utility	5.00	30.00	5.00					40.00
16	Civil Projects	4.00	0.00	0.16					4.16
Total Rs. In Crs		**1.28**	**2.46**	**3.70**	**0.00**	**0.05**	**0.66**	**0.10**	**8.24**
Commitment Rs. In Crs (as per EC)		**4.00**	**0.20**	**1.00**	**0.20**	**0.30**	**0.50**		6.20

Annexure –O

Carbon sequestration report – FY21

CARBON SEQUESTRATION STUDY REPORT

March -2022

for

M/s. JSW Steel Ltd,
Salem Works.

Site Location :
Pottaneri P.O.,Mecheri, Mettur Taluk,
Salem District-636 453, Tamil Nadu, India

by

Green Global Safety Systems
43/7b,Senthil Nagar,Chinna Kodungaiyur ,
Chennai -600051, Ph: 91-8248885428
A Lead Environmental Pollution Control and Prevention Consultants.

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PART - A

I. Preface

M/s. JSW Steel Ltd, Salem Works, Pottaneri P.O.,Mecheri, Mettur Taluk, Salem District-636 453, Tamil Nadu, India offered an opportunity to M/s. Green Global Safety Systems, Chennai to conduct the Carbon Sequestration Study to evaluate the Contribution of the trees for carbon Sequestration in their Steel Manufacturing facility. Upon the requirement and the Purchase order issued to us, a Comprehensive study was carried out and the final report is submitted.

Disclaimer

We have performed study on Carbon Sequestration by the Existing Green Belt and the report submitted is not deemed to be any undertaking, warranty or certificate.

Place : Chennai

Date : 09.05.2022

M.MEGANATHAN MIE, DIS, Ph.D Scholar–Safety

ME, Environmental Engineering , Lead Auditor –ISO 14001: 2015 , Accredited Safety Auditor by Govt of Tamilnadu & Kerala Chartered Engineer & International PHA Specialists.

II. Introduction

Carbon sequestration

What is Carbon Sequestration :- Carbon sequestration means capturing carbon dioxide (CO_2) from the atmosphere or capturing anthropogenic (human) CO_2 from large-scale stationary sources like power plants before it is released to the atmosphere. As Per CPCB ,India

Once captured, the CO_2 gas (or the carbon portion of the CO_2) is put into long-term storage. CO_2 sequestration has the potential to significantly reduce the level of carbon that occurs in the atmosphere as CO_2 and to reduce the release of CO_2 to the atmosphere from major stationary human sources, including power plants and refineries. There are two major types of CO_2 sequestration: terrestrial and geologic.

Terrestrial

Terrestrial (or biologic) sequestration means using plants to capture CO_2 from the atmosphere and then storing it as carbon in the stems and roots of the plants as well as in the soil.

Geologic

Geologic sequestration is the method of storage that is generally considered for carbon capture and storage (CCS) projects. CCS is the practice of capturing CO_2 at anthropogenic sources before it is released to the atmosphere and then transporting the CO_2 gas to a site where it can be put into long-term storage. (Pacala & Socolow 2004). The rapid urbanization of cities in India has led to over exploitation of natural resources, exponential increase in pollution, and accumulation of greenhouse gases in the atmosphere.

Carbon emission due to deforestation and use of fossil carbon has brought forests to the center-stage of climate change mitigation strategies. As per MoEF (2014), India has a spatial extent of the urban tree cover on 12,790 Km2 (16.40 %) out of the total urbanized area of 77,997 Km2 as on 2013. The National Forest Policy, 1988 envisions average forest and tree cover of 33 % for the plains and 66.66 % for the hilly areas of the country.

There is an urgent need for the planned development of the urban areas to present the picture of green and clean cities with adequate forest & tree cover, parks, lakes, wetlands, urban biodiversity, nature education centers, etc.

M/s. JSW Steel Ltd,Salem Works, Pottaneri P.O. ,Mecheri, Mettur Taluk, Salem District-636 453, Tamil Nadu, India have organized for the Carbon Sequestration by Plants and conducted by our team of M/s. Green Global Safety Systems, Chennai.

The detailed report of Carbon Sequestration by Plants is presented in this booklet for M/s. JSW Steel Ltd,Salem Works.

III. Study Team Profile

Lead Environmental Expert

1. NAME AND DESIGNATION:

- Name : M.MEGANATHAN. ME.,MIE.,AMIE.,DCT.,DIS.,BOC.,.
- ME –Environmental Engineering
- Designation : Lead Environment Expert
- ISO 14001:2015 Lead Auditor –Enironmental Management Systems
- Expert in Environment Dispersion Modeling –Internationally approved Software

2. RELEVANT QUALIFICATIONS:

- ME-Master of Environmental Engineering
- AMIE in Chemical Engineering
  Diploma in chemical Technology Diploma in Industrial safety
- Accredited safety auditor – Govt of India and Tamilnadu
- Competent person of Boilers – A CLASS
- Trained HAZOP Leader - Certified by China risk management
- Chartered Engineer by Institution Engineers India

3. WORK EXPERIENCE:

- Total Year of Industrial Experience : 23 years of Industrial Exposure in Various disciplines.

  M/S. Madras Chlor-Alkalis Ltd , Chennai.
  M/S. Southern Chlor-Alkali industries ltd, Manali
  M/S. Tamil Nadu petro Products ltd, TIDCO, Manali.
  M/S. Dalmia Cement Bharat Ltd , Trichy
  M/S. GE – Momentive performance materials India pvt Ltd (MNC)
  M/S. Piramal Pharmaceuiticals ,Ennore,Chennai -68.

4. RESPONSIBILITIES INCLUDED:

Environmental Studies, EIA ,Quantitative Risk Analysis as per the EIA Notification Guidance , Conducted Safety audits, Risk assessments, Training on Safe Handling Chlorine system, Construction safety system, Behavior Based Safety system a modern approach etc.
As Process Safety Specialist we have conducted PHA (Process Hazard Analysis) for two project- Plant erected and commissioned and running with full rated capacity.

4.1 PLANT SAFETY:

- Having Experience in water quality Analysis, Air quality, Confined Vessel Entry, Explosive atmosphere, Ventilation in Lab Hoods analytical equipments and techniques
- Experienced in Hydraulic testing of Chlorine cylinders and conducting physical and internal inspection of the cylinders and clearance for filling / Rejection.
- Hydraulic testing of Pipelines after erection and report preparation.
- Experienced in operation and maintenance of Belt conveyors, Screw convey, Bucket elevators ,Pipe conveyors and Pneumatic conveyors
- Working experience in Thermic fluid Heaters of make Thermax Ltd
- Experienced in Hydrogen fired Boiler of make Thermax Ltd.
- Having experience in Solvent separation unit in pharmaceuticals and specialty chemical plants
- Working Experience Operation and maintenance of Centrifugal machines

4.2 ENVIRONMENT SAFETY:

- Activities towards Compliance to the Environmental Statutory Requirements like
  1. Consent Order for Existing / Expansion Projects
  2. Environmental Clearance from MoEF&CC, CPCB, TNPCB.
  3. Environmental Impact Assessment (EIA),
     3.1 It Involves Prefeasibility study
     3.2 Quantitative Environmental Risk assessment
     3.3 Environmental report
     3.4 Socio Economic conditions
     3.5 Air & water quality modeling
     3.5.1 Gaussian Model
     3.5.2 Noise Level reports and mapping
     3.6 Climatic
     3.7 Human Interface study
     3.8 Evaluation of Env Impacts
     3.9 setting an Environment Management Plan
  4. Public Hearing
  5. Participation in MoEF & CC Meetings
  6. Hazardous and Non Hazardous Chemicals Management,
  7. Transportation of hazardous Chlor-Alkali substances
  8. Waste management of Solid, liquid and gaseous materials.
     8.1 Disposal methods of Haz waste and procedures
     8.2 Compliance requirements

5. SPECIFIC TOOLS AND EQUIPMENT USED:

Toolbox Talk, JSA, HAZOP, ENVID, Incident Investigation System, Gas Testing, PTW-Auditing, SCBA, Scaffolding Appreciation, Safe Journey Management, Safe Defensive Driving, Basic Life Support, Fire Warden on Emergency & Evacuation Drills, Fire Extinguisher, Fire Alarm, Fire Hydrant and Automatic Sprinkler system.

6. SPECIFIC STANDARDS USED:

IS 14489, Fact act -1948,Tamilnadu Factories rules 11950 MOEF, CPCB, TNPCB, OSHAs, EPA.,RCRA ,CERCELA, BIS. National Building Code,Tariff Advisory committee Etc..

7. PROCESS SAFETY MANAGEMENT RESPONSIBILITIES:

In charge of HSE Dept / Process Commissioning for Chlor alkali Plant, LPG, Benzene ,octane, heptane, Methanol, Diesel, and Furnace oil loading and unloading areas, Effluent Treatment Plant, Occupational Health & Training center HSE Achievements. Erection and Commissioning of Automatic Sprinkler system to 100 MT Storage of LPG Bullet (2 Nos) and Fire Hydrant System to petro-chemical and chlor alkali plant at given time schedule on Jan 2002.Basic HSE Induction Training to 2000 Manpower.

8. HSE ACHIEVEMENTS:

- Number accident free man days maintained up to 12 years continuously
- 5 star awards
- national safety awards
- consecutive national safety council awards
- British safety council awards
- ISO-9001 certificate
- ISO-14001 :2015 certificate – Lead Auditor
- Working with ISO 45001: 2018
- No of Internal safety audit conducted is approx 200.

9. HSE CERTIFICATES

- Ist Class Boiler Safety –Insp. Of Boilers-India
- HAZOP Leader – China –RISK MANAGEMENT SOLUTIONS
- DGFASLI – Govt of India Trained Safety auditor
- IRCA accredited LEAD AUDITOR FOR ISO 14001 -2004
- Certified Internal Auditor for ISO 9001
- First aid – St john Ambulance – Cent Govt of India

10. EHS SOFTWARE KNOWLEDGE:

- Process Hazard Analysis : HAZOP ,FMEA,FTA,SOP-Leader Software (ABS USA)
- Environmental Risk Assessments – 3MRA Software – EPA (USA)
- Noise mapping – Custics software –Spain
- Quantitative Risk estimation – ALOHA Software (EPA –USA)
- Piping – Pipe flow Expert Software –UK

11. OTHER CERTIFICATES:

- Safety Training Programme –By Insp.Of. Factories-Tamilnadu-India
- First Aider – St John Ambulance –India
- Ms-Office- 2000 – NIIT – India

12. PROFESSIONAL MEMBERSHIPS

- National Safety Council- Member-India
- Safety Engineers Association – Member-Tamilnadu
- Indian institute of Engineers (India)– Associate – Calcutta
- Safety Auditors Association of India -SAAI – Moderator
- Indian safety Engineers(ISE) – Member
- Chartered Engineer – In progress with IEI-India
- Industrial Waste management Association – Member -2010

Study Team Member ---------- 01

- Name : Mr. Vignesh .S - Environmental Specialist
- Designation : Study Team member of Green Global Safety System

Study team member ---------- 02

G.Balasubrmanian- Environment Assistant

Study Team Member ---------- 03

Mr. Prabhakaran p - Environmental Specialist

Study Team Member ---------- - 04

Mr. Gunasekaran.P -Environmental Specialist

IV .Executive Summary

- ✓ As part of comprehensive Carbon Sequestration by green belt Study Report, M/s. JSW Steel Ltd, Salem Works located at, Pottaneri P.O.,Mecheri, Mettur Taluk, Salem District-636 453, Tamil Nadu, India, have the commitment and attitude towards the Pollution Control and Prevention management system.
- ✓ Total Carbon Sequestration by the Green Belt is 4539 MT during FY 2021-22. There is an increase in quantity of carbon Sequestration when compared with FY 2020-21 and there is a considerable Contribution in carbon sequestration by Tree Plantations at JSW, Salem plant. However, scope for improvement in planting trees is existed.
- ✓ Total Carbon dioxide emission by the integrated steel plant operation in the year 2021-22 is about **30,28,872** MT (Steel Production 10,91,580 MT) .
- ✓ Total quantum Carbon Sequestration by the Existing Green Belt in the Year 2021-22 is **4539** MT.
- ✓ Proposed green belt to the FY 2022-23 is 15000 Tree saplings.
- ✓ Organization have been continually striving to control and prevent air pollution by effective implementation of Environmental Management Systems and JSW Salem unit is certified for ISO 14001:2015 standard.
- ✓ Plant have controls over Oxides of nitrogen and sulphur and to a much lesser extent fluorides and chlorides release as they are present in the materials being burnt.
- ✓ Plant have Pollution Prevention system even about 99% of the total fumes and dust generated in steel-making process escape as fugitive emissions whereas slags also lead to release of fumes in the form of iron oxide, kish (graphite), soot and silica.
- ✓ Effective Pollution Control over Coke ovens which are another major source of emissions have been taken care by the organization.

- ✓ Two types of cleaning systems, dry and wet cleaning from hard substances are practiced. In dry cleaning the following control systems are used, viz., inertial dust catchers, cyclones, electro-static precipitators and different types of cloth filters.

- ✓ While in wet cleaning scrubbers, wet cyclones and various kinds of venturis are used. Wet method of gas cleaning is used such production where the cleaning is done from gases containing explosive grade substances.

- ✓ Total Tree plantation as reported by JSW is around 2,52,165 trees since inception till March 2022.

TREES PLANTED DETAILS -Cumulative				
S.No.	**Year**	**Opening (Nos.)**	**Tree planted (Nos.)**	**Cumulative (Nos.)**
1	2004 - 05	94340	100	94440
2	2005 - 06	94440	1100	95540
3	2006 - 07	95540	200	95740
4	2007 - 08	95740	4395	100135
5	2008 - 09	100135	5940	106075
6	2009 - 10	106075	5120	111195
7	2010 -11	111195	14250	125445
8	2011 -12	125445	7535	132980
9	2012 - 13	132980	10120	143100
10	2013 - 14	143100	6645	149745
11	2014-15	149745	19065	168810
12	2015-16	168810	10000	178810
13	2016-17	178810	6050	184860
14	2017-18	184860	5000	189860
15	2018-19	189860	14165	204025
16	2019-20	204025	14830	218855
17	2020-21	218855	18130	236985
18	2021-22	236985	15,180	252165

Criteria for number of trees:

- ✓ Trees having height greater than 4 feet only is considered for sequestration calculation.

Tree Plantation -From April 2021 to March 2022

S NO	Date	Location	Shadow Trees	Types of Trees & Ornamentals
1	2-Apr-21	CEMENT FACTORY AREA	77	Ashoka
2	2-Apr-21	CEMENT FACTORY AREA	35	Casuarina
3	2-Apr-21	CEMENT FACTORY AREA	2	PaThani Tree
4	12-Apr-21	BRM AREA	15	Ashoka
5	13-Apr-21	COKE OVEN AREA	10	Jamun
6	13-Apr-21	COKE OVEN AREA	10	PaThani Tree
7	14-Apr-21	SAFETY OFFICE	10	Casuarina
8	15-Apr-21	SAFETY OFFICE	15	Bamboo
9	17-Apr-21	ENVIRONMENT DEPARTMENT	5	Mango
10	20-Apr-21	BF I AREA	40	Bamboo
11	24-Apr-21	BRM AREA	6	Mango
12	24-Apr-21	BRM AREA	8	Guava
13	24-Apr-21	BRM AREA	6	PaThani Tree
14	24-Apr-21	BRM AREA	6	Pongame oil Tree
15	26-Apr-21	SCARP YARD AREA	15	PaThani Tree
16	26-Apr-21	CEMENT FACTORY AREA	20	Coconut Tree
17	27-Apr-21	SINTER PLANT AREA	20	Bamboo Tree
18	27-Apr-21	SINTER PLANT AREA	20	PaThani Tree
19	27-Apr-21	SINTER PLANT AREA	20	Jamun tree
20	27-Apr-21	SINTER PLANT AREA	3	Gooseberry tree
21	29-Apr-21	BLM COIL AREA ROAD SIDE	37	Bamboo Tree
22	29-Apr-21	BRM AREA	10	PaThani Tree
23	30-Apr-21	PTCL OFFICE ROAD SIDE	50	Bamboo Tree
24	30-Apr-21	PTCL OFFICE ROAD SIDE	70	Sorgam Tree
25	4-May-21	PTCL OFFICE ROAD SIDE	4	Bamboo Tree
26	10-May-21	NEW CANTEEN AREA	12	Pathani, Jamun, Pongam
27	11-May-21	NORTH GATE LORRY PARKING AREA	50	Asoha, Jamun
28	12-May-21	NORTH GATE AREA	30	Jamun
29	14-May-21	NORTH GATE AREA	10	Pathani, Jamun, Fig, Pongam, Mango
30	14-May-21	BF I	30	casuarina
31	18-May-21	Wagon Tipprer	10	Bamboo Tree
32	20-May-21	AUDITORIUM Road SIDE	1	Papaya Tree
33	20-May-21	COIL AREA ROAD SIDE	1	Papaya Tree
34	22-May-21	TIME OFFICE AREA	3	PaThani Tree
35	22-May-21	TIME OFFICE AREA	4	Jamun
36	22-May-21	CEMENT FACTORY AREA	10	Jamun
37	22-May-21	CEMENT FACTORY AREA	10	Mango
38	25-May-21	PTCL OFFICE ROAD SIDE	15	Bamboo Tree
39	25-May-21	PTCL OFFICE ROAD SIDE	25	Jamun
40	25-May-21	PTCL OFFICE ROAD SIDE	12	Mango
41	26-May-21	CEMENT FACTORY AREA	8	Ashoka

42	26-May-21	CEMENT FACTORY AREA	5	Casuarina
43	27-May-21	COMPOUND WALL AREA	28	Bamboo Tree
44	27-May-21	COMPOUND WALL AREA	20	Jamun
45	27-May-21	COMPOUND WALL AREA	20	Tamarind Tree
46	28-May-21	COMPOUND WALL AREA	14	Bamboo Tree
47	28-May-21	COMPOUND WALL AREA	15	Jamun
48	28-May-21	COMPOUND WALL AREA	15	Tamarind Tree
49	29-May-21	COMPOUND WALL AREA	10	Tamarind Tree
50	29-May-21	COMPOUND WALL AREA	10	Jamun
51	29-May-21	AUDITORIUM	1	Palm Tree
52	5-Jun-21	CEMENT FACTORY AREA	12	Mango Tree
53	5-Jun-21	CEMENT FACTORY AREA	10	Jamun Tree
54	5-Jun-21	CEMENT FACTORY AREA	3	Fig Tree
55	5-Jun-21	CEMENT FACTORY AREA	5	Guava tree
56	5-Jun-21	CEMENT FACTORY AREA	3	Papaya Tree
57	5-Jun-21	COKEOVEN AREA	10	Jamun Tree
58	5-Jun-21	NEW LAND AREA NORTH GATE	110	Thaneerkai tree
59	5-Jun-21	NEW LAND AREA NORTH GATE	110	Gooseberry tree
60	5-Jun-21	NEW LAND AREA NORTH GATE	110	Vaagai Tree
61	5-Jun-21	NEW LAND AREA NORTH GATE	110	vagai Tree
62	5-Jun-21	NEW LAND AREA NORTH GATE	110	Neermaruth tree
63	5-Jun-21	NEW LAND AREA NORTH GATE	110	Karumaruth tree
64	5-Jun-21	NEW LAND AREA NORTH GATE	120	Teak Tree
65	5-Jun-21	NEW LAND AREA NORTH GATE	110	Spear Tree
66	5-Jun-21	NEW LAND AREA NORTH GATE	110	Semmaram Tree
67	5-Jun-21	NEW LAND AREA NORTH GATE	120	Mahakani Tree
68	5-Jun-21	NEW LAND AREA NORTH GATE	80	Jamun Tree
69	5-Jun-21	NEW LAND AREA NORTH GATE	80	Almond Tree
70	5-Jun-21	NEW LAND AREA NORTH GATE	87	Sorgam Tree
71	5-Jun-21	NEW LAND AREA NORTH GATE	80	Tamarind Tree
72	5-Jun-21	NEW LAND AREA NORTH GATE	80	Pungam Tree
73	5-Jun-21	NEW LAND AREA NORTH GATE	50	Mango Tree
74	5-Jun-21	NEW LAND AREA NORTH GATE	80	Gulmar Tree
75	7-Jun-21	SCARP YARD AREA	10	Almond Tree
76	7-Jun-21	PTCL OFFICE ROAD SIDE	75	Jamun Tree
77	8-Jun-21	PTCL OFFICE ROAD SIDE	15	Sorgam Tree
78	8-Jun-21	PTCL OFFICE ROAD SIDE	5	Almond Tree
79	8-Jun-21	PTCL OFFICE ROAD SIDE	95	Jamun Tree
80	8-Jun-21	MAIN GATE LORRY PARKING AREA	10	Almond Tree
81	8-Jun-21	MAIN GATE LORRY PARKING AREA	5	Mango Tree
82	8-Jun-21	MAIN GATE LORRY PARKING AREA	5	Jamun Tree
83	10-Jun-21	ADMIN ROAD SIDE	10	Jamun Tree
84	10-Jun-21	ADMIN ROAD SIDE	10	Almond Tree
85	11-Jun-21	RO WATER PLANT AREA	15	Cranberry

86	11-Jun-21	RO WATER PLANT AREA	20	Gooseberry tree
87	12-Jun-21	RO WATER PLANT AREA	2	Jamun Tree
88	14-Jun-21	COKE OVEN AREA	10	Almond Tree
89	14-Jun-21	COKE OVEN AREA	10	Jamun Tree
90	16-Jun-21	CEMENT FACTORY AREA	30	Bamboo Tree
91	17-Jun-21	WAGON TIPPRER ROAD SIDE	4	Papaya Tree
92	17-Jun-21	OLD CANTEEN -	6	Jamun Tree
93	22-Jun-21	CEMENT FACTORY AREA	4	Mango Tree
94	23-Jun-21	CEMENT FACTORY AREA	3	Papaya Tree
95	23-Jun-21	CEMENT FACTORY AREA	4	Guava
96	26-Jun-21	OLD R& D AREA	3	Date Fruit Tree
97	26-Jun-21	OLD R& D AREA	40	Ashoka Tree
98	26-Jun-21	ANNEALING PLANT BACK SIDE	45	Ashoka Tree
99	28-Jun-21	OLD R& D AREA	14	Ashoka Tree
100	30-Jun-21	SINTER PLANT ROAD SIDE	25	Almond Tree
101	30-Jun-21	SINTER PLANT ROAD SIDE	25	Jamun Tree
102	30-Jun-21	SINTER PLANT ROAD SIDE	1	Jack fruit Tree
103	30-Jun-21	BF-1	40	Casuarina
104	2-Jul-21	SCARP YARD AREA	17	Ashoka Tree
105	5-Jul-21	CEMENT FACTORY AREA	5	Coconut Plants
106	5-Jul-21	CEMENT FACTORY AREA	5	Jamun Tree
107	5-Jul-21	CEMENT FACTORY AREA	5	Jack fruit Tree
108	5-Jul-21	NEW LAND AREA NORTH GATE	25	Teak tree
109	5-Jul-21	NEW LAND AREA NORTH GATE	50	Mahogany Tree
110	5-Jul-21	NEW LAND AREA NORTH GATE	25	Karumaruth tree
111	5-Jul-21	NEW LAND AREA NORTH GATE	25	Spear Tree
112	5-Jul-21	NEW LAND AREA NORTH GATE	25	Neermaruth tree
113	5-Jul-21	NEW LAND AREA NORTH GATE	25	Aranelli Tree
114	5-Jul-21	NEW LAND AREA NORTH GATE	25	Semmaram Tree
115	6-Jul-21	TOWN SHIP AREA	75	Pungam Tree
116	6-Jul-21	TOWN SHIP AREA	50	Almond Tree
117	6-Jul-21	TOWN SHIP AREA	30	Jamun Tree
118	6-Jul-21	TOWN SHIP AREA	25	Tamarind Tree
119	6-Jul-21	TOWN SHIP AREA	25	Vaagai Tree
120	6-Jul-21	TOWN SHIP AREA	25	Sorgam Tree
121	7-Jul-21	TOWN SHIP AREA	25	Pungam Tree
122	7-Jul-21	TOWN SHIP AREA	25	Almond Tree
123	7-Jul-21	TOWN SHIP AREA	25	Jamun Tree
124	7-Jul-21	TOWN SHIP AREA	25	Sorgam Tree
125	7-Jul-21	CANTEEN ROAD SIDE	25	Pungam Tree
126	7-Jul-21	CANTEEN ROAD SIDE	35	Almond Tree
127	7-Jul-21	CANTEEN ROAD SIDE	15	Jamun Tree
128	7-Jul-21	CANTEEN ROAD SIDE	25	Sorgam Tree
129	8-Jul-21	CANTEEN ROAD SIDE	20	Almond Tree
130	8-Jul-21	CANTEEN ROAD SIDE	20	Aranelli Tree
131	8-Jul-21	CANTEEN ROAD SIDE	20	Vaagai Tree

132	8-Jul-21	CANTEEN ROAD SIDE	20	Neermaruth tree
133	8-Jul-21	CANTEEN ROAD SIDE	20	Karumaruth tree
134	8-Jul-21	CANTEEN ROAD SIDE	20	Teak tree
135	8-Jul-21	CANTEEN ROAD SIDE	20	Spear Tree
136	8-Jul-21	CANTEEN ROAD SIDE	20	Semmaram Tree
137	8-Jul-21	CANTEEN ROAD SIDE	20	Mahogany Tree
138	8-Jul-21	CANTEEN ROAD SIDE	20	Thoongu Vaagai Tree
139	8-Jul-21	TEMPLE AREA	1	Karumaruth tree
140	8-Jul-21	POWER PLANT -II	50	Ashoka Tree
141	9-Jul-21	ANNEALING PLANT SIDE	7	Jack fruit Tree
142	9-Jul-21	ANNEALING PLANT SIDE	4	Guava Tree
143	9-Jul-21	ANNEALING PLANT SIDE	2	Lemon Tree
144	9-Jul-21	ANNEALING PLANT SIDE	7	Kalakai Tree
145	10-Jul-21	BF II GROUND HOPPER	20	Spear Tree
146	10-Jul-21	BF II GROUND HOPPER	10	Vaagai Tree
147	10-Jul-21	BF II GROUND HOPPER	10	Semmaram Tree
148	10-Jul-21	BF II GROUND HOPPER	10	Mahogany Tree
149	10-Jul-21	BF II GROUND HOPPER	25	Jamun Tree
150	10-Jul-21	BF II GROUND HOPPER	5	Mango Tree
151	10-Jul-21	TOWN SHIP AREA	5	Jack fruit Tree
152	10-Jul-21	TOWN SHIP AREA	5	Mango Tree
153	10-Jul-21	TOWN SHIP AREA	5	Jamun Tree
154	12-Jul-21	TOWN SHIP AREA	20	Jamun Tree
155	12-Jul-21	SRI ENGEENING COMPOUND WALL AREA	4	Bamboo Tree
156	15-Jul-21	MAIN GATE ROAD SIDE	25	Almond Tree
157	15-Jul-21	MAIN GATE ROAD SIDE	25	Pungam Tree
158	15-Jul-21	MAIN GATE ROAD SIDE	25	Jamun Tree
159	15-Jul-21	MAIN GATE ROAD SIDE	25	Sorgam Tree
160	16-Jul-21	MAIN GATE ROAD SIDE	20	Almond Tree
161	16-Jul-21	MAIN GATE ROAD SIDE	20	Sorgam Tree
162	16-Jul-21	MAIN GATE ROAD SIDE	20	Pungam Tree
163	16-Jul-21	MAIN GATE ROAD SIDE	20	Jamun Tree
164	16-Jul-21	MAIN GATE ROAD SIDE	20	Vaagai Tree
165	16-Jul-21	RESERVOYER	10	Neermaruth tree
166	16-Jul-21	RESERVOYER	20	Teak tree
167	16-Jul-21	RESERVOYER	25	Jamun Tree
168	16-Jul-21	RESERVOYER	25	Almond Tree
169	16-Jul-21	RESERVOYER	5	Spear Tree
170	16-Jul-21	RESERVOYER	5	Karumaruth tree
171	16-Jul-21	RESERVOYER	10	Gooseberry tree
172	16-Jul-21	RESERVOYER	15	Thoongu Vaagai Tree
173	16-Jul-21	TEMPLE GATE AREA	2	Guava Tree
174	16-Jul-21	TEMPLE GATE AREA	2	Lemon Tree
175	16-Jul-21	TEMPLE GATE AREA	2	Peepul Tree
176	16-Jul-21	TEMPLE GATE AREA	2	Pungam Tree

177	16-Jul-21	TEMPLE GATE AREA	2	Mahogany Tree
178	16-Jul-21	TEMPLE GATE AREA	6	Jamun Tree
179	16-Jul-21	TEMPLE GATE AREA	2	Jack fruit Tree
180	16-Jul-21	TEMPLE GATE AREA	2	Mango Tree
181	17-Jul-21	TOWN SHIP AREA	20	Jamun Tree
182	17-Jul-21	TOWN SHIP AREA	20	Manual Ponna
183	17-Jul-21	TOWN SHIP AREA	10	Teak tree
184	17-Jul-21	RESERVOYER	10	Teak tree
185	17-Jul-21	RESERVOYER	40	Jamun Tree
186	17-Jul-21	RESERVOYER	30	Manual Ponna
187	17-Jul-21	RESERVOYER	30	Almond Tree
188	17-Jul-21	RESERVOYER	30	Tamarind Tree
189	17-Jul-21	RESERVOYER	10	Mango Tree
190	19-Jul-21	TOWN SHIP AREA	40	Sorgam Tree
191	19-Jul-21	TOWN SHIP AREA	40	Pungam Tree
192	19-Jul-21	TOWN SHIP AREA	40	Jamun Tree
193	19-Jul-21	TOWN SHIP AREA	30	Tamarind Tree
194	19-Jul-21	CPP-II	50	Ashoka Tree
195	19-Jul-21	CPP-II	2	Mango Tree
196	19-Jul-21	CPP-II	3	Guava Tree
197	19-Jul-21	BRM	10	Jamun Tree
198	19-Jul-21	BRM	10	Pungam Tree
199	19-Jul-21	BRM	5	Tamarind Tree
200	19-Jul-21	BRM	5	Sorgam Tree
201	20-Jul-21	TOWN SHIP AREA	25	Sorgam Tree
202	20-Jul-21	TOWN SHIP AREA	25	Jamun Tree
203	20-Jul-21	TOWN SHIP AREA	25	Pungam Tree
204	20-Jul-21	TOWN SHIP AREA	25	Tamarind Tree
205	21-Jul-21	TOWN SHIP AREA	30	Golden shower Tree
206	21-Jul-21	TOWN SHIP AREA	40	Pungam Tree
207	21-Jul-21	TOWN SHIP AREA	40	Sorgam Tree
208	21-Jul-21	TOWN SHIP AREA	40	Jamun Tree
209	22-Jul-21	TOWN SHIP AREA	20	Pungam Tree
210	22-Jul-21	TOWN SHIP AREA	20	Sorgam Tree
211	22-Jul-21	TOWN SHIP AREA	20	Tamarind Tree
212	22-Jul-21	TOWN SHIP AREA	20	Jamun Tree
213	22-Jul-21	TOWN SHIP AREA	20	Guava Tree
214	23-Jul-21	TOWN SHIP STB AREA	2	Papaya Tree
215	23-Jul-21	TOWN SHIP STB AREA	2	Guava Tree
216	23-Jul-21	TOWN SHIP STB AREA	1	Jack fruit Tree
217	23-Jul-21	MAIN GATE ROAD SIDE	3	Teak tree
218	23-Jul-21	CEMENT FACTORY AREA	2	Mango Tree
219	23-Jul-21	CEMENT FACTORY AREA	3	Guava Tree
220	23-Jul-21	MAIN GATE 100 TON WEIGH BRIDGE	2	Palm Tree
221	23-Jul-21	MAIN GATE 100 TON WEIGH	2	Jamun Tree

		BRIDGE		
222	23-Jul-21	MAIN GATE 100 TON WEIGH BRIDGE	2	Almond Tree
223	23-Jul-21	TOWN SHIP AREA	40	Sorgam Tree
224	23-Jul-21	TOWN SHIP AREA	40	Pungam Tree
225	23-Jul-21	TOWN SHIP AREA	20	Jamun Tree
226	26-Jul-21	BB CBD -II POWER PLAND	50	Ashoka Tree
227	26-Jul-21	BB CBD -II POWER PLAND	3	Mango Tree
228	26-Jul-21	MAIN GATE ROAD SIDE	25	Sorgam Tree
229	26-Jul-21	MAIN GATE ROAD SIDE	25	Pungam Tree
230	27-Jul-21	MAIN GATE- NEW LAND	40	Sorgam Tree
231	27-Jul-21	MAIN GATE- NEW LAND	40	Pungam Tree
232	27-Jul-21	MAIN GATE- NEW LAND	40	Jamun Tree
233	27-Jul-21	MAIN GATE- NEW LAND	40	Golden shower Tree
234	27-Jul-21	MAIN GATE- NEW LAND	1	Peepul Tree
235	27-Jul-21	MAIN GATE- NEW LAND	40	Tamarind Tree
236	27-Jul-21	MAIN GATE- NEW LAND	20	Tin Tree
237	28-Jul-21	MAIN GATE ROAD SIDE	10	Tamarind Tree
238	28-Jul-21	MAIN GATE ROAD SIDE	10	Pungam Tree
239	28-Jul-21	MAIN GATE ROAD SIDE	10	Jamun Tree
240	28-Jul-21	MAIN GATE ROAD SIDE	10	Teak tree
241	28-Jul-21	MAIN GATE ROAD SIDE	10	Gooseberry tree
242	28-Jul-21	MAIN GATE ROAD SIDE	10	Mahogany Tree
243	28-Jul-21	MAIN GATE ROAD SIDE	10	Vaagai Tree
244	28-Jul-21	BF II ROAD SIDE	50	Ashoka Tree
245	28-Jul-21	BF II ROAD SIDE	3	Mango Tree
246	29-Jul-21	MAIN GATE	100	Malabar Neem Tree
247	29-Jul-21	MAIN GATE	100	Jamun Tree
248	30-Jul-21	MAIN GATE ROAD SIDE	20	Vaagai Tree
249	30-Jul-21	MAIN GATE ROAD SIDE	20	Spear Tree
250	30-Jul-21	MAIN GATE ROAD SIDE	10	Teak tree
251	30-Jul-21	MAIN GATE ROAD SIDE	10	Jamun Tree
252	30-Jul-21	MAIN GATE ROAD SIDE	10	Pungam Tree
253	30-Jul-21	MAIN GATE ROAD SIDE	5	Gooseberry tree
254	2-Aug-21	NEW LAND AREA NORTH GATE	30	Teak tree
255	2-Aug-21	NEW LAND AREA NORTH GATE	30	Mahogany Tree
256	2-Aug-21	NEW LAND AREA NORTH GATE	30	Semmaram Tree
257	2-Aug-21	NEW LAND AREA NORTH GATE	30	Spear Tree
258	2-Aug-21	NEW LAND AREA NORTH GATE	30	Jamun Tree
259	2-Aug-21	NEW LAND AREA NORTH GATE	30	Vaagai Tree
260	2-Aug-21	NEW LAND AREA NORTH GATE	30	Vaagai Tree
261	2-Aug-21	NEW LAND AREA NORTH GATE	30	Mahu kadambu
262	4-Aug-21	NEW LAND AREA NORTH GATE	30	Teak tree
263	4-Aug-21	NEW LAND AREA NORTH GATE	40	Mahogany Tree
264	4-Aug-21	NEW LAND AREA NORTH GATE	30	Semmaram Tree
265	4-Aug-21	NEW LAND AREA NORTH GATE	30	Mahu kadambu

266	4-Aug-21	NEW LAND AREA NORTH GATE	40	Spear Tree
267	4-Aug-21	NEW LAND AREA NORTH GATE	30	Jamun Tree
268	4-Aug-21	NEW LAND AREA NORTH GATE	40	Vaagai Tree
269	4-Aug-21	NEW LAND AREA NORTH GATE	30	Vaagai Tree
270	4-Aug-21	NEW LAND AREA NORTH GATE	40	Aranelli Tree
271	4-Aug-21	OLD R&D	3	Gooseberry tree
272	5-Aug-21	NEW LAND AREA NORTH GATE	20	Teak tree
273	5-Aug-21	NEW LAND AREA NORTH GATE	20	Mahogany Tree
274	5-Aug-21	NEW LAND AREA NORTH GATE	20	Semmaram Tree
275	5-Aug-21	NEW LAND AREA NORTH GATE	20	Mahu kadambu
276	5-Aug-21	NEW LAND AREA NORTH GATE	20	Spear Tree
277	5-Aug-21	NEW LAND AREA NORTH GATE	20	Jamun Tree
278	5-Aug-21	NEW LAND AREA NORTH GATE	20	Vaagai Tree
279	5-Aug-21	NEW LAND AREA NORTH GATE	10	Vaagai Tree
280	5-Aug-21	COKE OVEN	35	Mahogany Tree
281	5-Aug-21	COKE OVEN	20	Mountain neem tree
282	5-Aug-21	COKE OVEN	20	Jamun Tree
283	5-Aug-21	COKE OVEN	20	Yellow Kadambu
284	5-Aug-21	COKE OVEN	5	Gooseberry tree
285	7-Aug-21	OHC BACK SIDE	12	Jack fruit Tree
286	7-Aug-21	OHC BACK SIDE	18	Mango Tree
287	7-Aug-21	OHC BACK SIDE	15	Jamun Tree
288	7-Aug-21	BF II	34	Rice Nelly Tree
289	7-Aug-21	BF II	6	Stool Nelly Tree
290	7-Aug-21	BF II	10	Mango Tree
291	7-Aug-21	BF II	5	Jack fruit Tree
292	16-Aug-21	MRSS	4	Mango Tree
293	23-Aug-21	NEW LAND AREA NORTH GATE	25	Mahogany Tree
294	23-Aug-21	NEW LAND AREA NORTH GATE	25	Mountain neem tree
295	23-Aug-21	NEW LAND AREA NORTH GATE	25	Jamun Tree
296	23-Aug-21	NEW LAND AREA NORTH GATE	25	Yellow Kadambu
297	23-Aug-21	NEW LAND AREA NORTH GATE	30	Vaagai Tree
298	23-Aug-21	NEW LAND AREA NORTH GATE	20	Teak tree
299	25-Aug-21	COKE OVEN	5	Jamun Tree
300	26-Aug-21	COKE OVEN	5	Jack fruit Tree
301	26-Aug-21	CPP2	5	Seethap fruit Tree
302	26-Aug-21	CPP2	2	Sapota Tree
303	28-Aug-21	ANNEALING PLANT SIDE	10	Plam Tree
304	3-Sep-21	ANNEALING PLANT	20	Teak tree
305	3-Sep-21	ANNEALING PLANT	20	Mountain neem tree
306	3-Sep-21	ANNEALING PLANT	20	Mahogany Tree
307	3-Sep-21	ANNEALING PLANT	20	Karumaruth tree
308	3-Sep-21	ANNEALING PLANT	30	Spear Tree
309	3-Sep-21	ANNEALING PLANT	20	Semmaram Tree
310	3-Sep-21	ANNEALING PLANT	30	Jamun Tree
311	3-Sep-21	ANNEALING PLANT	5	Vaagai Tree

312	4-Sep-21	NEW LAND AREA NORTH GATE	20	Teak tree
313	4-Sep-21	NEW LAND AREA NORTH GATE	20	Mountain neem tree
314	4-Sep-21	NEW LAND AREA NORTH GATE	20	Mahogany Tree
315	4-Sep-21	NEW LAND AREA NORTH GATE	20	Karumaruth tree
316	4-Sep-21	NEW LAND AREA NORTH GATE	20	Spear Tree
317	4-Sep-21	NEW LAND AREA NORTH GATE	20	Semmaram Tree
318	4-Sep-21	NEW LAND AREA NORTH GATE	20	Jamun Tree
319	4-Sep-21	NEW LAND AREA NORTH GATE	10	Vaagai Tree
320	6-Sep-21	CNG COKEOVEN ROAD SIDE	7	Plam Tree
321	8-Sep-21	CNG COKEOVEN ROAD SIDE	3	Plam Tree
322	11-Sep-21	AUDITORIUM	5	Papaya Tree
323	16-Sep-21	ASP	19	Ashoka tree
324	18-Sep-21	POWER PLANT/CPP II	2	Ashoka Tree
325	18-Sep-21	TEMPLE	52	Coconut, Mango, Jack fruit, Amla, Jamun
326	21-Sep-21	NEW LAND AREA NORTH GATE	20	Pungam Tree
327	21-Sep-21	NEW LAND AREA NORTH GATE	20	Mango Tree
328	21-Sep-21	NEW LAND AREA NORTH GATE	20	Jamun Tree
329	21-Sep-21	NEW LAND AREA NORTH GATE	20	Semmaram Tree
330	21-Sep-21	NEW LAND AREA NORTH GATE	20	Teak tree
331	21-Sep-21	NEW LAND AREA NORTH GATE	20	Mountain neem tree
332	21-Sep-21	NEW LAND AREA NORTH GATE	20	Karumaruth tree
333	21-Sep-21	NEW LAND AREA NORTH GATE	30	Vaagai Tree
334	21-Sep-21	NEW LAND AREA NORTH GATE	30	Mahogany Tree
335	21-Sep-21	CO-OPERATIVE THRIFT &CREDIT SOCIETY		Round Aloe Vera
336	22-Sep-21	PTCL OFFICE ROAD SIDE	20	Teak tree
337	22-Sep-21	PTCL OFFICE ROAD SIDE	20	Mountain neem tree
338	22-Sep-21	PTCL OFFICE ROAD SIDE	20	Vaagai Tree
339	22-Sep-21	PTCL OFFICE ROAD SIDE	25	Semmaram Tree
340	22-Sep-21	PTCL OFFICE ROAD SIDE	10	Jamun Tree
341	22-Sep-21	PTCL OFFICE ROAD SIDE	5	Mountain neem tree
342	24-Sep-21	AUDITORIUM Road SIDE	1	Jack fruit Tree
343	24-Sep-21	AUDITORIUM Road SIDE	1	Coconut Plants
344	24-Sep-21	BRM	5	Mango Tree
345	24-Sep-21	BRM	5	Jack fruit Tree
346	24-Sep-21	BRM	5	Pungam Tree
347	25-Sep-21	NEW LAND AREA NORTH GATE	50	Pungam Tree
348	25-Sep-21	NEW LAND AREA NORTH GATE	50	Teak tree
349	25-Sep-21	NEW LAND AREA NORTH GATE	50	Karumaruth tree
350	25-Sep-21	NEW LAND AREA NORTH GATE	50	Mountain neem tree
351	25-Sep-21	NEW LAND AREA NORTH GATE	30	Vaagai Tree
352	25-Sep-21	NEW LAND AREA NORTH GATE	40	Mahogany Tree
353	25-Sep-21	NEW LAND AREA NORTH GATE	30	Mango Tree
354	28-Sep-21	TOWNSHIP	102	Mango Tree, Pongam, JackFruit, Jamun, Tamarind
355	29-Sep-21	TOWNSHIP	145	Pongam, JackFruit, Jamun,

				Tamarind, Mango Tree
356	1-Oct-21	NEW LAND AREA	90	Mango Tree
357	1-Oct-21	NEW LAND AREA	90	JackFruit Tree
358	1-Oct-21	NEW LAND AREA	70	Tamarind Tree
359	1-Oct-21	NEW LAND AREA	70	Pongam Tree
360	1-Oct-21	NANDAVANAM BACK SIDE	2	Jamun Tree
361	1-Oct-21	NANDAVANAM BACK SIDE	2	Mango Tree
362	1-Oct-21	NANDAVANAM BACK SIDE	2	Semmaram Tree
363	1-Oct-21	NANDAVANAM BACK SIDE	1	Sandalwood Tree
364	6-Oct-21	BF II	27	Ashoka Tree
365	6-Oct-21	BF II	7	Stool Nelly Tree
366	9-Oct-21	COKE OVEN AREA	9	Mango Tree
367	9-Oct-21	COKE OVEN AREA	11	JackFruit Tree
368	9-Oct-21	COKE OVEN AREA	13	Pongam Tree
369	9-Oct-21	COKE OVEN AREA	10	Plam Tree
370	12-Oct-21	CEMENT FACTORY	17	Hibicus, Allamanda
371	13-Oct-21	TEMPLE BACK SIDE	215	Thippli, Tulsi
372	13-Oct-21	CIVIL OFFICE BACK SIDE	80	Yellow Flower
373	13-Oct-21	TEMPLE ROAD SIDE	200	Yellow Ribbon
374	13-Oct-21	CEMENT FACTORY	300	Oosi Alove Vera
375	16-Oct-21	CEMENT FACTORY	150	Oosi Alove Vera
376	16-Oct-21	MRSS	80	Yellow Ribbon, Crepe Jasmine, Oleander
377	20-Oct-21	BF II GROUND	11	Ashoka Tree
378	21-Oct-21	SINTER PLANT	5	Mango Tree
379	21-Oct-21	SINTER PLANT	5	JackFruit Tree
380	21-Oct-21	SINTER PLANT	5	Pongam Tree
381	22-Oct-21	NEW LAND AREA	25	Mango Tree
382	22-Oct-21	NEW LAND AREA	25	JackFruit Tree
383	22-Oct-21	NEW LAND AREA	15	Jamun Tree
384	22-Oct-21	NEW LAND AREA	35	Pongam Tree
385	27-Oct-21	PTCL ROAD SIDE	20	Mango Tree
386	27-Oct-21	PTCL ROAD SIDE	20	JackFruit Tree
387	27-Oct-21	PTCL ROAD SIDE	20	Pongam Tree
388	10-Nov-21	TOWNSHIP RESERVOYER AREA	20	Jamun Tree
389	10-Nov-21	TOWNSHIP RESERVOYER AREA	50	Mango Tree
390	10-Nov-21	TOWNSHIP RESERVOYER AREA	50	JackFruit Tree
391	10-Nov-21	TOWNSHIP RESERVOYER AREA	80	Pongam Tree
392	11-Nov-21	ASP ROAD SIDE	20	Mango Tree
393	11-Nov-21	ASP ROAD SIDE	20	JackFruit Tree
394	11-Nov-21	TEMPLE ROAD SIDE	2	Coconut Plants
395	16-Nov-21	NEW CANTEEN AREA	40	Banana, Mango, Jack, Pongai
396	18-Nov-21	NORTH GATE NEW LAND AREA	520	Mango, Jack, Arasan, Pongai, Jamun, Tamarind, Seetha

397	20-Nov-21	NORTH GATE NEW LAND AREA	500	Phyllanthus, Jack, Teak, Terminalia elliptica, Rosewood, Albizia lebbeck,Almond, Neolamarckia cadamba, Karungali, Magankani
398	22-Nov-21	NORTH GATE NEW LAND AREA	150	Mango, Jack, Arasan, Pongai, Jamun, Magankani
399	23-Nov-21	NORTH GATE NEW LAND AREA	150	Mango, Jack, Arasan, Pongai, Jamun, Magankani
400	23-Nov-21	AUDITORIUM	7	Lemon , Papaya Tree
401	23-Nov-21	CPP2	5	JackFruit Tree , Nelly Tree,Mountain neem
402	26-Nov-21	NORTH GATE NEW LAND AREA	150	Nelly, Arasan, Magankani,Spear,Teak ,Almond,Tamarind Tree
403	27-Nov-21	SINTER PLANT	10	JackFruit Tree , Nelly Tree
404	27-Nov-21	JSW ANJANEYAR TEMPLE	5	Jamun Tree
405	27-Nov-21	NANDAVANAM BACKC SIDE	23	Mango, JackFruit, Nelly Tree
406	1-Dec-21	TOWNSHIP	150	Mango, Jack, Arasan, Pongai,Jamun, Mahakani
407	2-Dec-21	TEMPLE GATE	15	Palm Tree
408	3-Dec-21	OLD ADMIN ROAD SIDE	30	Pongai, Nelli,Jamun,Manza Cadamba
409	6-Dec-21	TOWNSHIP & BRM ROAD SIDE	135	Teak, Spear,Jamun,Pongam, Plam Tree
410	17-Dec-21	RO WATER PLANT AREA	10	Ashoka Tree , Yellow Ribbon
411	18-Dec-21	ANNEALING PLANT ROAD SIDE	10	Oosi Aloe Vera ,Plam Tree
412	18-Dec-21	HR Department Back Side	30	Mango, Jamun, Ashoka Tree
413	22-Dec-21	BF-1	10	Teak, Jamun,Pongam,Tree
414	22-Dec-21	SINTER PLANT-II	12	Jamun Tree
415	15-Jan-22	NEW CANTEEN ROAD SIDE	25	Duranda, Yellow Ribbon, Plam Tree
416	21-Jan-22	MAIN GATE COMPOUND WALL AREA	10	Paper Flower, Ashoka Tree
417	25-Jan-22	COKE OVEN AREA	10	Yellow Ribbon,Ashoka Tree
418	14-Feb-22	NORTH GATE NEW LAND AREA	200	Jamun Tree
419	14-Feb-22	PTCL	50	Ashoka Tree
420	14-Feb-22	PTCL	100	Pongam Tree
421	14-Feb-22	PTCL	50	Jamun Tree
422	17-Feb-22	NORTH GATE NEW LAND AREA	100	Jamun Tree
423	17-Feb-22	NORTH GATE NEW LAND AREA	50	Fig Tree
424	17-Feb-22	NORTH GATE NEW LAND AREA	100	Pongam Tree
425	17-Feb-22	NORTH GATE NEW LAND AREA	50	Almond Tree
426	24-Feb-22	ANNEALING PLANT SIDE	6	Coconut Tree
427	24-Feb-22	ANNEALING PLANT SIDE	0	Duranda, Oleander
428	24-Feb-22	MRSS	15	Jamun Tree
429	25-Feb-22	SINTER PLANT ROAD SIDE -II	10	Jamun Tree
430	25-Feb-22	NEW LAND AREA	70	Jamun Tree
431	1-Mar-22	COKE OVEN AREA	10	Jamun Tree

432	1-Mar-22	ANNEALING PLANT SIDE	15	Coconut Tree
433	4-Mar-22	SINTER PLANT ROAD SIDE -II	20	Jamun Tree, Pongam Tree
434	5-Mar-22	TOWNSHIP	150	Pongam Tree
435	5-Mar-22	TOWNSHIP	150	Jamun Tree
436	5-Mar-22	TOWNSHIP	150	Tamarind Tree
437	5-Mar-22	TOWNSHIP	50	Vaagai Tree
438	7-Mar-22	SINTER PLANT-II ROAD SIDE	15	Jamun Tree
439	10-Mar-22	NEW LAND AREA	100	Jamun Tree
440	10-Mar-22	NEW LAND AREA	100	Pongam Tree
441	10-Mar-22	NEW LAND AREA	50	Vaagai Tree
442	10-Mar-22	NEW LAND AREA	50	Spear Tree
443	12-Mar-22	ANNEALING PLANT SIDE	0	Allamnada
444	16-Mar-22	NEW LAND AREA	50	Jamun Tree
445	16-Mar-22	NEW LAND AREA	50	Pongam Tree
446	16-Mar-22	NEW LAND AREA	50	Vaagai Tree
447	17-Mar-22	PTCL	50	Jamun Tree
448	17-Mar-22	PTCL	50	Pongam Tree
449	17-Mar-22	PTCL	50	Vaagai Tree
450	18-Mar-22	WAGON TIPPRER ROAD SIDE	50	Jamun Tree
451	18-Mar-22	WAGON TIPPRER ROAD SIDE	60	Vaagai Tree
452	19-Mar-22	TOWNSHIP	90	Jamun Tree, Pongam Tree
453	24-Mar-22	TOWNSHIP RESERVOVER	250	Pongam ,Almond,Jamun,Mantharai Tree
454	25-Mar-22	NEW LAND AREA	250	Pongam ,Almond,Jamun,Mantharai Tree
455	25-Mar-22	COKE OVEN AREA	50	Pongam ,Almond,Jamun Tree
456	25-Mar-22	SINTER PLANT-II ROAD SIDE	50	Pongam ,Almond,Jamun Tree
457	26-Mar-22	CPP-2	50	Pongam ,Almond,Jamun Tree
		Total	**15180**	

V. Objective of the Carbon Sequestration by Trees

- To evaluate the amount of carbon sequestrated by the green belt in M/s. JSW Steel Ltd, Salem Works located at, Pottaneri P.O.,Mecheri, Mettur Taluk, Salem District-636 453, Tamil Nadu, India.
- To carry out a study on Carbon Sequestration by Trees

VI. Scope of the Study

Carbon dioxide (CO_2) is the prime cause of global warming. The levels of CO_2 in the earth's atmosphere are rising ever since the industrial revolution begun. Even today in India, most of the industries rely heavily on coal as their source of energy. Most of us are still concerned only with acquiring energy, irrespective of methodology involved. CO_2 produced in the form of flue-gases is released without appropriate treatment which is adversely affecting the environment. A range of actions that need to be undertaken includes Carbon Dioxide Capture and Sequestration (CCS) Technology. CCS is a process of separation of CO_2 from Large Point Sources (LPSs), transport to a storage location, followed by long-term isolation from atmosphere. A portion of desired depletion can be achieved by improving energy efficiency owing to technological advancements, and the remainder might be achieved by moving on to renewable energy resources. In India, along with population explosion, there is rise in temperature due to global warming and to cope with the levels of CO_2, we need to see what kind of technological options we have to solve the problem. The paper brings about the study of CCS, its advantages, cost effectiveness and related drawbacks in India.

Capturing CO_2 : CO_2 finds its way into the atmosphere in numerous ways. In India, most of it is emitted by large stationary sources and rest by mobile sources in comparatively smaller quantities. These emissions are mainly from the combustion of fossil fuels, dominantly coal, used for power generation, industrial processes, and the other fossils fuels used in transportation, residential and commercial buildings. CO_2 is also emitted during certain industrial processes like cement manufacture or hydrogen production and during combustion of biomass. The main purpose of capturing is to produce a concentrated stream of CO_2, so that it can be transported to storage sites at high pressures.

The reason for concentrating the CO_2 stream is to make it economically feasible. Transportation of CO_2 in dilute form would make it unrealistic and impractical in context of the required capital. The main application of CCS is at the large stationary sources as capturing CO_2 directly from small and mobile sources has so far proven to be very complicated and expensive too. The capture directly from atmosphere would not be discussed in the paper as the concentration is less in ambient air (around 380 ppm) by a factor of 100 times as compared to flue gases. Minimization of emissions from these large point sources can have a drastic impact towards lowering the CO_2 levels. Capture from industrial process streams

- Post-combustion capture
- Pre-combustion capture
- Oxy-fuel combustion capture

➢ To conduct the Carbon Sequestration by Plants in the M/s. JSW Steel Ltd,Salem Works located at,Pottaneri P.O.,Mecheri, Mettur Taluk, Salem District-636 453, Tamil Nadu, India and the general List of areas in the factory premises are as follows

➢ Boundaries of the plant

➢ Wagon tippler

➢ Water reservoir area

➢ JSW Power Plant

➢ R&D Blocks

➢ Admin Building

➢ Old Gust House Area

➢ Canteen area

➢ Plant units

- Road sides
- Temple Area
- Non Recovery Type Coke Oven Plant
- Sinter Plant
- Blast Furnace
- Steel Making
- Air Separation Plant
- Steel Refining
- Continuous Casting of Billets and Blooms
- Bar and Rod Mill
- Blooming Mill
- QAD
- Captive Power Plant (3 x 30 MW)
- Utilities – Boilers, Water treatment, ETP, STP, Cooling water, Air compressors etc.
- HR and Admin building
- Purchase and Logistics buildings
- Accounts and Finance building
- Occupational Health Center -building

VII. Methodology

The following sequence of the methodology is adopted to conduct the Carbon Sequestration by Plants

The given study is an amalgamation of the literature review, Site visits, qualitative and Quantitative analysis of the data on spatial coverage of the green cover in the study area and its respective carbon sequestration potential. Based on the above findings, the study recommends percentage achievable area under tree cover through appropriate policies, plans.

1.Pre Study

1.1 On the requests from M/s. JSW Steel Ltd,Salem Works located at, Pottaneri P.O.,Mecheri, Mettur Taluk, Salem District-636 453, Tamil Nadu, India., Our Study team sent a questionnaire.

1.2 Study plan was prepared and sent to the client.

2.Site Visit

2.1 Our team conducted a site visit after the opening meeting with the Environmental Department team.

2.2 Opening meeting happened in the presence of EHS Head

2.3 After the Opening meeting, site Study was conducted by our team at Site

2.4 Site Study of Carbon Sequestration by Plants was done as per the scope of work

3.Post Study

3.1 Closing meeting were conducted and inputs were taken for further Analysis and Study by our team. Report sent to the management

- This is the final report presented to M/s. JSW Steel Ltd,Salem Works located at Salem.

Methodology- Comprehensive

The rate of carbon sequestration depends on the growth characteristics of the tree species, the conditions for growth where the tree is planted, and the density of the

tree's wood. It is greatest in the younger stages of tree growth, between 20 to 50 years. Further complicating the issue is the fact that far less research has been done on tropical tree species as compared to temperate tree species.

Nevertheless, we can roughly estimate the amount of CO_2 sequestered in a given tree, and if we divide by the tree's age, get a yearly sequestration rate.

We got this process from two educational websites who had conceived it as a learning activity for their students.

This is the process:

1. Determine the total (green) weight of the tree.
2. Determine the dry weight of the tree.
3. Determine the weight of carbon in the tree.
4. Determine the weight of carbon dioxide sequestered in the tree
5. Determine the weight of CO_2 sequestered in the tree per year

Determine the total (green) weight of the tree

Based on tree species, the algorithm to calculate the weight of a tree is:

W = Above-ground weight of the tree in pounds

D = Diameter of the trunk in inches

H = Height of the tree in feet

For trees with D < 11:

$W = 0.25D^2 H$

For trees with D >= 11:

$W = 0.15 D^2 H$

Depending on the species, the coefficient (e.g. 0.25) could change, and the variables D2 and H could be raised to exponents just above or below 1. However, these two equations could be seen as an "average" of all the species' equations.

The root system weighs about 20% as much as the above-ground weight of the tree. Therefore, to determine the total green weight of the tree, multiply the above-ground weight of the tree by 120%.

Determine the dry weight of the tree

This is based on an extension publication from the University of Nebraska. This publication has a table with average weights for one cord of wood for different temperate tree species. Taking all species in the table into account, the average tree is 80 % dry matter and 20 % moisture. Therefore, to determine the dry weight of the tree, multiply the weight of the tree by 80%.

Determine the weight of carbon in the tree

The average carbon content is generally 50% of the tree's total volume. Therefore, to determine the weight of carbon in the tree, multiply the dry weight of the tree by 50%.

Determine the weight of carbon dioxide sequestered in the tree

CO_2 is composed of one molecule of Carbon and 2 molecules of Oxygen.

The atomic weight of Carbon is 12.001115.

The atomic weight of Oxygen is 15.9994.

The weight of CO_2 is C+2*O=43.999915.

The ratio of CO_2 to C is 43.999915/12.001115=3.6663.

Therefore, to determine the weight of carbon dioxide sequestered in the tree, multiply the weight of carbon in the tree by 3.6663

Determine the weight of CO_2 sequestered in the tree per year

Divide the weight of carbon dioxide sequestered in the tree by the age of the tree.

EXAMPLES

Estimated growth rates and sizes of agroforestry trees were taken from the World Agroforestry Centre's "Agrofores tree Database"

Let's see how much a Calliandra calothyrsus might sequester in a year. A 10-year-old Calliandra would probably grow about 15 feet tall with a trunk about 8 inches in diameter. Therefore:

$W = 0.25D^2 H = 0.25(8)^2(15) = 240$ lbs. green weight above ground.

240 lbs. * 120% = 288 lbs. green weight (roots included)

288 lbs. *80 = 230.4 lbs. dry weight

230.4 lbs. * 50% = 115.2 lbs. carbon

115.2 lbs * 3.6663 = 422.4 lbs. CO_2 sequestered

422.4 lbs / 10 years =42.2 lbs. CO_2 sequestered per year

Or consider a 10-year-old Grevillia robusta, 45 feet tall with a trunk 6 inches in diameter. Using the same calculations as above, the amount of CO_2 sequestered would be 71.3 lbs. per year.

Or a newly-planted Acacia angustissima, 2.5 years old, 15 feet tall with a trunk 3 inches in diameter: 23.8lbs. of CO_2 sequestered per year.

Or an Albizzia lebbek, 15 years old, 30 feet tall, with a 12 inch trunk: 76.0lbs. of CO_2 sequestered per year.

Note : Reference from the below site

This research and methodology is based on research papers, university publications, and other information freely available on the Internet. As we stated before, it is difficult to calculate the amount of carbon dioxide sequestered per tree per year due to the complexity of the variables involved, as well as the lack of research on tropical tree species. If you have any information that could further refine or enhance our calculations, please let us know at info@treesftf.org.

Other methods

Another way to estimate the amount of CO_2 sequestered by a tree in a year is to estimate the amount sequestered in a hectare per year, and divide that amount by the number of trees per hectare. Scanning around on the Internet, it seems that the number of trees per hectare (in agroforestry and/or industrial plantations) ranges from under 500 to over 2,000.According to Myers and Goreau, tropical tree plantations of pine and eucalyptus can sequester an average of 10 tons of carbon per hectare per year. Therefore, the plantation can sequester an average of 20,000 lbs * 3.6663 = 73,326 lbs CO_2/ha/year, or, taking an average of 1,000 trees per hectare, 73.326 lbs CO_2/tree/year.

Of course, we heavily discourage the planting of pine and/or eucalyptus in our agroforestry systems. Our trees may not grow as fast or as straight as eucalyptus, but they are not invasive, and they do not destroy the water table and the soil!

Disclaimer

This research and methodology is based on research papers, university publications, and other information freely available on the Internet. As we stated before, it is difficult to calculate the amount of carbon dioxide sequestered per tree per year due to the complexity of the variables involved, as well as the lack of research on tropical tree species.

VIII. Standards

- As per the CPCB Guidelines, Green belt shall be developed in an area equal to 33% of the plant area with a native tree species in accordance with CPCB guidelines. The greenbelt shall inter alia cover the entire periphery of the plant.
- The project proponent shall prepare GHG emissions for the plant and shall submit the programme for the reduction of the same including carbon sequestration including plantation. The guideline is attached as **Annexure –II** of the report.

IX. Industry Profile

Manufacturing Process

1.0 Introduction

JSW Steel Limited, Salem Works is a continuous process industry. The Production capacity of finished products at present is 1.15 million TPA special alloy steel.

Iron complex consist of 2 nos of Blast Furnaces with the production capacity of 1.05 MTPA,1 no of 2 strand Pig Casting Machines and 2 nos of Sinter Plants with production capacity of 1.235MTPA and Coke Oven Plant of 0.5 MTPA capacity.

Steel Melting shop consisting of 2 nos of Energy Optimizing Furnaces (each 65 T/ladle), 4 nos of Ladle Furnaces (each 65 T/ladle), 2 no of Vacuum Degassing Unit, 2 nos. of 3 strand Continuous Billet Casters, 1 no of 3 strand Continuous Bloom casters. Steel finishing shop consisting of Bar and Rod Mill (BRM) with the capacity of 0.48 MTPA and Blooming Mill capacity of 0.48 MTPA. and wire rod block. BRM has downstream operations of Annealing, pickling and peeled & ground unit. The downstream operations are based on supplier needs.

In addition to the above plants, there are 2 nos of Air Separation Plants, 1 no 7 MW and 3 Nos of 30 MW (97 MW) Captive Power Plants , 1 no Pulverizing Coal Injection Plant, 1 no Lime Calcining Plant and MRSS, utilities are installed as support functions. The main products of the plants are pig iron, steel billets/steel blooms, steel bars rods and coil.

Raw Materials Storage

The raw materials, namely, iron ore, coke, manganese, limestone, dolomite and quartzite will come from different sources such as Bellary-Hospet area, Salem area, Sandur belt of Bellary-Hospet area by rail/road. Some raw materials are imported from Australia and /or china. They will be stacked in the raw material storage yard, transported by conveyor system to the storage bunkers. These materials shall be fed in required proportion for Sinter Making, Iron Making and Steel Making etc.

Wagon tippler

JSW Salem has installed a unique design of Wagon tippler first of its kind in Indian, which has the facility to form empty rake parallel to the loaded rake, with a uniquely designed Traverser which shifts empty wagon from inhaul to outhaul line.

The JSW Wagon tippler is designed by M/s Metso minerals India pvt.ltd. Wagon tippler is designed for handling 140 MT (includes wagon weight) with cycle time of 144 seconds per wagon. The installed capacity can evacuate material up to 1600MT per hour.

Wagon Tippler also has a specially designed side pad with articulated movement by which even the bulged wagons also can be handled.

Non Recovery Type Coke Oven Plant

The Coke Oven Plant will use stamp-charging technique to increase the bulk density of the coal, which will be charged to the oven. This will increase the yield and increase the strength of coke. The Coke Oven operation completely automatic and the process of carbonization of coal being controlled.

Carbonization of coal shall be completed in 65 hrs at temperature range of 1100-1300 C. On completion of the process the coke shall be discharged from the oven into the quenching car which will be quenched in the quenching tower. Subsequently the coke will be cut to the specified size, screened and transferred to Blast Furnace. The fines i.e. coke breeze shall be used in Sinter Plant for Sintering Making. The small amount of solid waste generation from the Coke Oven is being reused in the Sinter Plant. The waste heat of the flue gas will be fully utilized by Waste Heat Recovery Boilers for power generation.

Sinter Plant

The iron ore fines, coke fines, lime stone fines and other raw material fines dusts which cannot be used in the Blast Furnace are processed in the plant at a temperature of about 1200 C, by burning fuel. Sintering is a process of agglomeration of fines by incipient fusion in to porous lumps called Sinter which is an ideal input for Blast Furnace.

The sinter plant is essentially an assembly of pallets with grates moving with the help of sprocket wheel and chain table. The hearth layer passes through an ignition hood where it gets ignited by burning furnace oil/Blast Furnace Gas. Wind boxes are provided below the sinter bed for suction of air to effect uniform burning of sinter bed along the cross section. The suction is maintained by fans. The strand is provided with necessary sealing to prevent air leakage between pallets and the machine.

The hot sinter cakes are broken by a sinter breaker and passed through sinter cooler strand where the hot sinter is subjected to cold air below. This cold sinter is crushed in roll crusher and screened in three stages. The sinter having size less than 5mm is conveyed to the sinter return bin in the stock house of sinter plant. Sinter of size 20-50mm is taken to the stock house of the blast furnace. Sinter of intermediate size of 10-20mm is taken to the sinter machine to serve as a bed layer.

Blast Furnace

In this furnace sintered iron ore, lump iron ore along with fluxes are reduced with metallurgical coke at a temperature of around 1400 C to produce hot metal and slag. The slag gets granulated while tapping. The hot metal tapped is ready for either steel making or making pig iron in a pig casting machine.

The blast is heated up by high-pressure air through hot blast stoves. As the burden descends, the hot gases rise upwards. During the process operation, chemical reactions take place at different levels, specific temperature and gas composition. The reactions are confined mainly to the oxides of iron and carbon wherein deposition begins at 250 C.

The product (hot metal) from the Blast Furnace is then transported to Steel Melting Shop to purification and if any downstream operations down then hot metal will be transferred to pig casting machine. The cold pig iron from the pig casting machine will be sent to the storage yard.

Steel Melting Shop

The Energy Optimizing Furnace (EOF) process is essentially oxygen steel making process in which oxygen is injected into the furnace both above and below the surface of the molten bath.

The oxygen that reacts with the carbon present in the hot metal produces carbon monoxide, which again gets oxidized to carbon dioxide with the liberation of heat by burning with oxygen above the bath. The temperature in the bath will be maintained within 1650 -1700 C. Fuel heating provision is provided in case the bath gets cooled.

The hot metal from Blast Furnace will be transported to EOF in ladle by diesel loco operated hot metal transfer car. The hot metal will be received at the hot metal bay and then poured in the EOF with help of hot metal charging crane.

Processed scrap will be brought from scrap yard to EOF in scrap charging box (15-20 %) and then will be charged to EOF. Other fluxes and additives will be stored in over storage bunkers and will be added in EOF as per the process requirement.

The steel making operation, two other supporting plant facilities will be needed

(I) Lime Calcimining Plant – for providing burnt lime

(II) Air Separation Plant – for providing oxygen to the steel making furnace

Air Separation Plant

An air separation plants have been installed to provide oxygen for steel making furnace. The air separation plants have the provision to produce argon and nitrogen required for steel making/refining operation.

Steel Refining

From EOF, liquid steel will be tapped into steel teeming ladle placed on a self-propelled steel transfer car and the liquid steel in the ladle will be placed on steel vessel for processing in LRF.

Crude steel obtained from EOF will be taken to the Ladle Refining Furnace (LRF) for adjustment of steel chemistry by addition of Ferro-alloys. The LF has been provided with water-cooled hood and electric arc heating devices for the adjustment of steel chemistry in the LRF.

An online argon rinsing stand is provided in the secondary refining aisle and it is envisaged that all the plain C-steels (i.e. re-bars etc.) will be burged in the argon rinsing stand and then moved to the Continuous Casting Machine (CCM) for making billets. In the Ladle Furnace necessary secondary metallurgical treatments will be carried out to

take care of proper temperature and composition of steel required for the casting of different grades of steel as per product-mix. The LF has been equipped with a fume extraction system consisting of ducts bag filters, chain conveyor and silo for necessary de-dusting.

Continuous Casting of Billets and Blooms

The refined steel is brought from Ladle Furnace in steel teeming ladle to continuous casting machine to make steel billets and blooms. The casters are provided with three strand casters with secondary water cooling system, auto-touch cut off unit, bottom bed dummy bar system, cooling bed, tundish, mould, and segment preparation facilities.

Bar and Rod Mill

The billets will be transported to rolling mill billet transfer car/crane to billet storage and conditioning Bay of bar and rod mill. Mild steel billets will be stored and the alloy steel billets will be conditioned (i.e. ground and inspected).

Billets will than be loaded in to billet charging grid of the bar and rod mill. From there, billets will proceed to 2 nos. of 45t/hr. rapid re-heating furnaces. After discharge from the furnace at a temperature of 1200-1300 C, the billets will be descaled in a descaler and will be rolled in a 3-high mill strand. After this, the billets will further rolled in 18-strands of bar mill for production of bars of 13-55mm diameter going to cooling bed and for rods 12-34mm diameter going to garret coilers.

With the help of another 4 strands, rods 5.5 -16 mm diameter will be produced and will be cooled in Eden borne coilers. From cooling bed, the rolled bars will proceed to a cold shear where these will be cut to commercial lengths and then collected for bundling and tying.

From coilers, the rod coils will proceed via flat conveyor and hook conveyor to coil collecting capstan. Finishing facilities like straightening, annealing, bright bar grinding, shot blasting, inspection benches etc. are provided for further treatment of rolled bars.

Blooming Mill

The Reversible Blooming Mill is designed to produce heavy rounds and square in the range of 60 - 180 mm as finished/semi-finished product for re-rolling.

The raw material as input to the mill shall be continuously cast blooms from Steel Melt Shop. The bloom sizes available will be:

i) 250 x 250 mm

ii) 340 x 400 mm

Depending on quality requirement of the customer, appropriate size of bloom shall be selected for each size of the product. The manufacturing process flow sheet is enclosed.

Captive Power Plant (1 x 7 MW and 3 x 30 MW)

The heat energy of the fuel on combustion used to generate super heat steam in the boilers. The steam is made to run the steam turbine, which coupled, to turbo generator. The rotation of the shaft of turbo generator, produces the current in the coil of the generator, which drawn out as energy.

As the whole, CPP have energy converting systems in series; starting with heat energy into electrical energy, as final end product and the CPP is for a total power generation capacity of 90 MW; will have five parallel units, each having 30 MW capacity.

The CPP (3x30 MW) have necessary utilities like Cooling Tower, Power house, Compressor, water treatment and transportation systems, transformer bay etc., as common for both the power generation units.

To generate 90 MW power, steam is getting through one number of AFBC boiler (127 TPH) using coal as fuel, Five numbers of WHRB (45 TPH 2 Nos,31.5 TPH 2 Nos and 25 TPH 1 No) using COP gas (sensible heat) and One number BFG boiler (32 TPH) using BF gas for combustion.

Coal Based boiler

Coal based (AFBC) boiler make use of imported coal for the reasons off low ash and content; If imported coal is not available, happen at times, then the coal is essentially a washed one at the source of mine, namely, beneficiated coal drawn from the mines of JSW, one of the major shareholder of JSW. The beneficiated coal is less in ash and having low sulphur (< 1 %) content.

The major unit operations are:

1. Atmospheric Fluidized Bed Combustion (AFBC) boiler.
2. Coal storage and handling system

The major, specific utility for this coal – based CPP is the coal handling mechanical systems for storage and transportation and closed Mechanical Conveyor systems for coal transfer to prevent fugitive dust emission during coal transfer had been installed.

The Fly ash handling systems are specifically designed for better collection of fly ash from ESP and bottom ash from furnace, to destinations, through dense phase Pneumatic conveying systems. The ash collection point has been provided with closed mechanical transfer system to load the ash in trucks for transportation.

AFBC Boiler

The atmospheric fluidized bed combustion is state of the art Clean-Coal combustion technology for ensuring the complete combustion of the coal.

The AFBC boiler for CPP has the following processes and characteristics

a) It is Bubbling Bed type
b) Gas temperature in the boiler is 820 to 840 deg C
c) Provision is available to project limestone into the furnace to capture sulphur and remove it as a dry by-product.
d) Reduces the level of NOx emission by 90-95 %

Steam generation will be 127 TPH at 88 bar atmospheric pressure and at 520 C of super heat temperature and provided with a tall RCC stack for 80m height with ID fan and Electrostatic Precipitator for emission control. Ash collection systems are provided at the bottom of the ESP facility.

Coke Oven Gas/Blast Furnace gas fired boilers

In gas based system the waste heat from coke oven flue gases (COFG) from the Coke Oven Plant and the excess Blast Furnace Gas (BFG) is utilized for power generation. The non-recovery type of coke ovens are environmentally safe and waste heat recovery from these coke oven is inherently uncertain and is not prevalent. In this project activity 243,277 Nm3/hr of coke oven flue gases generated from coke oven batteries at 1050 deg C is utilized for power generation by sensing/recovering the waste heat through the boilers natural circulation single drum Waste Heat Recovery Boilers having a main stream pressure at 94 kg/cm2. In this Boiler there are three Economizers which help to recover the waste heat from the flue gas which in turn increase the efficiency of Boilers.

Also the Blast Furnace at Steel Plant, having a hot metal production capacity of 1.05 Million TPA will generate 36000 Nm3/hr of BF gas in excess, after in-house consumption. This excess BF gas which otherwise would have been flared will be utilized for power generation by installing a 32TPH single drum Blast furnace gas fired boiler having a main stream pressure at 94 kg/cm2.

The gas is burnt in the furnace of the boiler. The walls of this furnace are water tubes welded to each other. The water circulated through the water wall tubes absorb the heat and converted in to steam. The water – steam mixture goes to the steam drum where the steam is separated. The process of passing through super heater tubes arranged within the furnace leads to the super heating of the steam. This high pressure and high temperature steam is rooted to a steam turbine. The thermal energy is converted in to mechanical energy by expansion of steam (through reduction in its temp & press) in the turbine. This rotational energy is used drive the generator which produces electricity.

The combined steam from WHRB (5 nos.) and BF Gas fired boiler are taken through a main steam line and admitted to Steam turbine for power generation. A steam common header is provided (AFBC and other boilers steam is connected) before entering to steam turbines where is a flexibility to utilize steam to at both turbines invariable with steam generation at any boiler. In view of environmental prospective to minimize fossil fuel consumption power is being generated about 70 % through gas based by maximizing the utilization of COP, BF.

X. Study Team Selection

Our Study team is selected in such way that the competency level in hands on expertise in Carbon Sequestration Study of Iron and steel manufacturing operations and presenting suitable recommendations.

Our team comprises of

Mr.M.Meganathan	-	Lead Environment Expert
Mr. Kamalakannan	-	Team member
Mr. Vignesh	-	Team member
Mr. Sivnesh Mani	-	Team member
Mr. Desingraja	-	Team member

Lead Environmental Specialist have hands on Experience more than 15 years in Various Kinds of Industries in Environmental Pollution control departments .

We are recognized Auditors by the Central Government of India and notified accredited Safety Auditors under the Provisions of Manufacture storage, Import of Hazardous chemicals Rule 2000 (Mother Act - Environmental Protection Act 1986) by the Director of Industrial Health and Safety –Tamilnadu .

PART – B

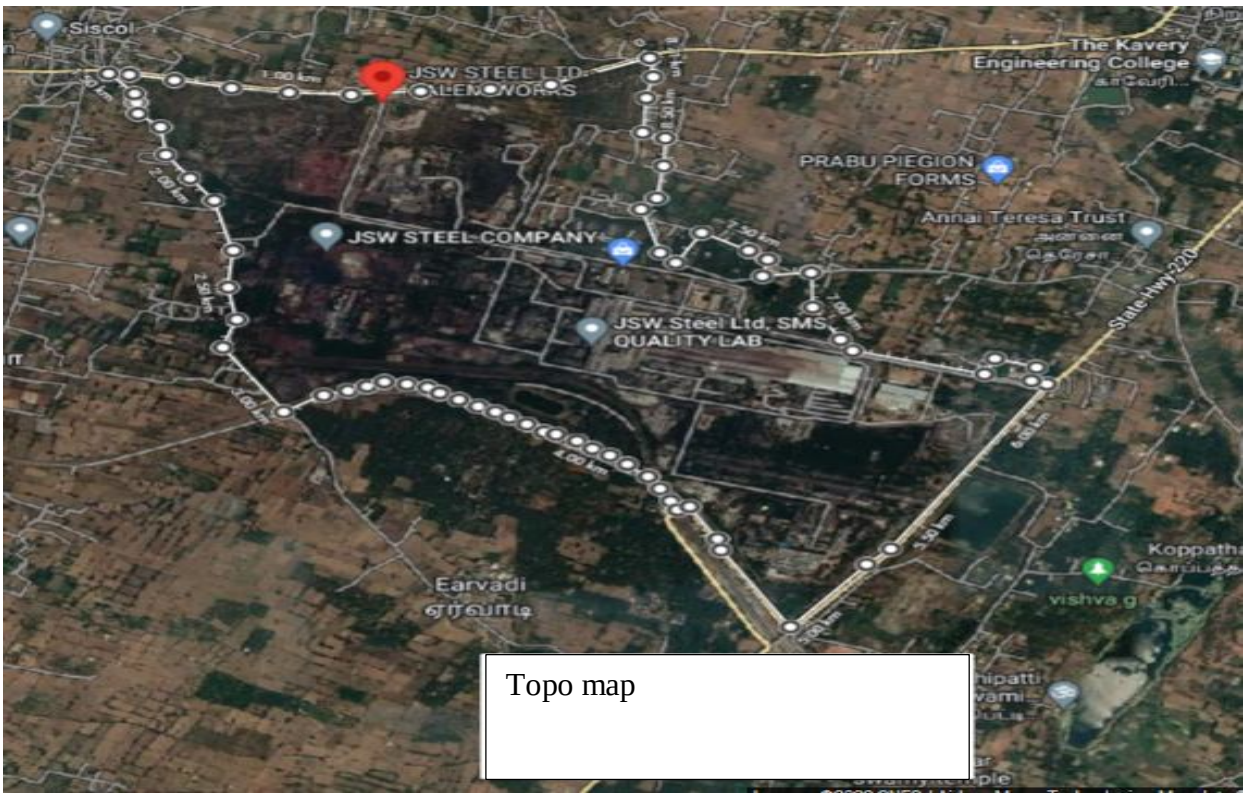
XI. Site Visit

We performed Carbon Sequestration Study for the following areas

- Boundary's of plant
- Old gust house
- New gust house
- New plant area
- Temple area
- Wagon tippler
- Non Recovery Type Coke Oven Plant
- Sinter Plant
- Blast Furnace
- Steel Making
- Air Separation Plant
- Steel Refining
- Continuous Casting of Billets and Blooms
- Bar and Rod Mill
- Blooming Mill
- QAD
- Captive Power Plant (1 X 7 MW & 3 x 30 MW)
- Utilities – Boilers, Water treatment ,ETP ,STP ,Cooling water , Air compressors Etc.
- HR and Admin
- Purchase and Logistics
- Accounts and Finance office buildings
- Occupational Health Center
- New Land area

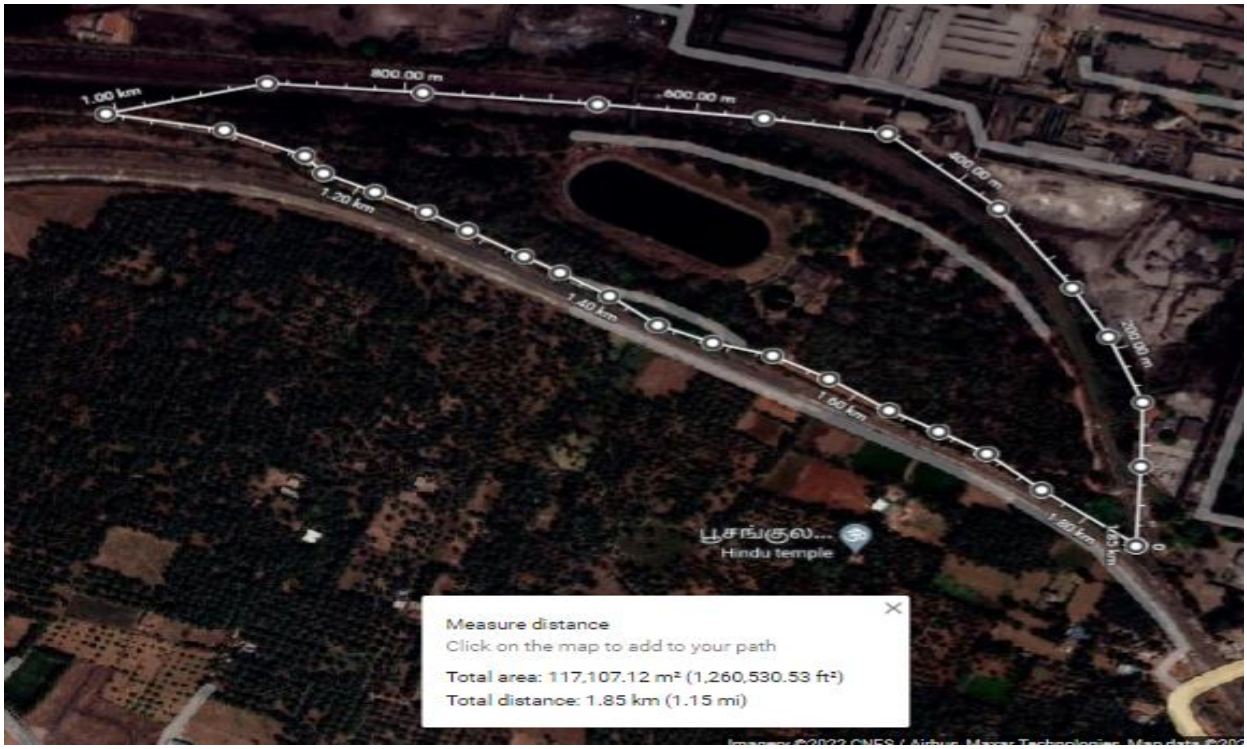
XII- GREEN BELT TOPO MAP

Topo Map:

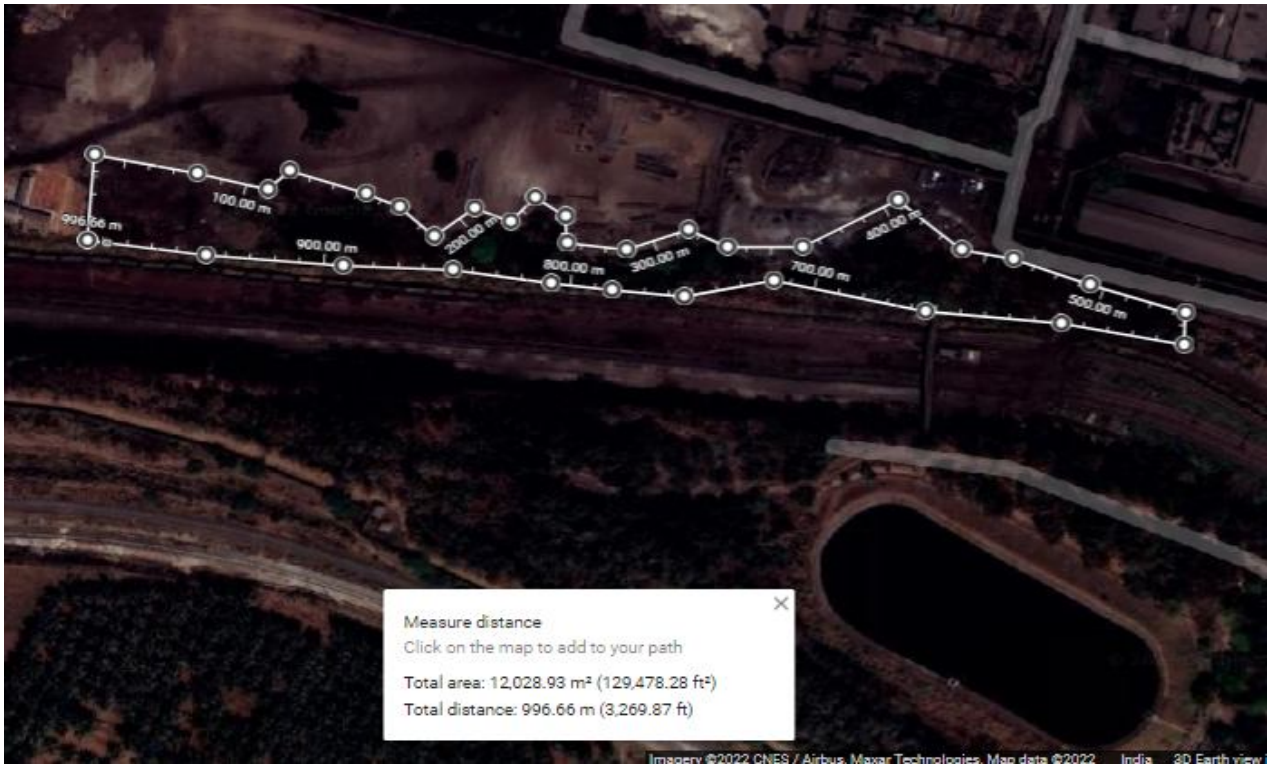


Topo map

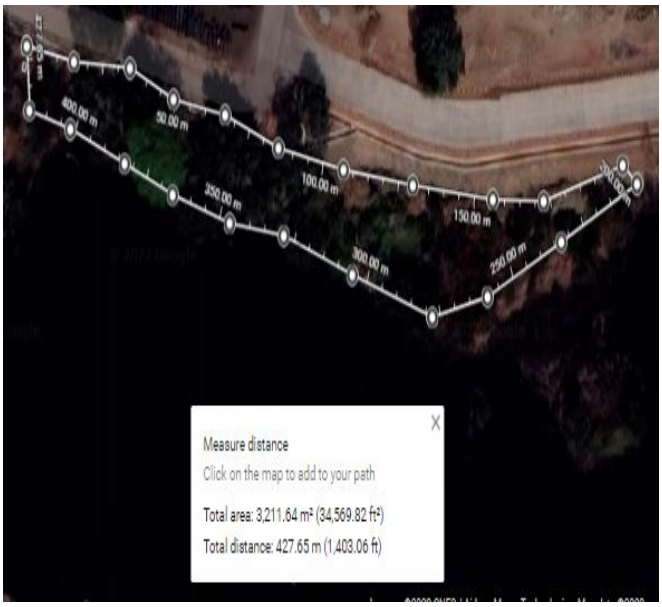
Water Reservoir



Wagon to near by Water reservoir:



Coal storage area



Temple Area:

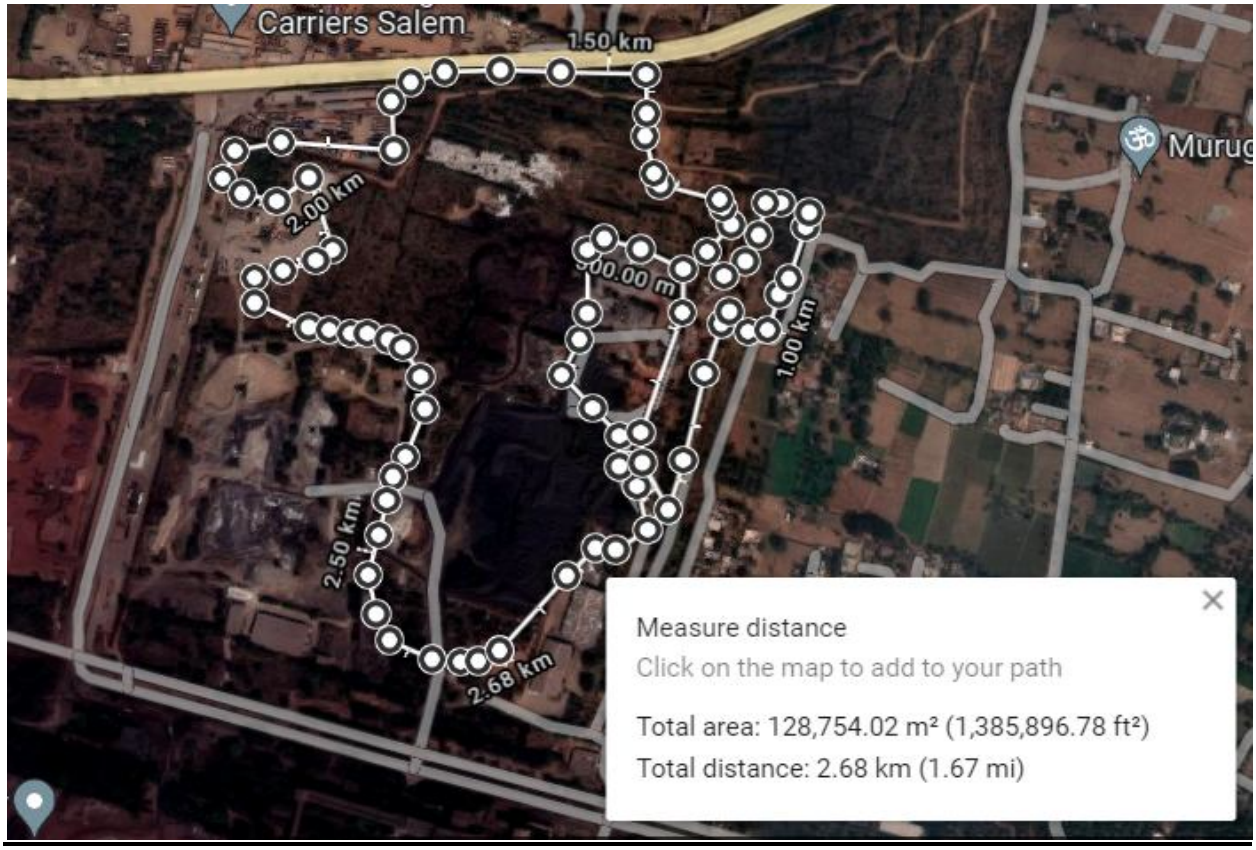
JSW Power plant Area:

Raw Material Yard (Admin Building)

Old Guest House Surrounding Area:

JSW Canteen:

JSW Canteen Back Side:



Mill Area:

GREEN BELT DEVELOPED AREA IN PERCENTAGE

Green Belt developed area in percentage			
Sl.no	Location	Green belt cover area in Hectares	Sapling in Nos (Approx.)
1	JSW canteen beside area	10.95	32784
2	Old Guest House area	6.16	17565
3	Raw material Yard (BF & SP)	7.6	22475
4	Water Reservoir Area	11.71	34128
5	Wagon Tippler area	1.2	3007
6	Coal Yard area (COP)	0.27	675
7	Coal Yard area	0.32	803
8	Temple area	3.16	8546
9	Power plant (CPP#II)	7.36	19986
10	Back side of canteen (New land area)	12.88	34529
11	Mills area	7.01	18524
12	Township	10.54	29607
13	Miscellaneous	12.08	29536
	Total Area	91.24	
	Total Area available (Ha)	268.08	
	Total plant area available (Ha)	237.28	
	Greenbelt developed (%)	34.04	
	Total planted trees as on March 2022		252165

Green Belt Development management

Carbon Sequestration Team - 2022

Carbon Sequestration study by GGSS team - 2022

XIII. Recommendations:

- ✓ **Scientific Long Term Planning**

  Plant green and tree cover should form an integral part of the development of the master plans of the plant and its successive long term management. Resource assessment with respect to water availability, soil type, existing tree species, their density & health, growth conditions, etc. should be done to minimize stressful conditions and ensure long term survival of the selected species. Use of modern scientific tool like GIS wherein the given area can be divided into 1 Km2 x 1 Km2 or 5 Km2 x 5 Km2 uniform grids for planning of afforestation schemes should be done to attain the uniform results.

- ✓ **Industrial Green Agglomerations**

  High quality clonal or tissue culture seedlings should be supplied to Gardeners for plantation e.g., Neem (Azadirachta indica), Ardusa (Ailenthus sp.), Mango (Mangifera indica), etc. Inclusion of trees in farming systems of inside the plant and periphery landscape can enhance productivity, profitability, diversity, and ecosystem sustainability.

- ✓ **Biodiversity Parks and Tree Tourism**

  Tree tourism has the potential to attract nature enthusiast and biodiversity lovers to map the biodiversity in the Industrial agglomerations of the plants for their ecological, educational and aesthetics purpose.

- ✓ **Raising of Tall Seedlings**

  Tall seedlings of ecologically and economically important species should be raised so that plantations grow fast within three years and the success rate of plantation is also improved.

- ✓ **Tree Plantation Campaign**
  - ✓ Green JSW campaign should be undertaken by involving Workers society, schools, colleges, institutions, NGOs, tree lovers, and farmers to create mass movement for tree planting and their subsequent care.
  - ✓ **Guidelines for Tree Felling, Looping, and Pruning in the plant Areas**
    Tree cutting should be strictly regulated , Prior permission from the top management is mandatory while planning for tree cutting .
  - ✓ Land requirement for planting of trees is to be planned and marked in the plant layout as per the CPCB guidelines.
  - ✓ **Suggestions f**or Air Pollution control and Prevention which will supplement for carbon Sequestration before polluting atmosphere

Operations Control to Prevent Air Pollution

- ✓ **Transport / Handling of Raw Materials:**
- ✓ Raw material transport by rail, road and water, loading/unloading; belt transport; coal washing.
- ✓ **Suggested Treatment:**
- ✓ If material is received in moist condition, no precaution needed; For dry material, use water curtain or de-dusting by evacuation to a bag filter while unloading; Extensive enclosure of receiving hopper necessary;
- ✓ Minimum height of fall to avoid wind entrainment; Mobile equipment to be avoided, tired vehicle cause (salt and cement) may get contaminated. For proper care use bucket conveyor unloaders with water sprays; Chemical sealing if found suitable.
- ✓ 2. **Bedding and Blending of Ore:**
- ✓ Large beds for greater homogenization of composition; Blend recovered and placed on belt for storage; it aids in further blending.
- ✓ Suggested Treatment:
- ✓ Binding agent in the water may be necessary; Ensure proper wetting and use detergents, if need be; Large enclosures and evacuation at high rates at transfer points; Bag filters for cleaning gas; Spray installation at transfer points; Recovery of particulate – laden waters for treatment if necessary. Plantation in and around to arrest dust emission.

- ✓ 3. **Sintering/Pelletizing of Iron and Steel:**
- ✓ Suitability of fine ore in Blast Furnace; Pelletising with binder and rolled in drums/pans, Indurated at high temperature and cooled; for sintering blending of fines with coarser granular ores, flux mixed with coke breeze and heated; sizing.
- ✓ Important Consideration:
- ✓ Fines generated –
- ✓ (a) Crushing/grinding,
- ✓ (b) Grinding for pelletisation,
- ✓ (c) Cooling/crushing/screening sinter,
- ✓ (d) Cooling and screening pellets;
- ✓ Fugitive dust in pellet plant; Emission of gaseous and liquid fluorine compounds and oil as fuel, SO2/SO3; while fumes due to K2SO4/Na2SO4; Stack emissions may contain upto 1% CO and difficult to remove by incineration; If sintering materials contain lubricants/soluble oils (rolling mill waste), emissions will be visible and may contain hydrocarbon; Large fans create noise.
- ✓ Suggested Treatment:
- ✓ Fugitive dust (a) Recovery by suction hood installation and bag filters/electrostatic precipitation for dry material only, (b) Wet material requires no such precautions, (c) Energy saving by recycling clean heated air to ignition hood on sinter strand.
- ✓ Stack Emissions:
- ✓ (a) Normally not necessary to treat stack gases than to remove dust,
- ✓ (b) CaO/SiO2 ratio important. Low ratio may require desulphurisation of gases,
- ✓ (c) CaO/SiO2 > 2, difficult to apply electrostatic precipitators for fame removal,
- ✓ (d) High SOx – scrubbing with alkaline liquids (milk of lime). Expensive, fouling and disposal may create environmental problems. SO2 converted to gypsum (saleable),
- ✓ (e) High fluorine – wet scrubbing or contact with alumina/lime. High basicity leads to low emission,
- ✓ (f) NOx removal – catalytic converter (expensive),
- ✓ (g) Particulate removal by water scrubbing or electrostatic precipitators,
- ✓ (h) Cyclones for coarse grit removal,

- ✓ (i) Alkalies can cause problems with precipitators and tend to clog riddles and other mechanisms,
- ✓ (j) Dust to be dumped if recycles not possible,
- ✓ (k) Oily scale from rolling mills to be treated and not recycled to sinter plant.

PART C

XIV . Acknowledgments

We thank M/s. JSW Steel Ltd, Salem Works, Pottaneri P.O.,Mecheri, Mettur Taluk, Salem District-636 453, Tamil Nadu, India for offering an opportunity to carry out Carbon Sequestration by Plants Study at their facility. We extend our sincere thanks to Managing director / Occupier of the factory , Factory Manager , Dy.Manager- Environment , AM-Environment , Executive Environment ,Environment Assistants , all Employees and all Contract employees who contributed their Support to complete the Carbon Sequestration by Plants Study effectively.

The courtesy and cordiality extended to the carbon Sequestration Study team of Green Global Safety Systems is highly appreciated.

Lead Environment Expert

For Green Global Safety Systems

XV – Reference

- Central Pollution control board Guidelines
- State pollution control board Guidelines
- Ministry of Environment and Forest Departmental Guidance
- EPA-US Guidelines
- Environmental Protection act 1986 - for Iron and steel Industries
- Air (Pollution Prevention and Control) 1981
- Water Pollution (Pollution Prevention and Control) 1974
- The Forest Act
- Tropical forest and the greenhouse Effect :A Management response, "Norman Myers and Thomas J. Goreau, Discovery Bay Marine Laboratory, University of the West Indies, Discovery Bay, Jamaica, 1991.
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XVI. Annexure-I

Comprehensive study Report

M/s. JSW Steels Ltd , Salem Works
Carbon Sequestration by the Green Belt -April 21-March 2022

Calculation formula : 0.25 x (Dia)^2 x (Height) x (1.2 Wet weitht)x (0.8 dry weight) x (50% carbon content) x (3.6663 Co2 in Carbon) x 0.454 (Pounds to Kg) / 1000 (Kg to Ton)

Sl.no	Botonical Name	No of Trees	Location	Diameter in inches	Height in feet	^weight of Carbon in Kg	CO2 Sequestrn in MT	Age setted for calculation	CO2 Sequestrn in MT per Annum
1	Terminalia Catappa	19	5 S Red zone	8	15	1130.83	4.15	9	0.5
2	Fabaceae	26	5 S Red zone	10	15	2378.42	8.72	10	0.9
3	Melia azadirachta	18	5 S Red zone	10	15	1621.65	5.95	10	0.6
4	Fabaceae	98	5 S Red zone	11	18	11096.32	40.68	10	4.0
5	Bambusa arundinacea	1870	AAQMS-2	3	8	8724.55	31.99	1	30.5
6	Fabaceae	86	AAQMS-2	8	13	4146.77	15.20	10	1.5
7	Fabaceae	218	AAQMS-4 North	8	14	11318.52	41.50	7	5.9
8	Melia azadirachta	202	AAQMS-4 North	10	15	18162.44	66.59	10	6.6
9	Borassus flabellifer	12	AAQMS-4 North	14	44	5725.87	20.99	18	1.2
10	Tectona grandis	326	AAQMS-4 North	15	29	122006.63	447.31	18	24.8
11	Tectona grandis	2700	AAQMS-4 North	16	30	########	4242.53	18	235.0
12	Tectona grandis	1920	AAQMS-4 North	16	31	850740.17	3119.07	18	172.8
13	Fabaceae	484	AAQMS-4 West	3	8	2256.74	8.27	1	7.9
14	Fabaceae	677	Admin Block East	10	17	65176.94	238.96	10	23.8
15	Fabaceae	216	Admin Block East	14	21	46542.02	170.64	11	15.4
16	Melia azadirachta	79	Admin Block East	14	25	21296.78	78.08	18	4.3
17	Eucalyptus	106	Admin Block East	22	31	85324.43	312.82	18	17.3
18	Pithecellobium dulce	55	Admin Block North	11	19	7289.90	26.73	10	2.7
19	Pithecellobium dulce	90	Admin Block North	14	21	20254.96	74.26	18	4.1
20	Saraca asoca	10	Admin Block North	14	30	3107.55	11.39	18	0.6

21	Eucalyptus	30	Admin Block North	23	40	34410.62	126.16	18	7.0
22	Fabaceae	37	Admin office Entrance	17	28	17170.75	62.95	18	3.5
23	Fabaceae	438	Admin office Entrance -East	8	9	14983.26	54.93	9	6.1
24	Fabaceae	840	Admin office Entrance -North	6	9	16478.32	60.41	3.6	17.0
25	Saraca asoca	91	Admin office Entrance -North	8	26	7868.13	28.85	7	4.1
26	Fabaceae	395	Admin office Entrance -North	14	14	59104.87	216.70	16	13.5
27	Fabaceae	1063	Admin office Entrance -South	4	10	10760.97	39.45	1.6	25.5
28	Fabaceae	895	Admin office Entrance -South	5	10	13315.73	48.82	2.6	19.1
29	Melia azadirachta	498	Admin office Entrance -South	6	10	10917.65	40.03	3.6	11.3
30	Fabaceae	440	Admin office Entrance -South	6	10	9654.88	35.40	3.6	10.0
31	Fabaceae	840	Admin office Entrance -South	8	9	28735.02	105.35	9	11.6
32	Mangifera indica	190	Admin office Entrance -south	8	11	7647.67	28.04	9	3.1
33	Acacia nilotica	467	Admin office Entrance -South	8	16	27767.14	101.80	9	11.2
34	Mangifera indica	175	Admin office Entrance -South	8	11	7066.83	25.91	10	2.6
35	Melia azadirachta	390	Admin office Entrance -South	8	16	23198.77	85.05	10	8.5
36	Albizia lebbeck	562	Admin office Entrance -South	8	16	33406.22	122.48	10	12.2
37	Tectona grandis	54	Admin office Entrance -South	14	28	16296.20	59.75	18	3.3
38	Fabaceae	46	Admin office Entrance -south	16	15	10080.21	36.96	18	2.0
39	Casuarina Tree	24	ANNEALING AREA	1	5	**1.984**	**0.007**	**1**	0.0069
40	Casuarina Tree	12	ANNEALING PLANT	1	5	**0.992**	**0.004**	**1**	0.0035
41	Casuarina Tree	60	ANNEALING PLANT	1	5	**4.959**	**0.018**	**1**	0.0173
42	Casuarina Tree	2	ANNEALING PLANT BACK SIDE	1	5	**0.195**	**0.001**	**1**	0.0007
43	Casuarina Tree	192	ANNEALING PLANT ROAD SIDE	1	5	**15.870**	**0.058**	**1**	0.0554
44	Casuarina Tree	120	ANNEALING PLANT ROAD	1	5	**9.919**	**0.036**	**1**	0.0346

			SIDE						
45	Bambusa arundinacea	226	AQMS North	4	10	2283.37	8.37	1.6	5.4
46	Bambusa arundinacea	60	AQMS North	5	9	679.13	2.49	2.6	1.0
47	Fabaceae	265	AQMS South	6	8	4590.90	16.83	3.6	4.7
48	Fabaceae	42	AQMS South	14	11	4669.54	17.12	16	1.1
49	Fabaceae	43	AQMS South	16	13	8233.13	30.19	18	1.7
50	Fabaceae	35	AQMS South	17	15	8886.92	32.58	18	1.8
51	Casuarina Tree	60	ASP AREA	1	5	**4.959**	**0.018**	**1**	0.0173
52	Casuarina Tree	84	ASP AREA	1	5	**6.943**	**0.025**	**1**	0.0242
53	Casuarina Tree	132	ASP AREA	1	5	**10.911**	**0.040**	**1**	0.0381
54	Casuarina Tree	367	ASP AREA	1	5	**30.352**	**0.111**	**1**	0.1060
55	Casuarina Tree	72	ASP AREA	1	5	**5.951**	**0.022**	**1**	0.0208
56	Casuarina Tree	120	ASP AREA	1	5	**9.919**	**0.036**	**1**	0.0346
57	Casuarina Tree	120	ASP AREA	1	5	**9.919**	**0.036**	**1**	0.0346
58	Casuarina Tree	144	ASP II AREA ROAD SIDE	1	5	**11.903**	**0.044**	**1**	0.0416
59	Casuarina Tree	36	ASP ROAD SIDE	1	5	**2.976**	**0.011**	**1**	0.0104
60	Casuarina Tree	72	ASP ROAD SIDE	1	5	**5.951**	**0.022**	**1**	0.0208
61	Fabaceae	34	ASP-1	8	9	1149.40	4.21	9	0.5
62	Melia azadirachta	30	ASP-1	8	15	1669.63	6.12	10	0.6
63	Eucalyptus	10	ASP-1	15	17	2047.79	7.51	18	0.4
64	Melia azadirachta	18	ASP-1 Back side	9	11	912.97	3.35	10	0.3
65	Roystonea regia	32	ASP-1 Back side	10	9	1711.71	6.28	10	0.6
66	Albizia lebbeck	18	ASP-1 Back side	11	14	1819.17	6.67	10	0.7
67	Terminalia Catappa	24	ASP-1 Entrance	8	9	821.00	3.01	9	0.3
68	Derris indica	18	ASP-1 Entrance	9	17	1433.06	5.25	10	0.5
69	Melia azadirachta	12	ASP-1 Entrance	14	17	2036.41	7.47	11	0.7
70	Fabaceae	6	ASP-1 Entrance	14	16	983.75	3.61	16	0.2
71	Eucalyptus	5	ASP-1 Entrance	15	25	1542.68	5.66	18	0.3
72	Melia azadirachta	42	ASP-2 south	8	13	2015.79	7.39	10	0.7
73	Albizia lebbeck	38	ASP-2 south	9	17	3057.19	11.21	10	1.1
74	Fabaceae	47	ASP-2 south	10	16	4299.32	15.76	10	1.6
75	Melia azadirachta	19	ASP-2 south	10	15	1729.76	6.34	10	0.6
76	Melia azadirachta	36	Assembly point-1	17	30	17823.93	65.35	18	3.6
77	Tamarindus indica	14	Assembly point-2	14	31	4819.16	17.67	18	1.0
78	Albizia lebbeck	66	Assembly point-3	14	26	18470.74	67.72	18	3.8
79	Cocos nucifera	24	Assembly point-4	15	34	10543.15	38.65	18	2.1
80	Borassus flabellifer	12	Assembly point-5	13	33	3435.12	12.59	10	1.3
81	Fabaceae	426	ASV-2 North	5	11	5955.44	21.83	2.6	8.6
82	Fabaceae	306	ASV-2 North	5	9	3463.58	12.70	2.6	5.0
83	Fabaceae	300	ASV-2 North	6	9	5885.11	21.58	3.6	6.1

84	Fabaceae	122	ASV-2 North	6	10	2683.37	9.84	3.6	2.8
85	Fabaceae	144	ASV-2 North	9	11	7303.77	26.78	10	2.7
86	Albizia lebbeck	18	Bar and rod mill entrance-east	8	20	1187.99	4.36	7	0.6
87	Derris indica	66	Bar and rod mill entrance-east	16	29	27328.58	100.19	18	5.6
88	Derris indica	66	Bar and rod mill entrance-South	5	9	747.05	2.74	2.6	1.1
89	Fabaceae	12	Bar and rod mill entrance-South	8	13	575.94	2.11	9	0.2
90	Melia azadirachta	12	Bar and rod mill entrance-South	8	14	621.90	2.28	9	0.3
91	Albizia lebbeck	20	Bar and rod mill entrance-South	8	16	1213.47	4.45	10	0.4
92	Fabaceae	18	Bar and rod mill entrance-South	9	15	1259.70	4.62	10	0.5
93	Derris indica	18	Bar and rod mill entrance-South	9	17	1433.06	5.25	10	0.5
94	Albizia lebbeck	12	Bar and rod mill entrance-South	10	15	1081.10	3.96	10	0.4
95	Casuarina Tree	30	BF II	1	5	**2.480**	**0.009**	**1**	0.0087
96	Casuarina Tree	84	BF II AREA	1	5	**6.943**	**0.025**	**1**	0.0242
97	Casuarina Tree	120	BF II AREA	1	5	**9.919**	**0.036**	**1**	0.0346
98	Casuarina Tree	36	BF II GROUND OFFER	1	5	**2.976**	**0.011**	**1**	0.0104
99	Casuarina Tree	66	BF II GROUND OFFER	1	5	**5.455**	**0.020**	**1**	0.0190
100	Musa paradisiaca	120	BF North	4	6	703.55	2.58	1.6	1.7
101	Albizia lebbeck	53	BF North	8	17	2904.95	10.65	7	1.5
102	Melia azadirachta	290	BF North	8	16	17274.16	63.33	10	6.3
103	Albizia lebbeck	18	BF North	10	15	1621.65	5.95	10	0.6
104	Roystonea regia	26	BF North	14	20	5652.09	20.72	18	1.1
105	Cocos nucifera	14	BF North	14	31	4819.16	17.67	18	1.0
106	Fabaceae	30	BF-1 Pump house	5	11	493.17	1.81	2.6	0.7
107	Terminalia Catappa	66	BF-1 Pump house	6	8	1142.53	4.19	3.6	1.2
108	Roystonea regia	66	Blast Furnace -1	5	9	747.05	2.74	2.6	1.1
109	Terminalia Catappa	60	Blast Furnace -1	6	10	1315.38	4.82	3.6	1.4
110	Melia azedarach	12	Blast Furnace -1	8	14	621.90	2.28	9	0.3
111	Fabaceae	24	Blast Furnace -1	8	15	1335.70	4.90	10	0.5
112	Melia azadirachta	60	Blast Furnace -1	10	18	6150.71	22.55	10	2.2
113	Fabaceae	18	Blast Furnace Near to AIR compr	5	9	203.74	0.75	2.6	0.3
114	Terminalia Catappa	18	Blast Furnace Near to AIR compr	6	9	353.11	1.29	3.6	0.4

115	Melia azadirachta	18	Blast Furnace Near to AIR compr	8	14	977.65	3.58	9	0.4
116	Fabaceae	96	BLM North	8	9	3284.00	12.04	9	1.3
117	Fabaceae	208	BLM North	8	16	12348.88	45.27	10	4.5
118	Swietenia Mahagoni	50	BLM North	9	15	3527.15	12.93	10	1.3
119	Fabaceae	18	BRM	8	14	932.85	3.42	9	0.4
120	Melia azadirachta	18	BRM	10	17	1733.43	6.36	10	0.6
121	Casuarina Tree	60	BRM AREA	1	5	**4.959**	**0.018**	**1**	0.0173
122	Fabaceae	306	BRM Charge West	8	14	15858.37	58.14	9	6.4
123	Albizia lebbeck	18	BRM Pump house entrance East	11	18	2029.81	7.44	10	0.7
124	Derris indica	30	BRM Pump house entrance North	6	10	657.69	2.41	3.6	0.7
125	Couroupita Guianensis	18	BRM Pump house entrance North	11	18	2029.81	7.44	10	0.7
126	Albizia lebbeck	12	BRM Pump house entrance North	14	19	2333.81	8.56	11	0.8
127	Cocos nucifera	12	BRM Pump house entrance North	14	44	5725.87	20.99	18	1.2
128	Fabaceae	12	BRM Pump house entrance West	8	14	621.90	2.28	9	0.3
129	Casuarina Tree	36	CANTEEN AREA	1	5	**2.976**	**0.011**	**1**	0.0104
130	Melia azadirachta	60	Canteen road view	8	15	3500.11	12.83	9	1.4
131	Fabaceae	24	Canteen road view	13	26	5391.98	19.77	10	2.0
132	Fabaceae	18	CC-1	8	13	863.91	3.17	7	0.4
133	Casuarina Tree	12	CCM III	1	5	**0.992**	**0.004**	**1**	0.0035
134	Casuarina Tree	138	CCM III SCRAP YARD	1	5	**11.407**	**0.042**	**1**	0.0398
135	Casuarina Tree	18	CEMENT FACTORY	1	5	**1.488**	**0.005**	**1**	0.0052
136	Pithecellobium dulce	18	Center plant 1 Assembly point	6	10	394.61	1.45	3.6	0.4
137	Fabaceae	24	Center plant 1 Assembly point	8	15	1235.28	4.53	7	0.6
138	Terminalia Catappa	12	Center plant 1 Assembly point	8	14	621.90	2.28	9	0.3
139	Melia azadirachta	18	Center plant 1 Assembly point	10	18	1845.21	6.77	10	0.7

140	Cocos nucifera	12	Center plant 1 Assembly point	14	43	5371.86	19.69	16	1.2
141	Tectona grandis	20	Center plant 1 Assembly point	16	30	8743.07	32.05	18	1.8
142	Fabaceae	175	Chimney area	6	9	3436.91	12.60	3.6	3.5
143	Fabaceae	6600	Chimney area	1	6	3165.03	11.60	4.6	2.6
144	Melia azadirachta	276	Chimney area	8	17	15184.97	55.67	7	7.9
145	Cocos nucifera	67	Chimney area	14	29	21016.29	77.05	18	4.3
146	Cocos nucifera	288	Chimney area	14	31	96383.30	353.37	18	19.6
147	Tamarindus indica	60	Chimney area	19	31	35749.26	131.07	18	7.3
148	Cocos nucifera	12	Coal yard East	14	40	5199.75	19.06	18	1.1
149	Fabaceae	336	Coal yard north	6	9	6591.33	24.17	3.6	6.8
150	Fabaceae	312	Coil yard north	5	7	2701.25	9.90	2.6	3.9
151	Fabaceae	310	Coil yard north	5	10	4605.17	16.88	2.6	6.6
152	Fabaceae	98	Coil yard north	6	9	1930.32	7.08	3.6	2.0
153	Melia azadirachta	13	Coil yard north	8	16	785.19	2.88	9	0.3
154	Melia azadirachta	13	Coil yard north	10	15	1189.21	4.36	10	0.4
155	Ficus religiosa	7	Coil yard north	14	21	1620.40	5.94	18	0.3
156	Casuarina Tree	60	COKE OVEN AREA	1	5	**4.959**	**0.018**	**1**	0.0173
157	Casuarina Tree	60	COKE OVEN AREA	1	5	**4.959**	**0.018**	**1**	0.0173
158	Casuarina Tree	120	COKE OVEN AREA	1	5	**9.919**	**0.036**	**1**	0.0346
159	Casuarina Tree	120	COKE OVEN NEAR LEMS SHED	1	5	**9.919**	**0.036**	**1**	0.0346
160	Fabaceae	1080	cook oven hopper	5	11	17754.29	65.09	2.6	25.5
161	Fabaceae	360	cook oven hopper	5	11	5918.10	21.70	2.6	8.5
162	Fabaceae	118	cook oven hopper	8	11	4743.49	17.39	9	1.9
163	Melia azadirachta	38	cook oven hopper	8	9	1313.60	4.82	10	0.5
164	Melia azadirachta	106	cook oven hopper	8	11	4259.46	15.62	10	1.6
165	Albizia lebbeck	36	cook oven plant East	5	10	455.38	1.67	2.6	0.7
166	Fabaceae	202	cook oven plant East	5	8	2013.66	7.38	2.6	2.9
167	Fabaceae	348	cook oven plant East	5	10	5176.36	18.98	2.6	7.4
168	Fabaceae	120	cook oven plant East	5	11	1972.70	7.23	2.6	2.8
169	Bambusa arundinacea	1380	cook oven plant East	5	11	22686.04	83.17	2.6	32.6
170	Bambusa arundinacea	432	cook oven plant East	6	10	9470.73	34.72	3.6	9.8

171	Melia azadirachta	180	cook oven plant East	6	10	3946.14	14.47	3.6	4.1
172	Fabaceae	173	cook oven plant East	6	10	3788.29	13.89	3.6	3.9
173	Tamarindus indica	17	cook oven plant East	8	9	574.70	2.11	9	0.2
174	Albizia lebbeck	19	cook oven plant East	8	16	1142.09	4.19	9	0.5
175	Fabaceae	18	cook oven plant East	9	15	1259.70	4.62	10	0.5
176	Cassia tora	31	cook oven plant East	9	17	2483.97	9.11	10	0.9
177	Borassus flabellifer	14	cook oven plant East	13	43	5389.23	19.76	10	2.0
178	Fabaceae	66	cook oven plant East	14	17	11200.23	41.06	11	3.7
179	Melia azadirachta	58	cook oven plant East	14	11	6403.94	23.48	16	1.5
180	Bambusa arundinacea	864	cook oven plant West	5	10	10929.08	40.07	2.6	15.7
181	Bambusa arundinacea	794	cook oven plant West	6	8	13751.94	50.42	3.6	14.2
182	Fabaceae	348	cook oven plant West	6	9	6826.73	25.03	3.6	7.1
183	Bambusa arundinacea	792	cook oven plant West	6	10	17363.01	63.66	3.6	17.9
184	Derris indica	106	cook oven plant West	8	8	3187.77	11.69	9	1.3
185	Fabaceae	466	cook oven plant West	8	9	15927.41	58.39	9	6.5
186	Fabaceae	314	cook oven plant West	8	9	10755.11	39.43	10	3.9
187	Fabaceae	26	cook oven plant West	9	8	1002.12	3.67	10	0.4
188	Bauhinia purpurea	22	cook oven plant West	9	15	1511.64	5.54	10	0.6
189	Melia azadirachta	26	cook oven plant West	10	15	2269.12	8.32	10	0.8
190	Melia azadirachta	46	cook oven plant West	10	17	4458.78	16.35	10	1.6
191	Melia azadirachta	180	cook oven plant West	11	18	20298.15	74.42	10	7.4
192	Couroupita Guianensis	24	cook oven plant West	14	9	2256.35	8.27	16	0.5
193	Melia azadirachta	34	cook oven plant West	14	9	3158.89	11.58	16	0.7
194	Derris indica	36	cook oven plant West	14	11	4002.46	14.67	16	0.9

195	Tectona grandis	79	cook oven plant West	14	29	24769.20	90.81	18	5.0
196	Fabaceae	30	cookoven north	8	15	1750.05	6.42	9	0.7
197	Fabaceae	186	CPP 2 & AAQMS	6	10	4077.68	14.95	3.6	4.2
198	Fabaceae	32	CPP 2 & AAQMS	7	11	1056.81	3.87	5	0.8
199	Fabaceae	88	CPP 2 & AAQMS	9	15	6130.52	22.48	10	2.2
200	Fabaceae	29	CPP 2 & AAQMS	17	15	7354.69	26.96	18	1.5
201	Fabaceae	31	CPP 2 & AAQMS	21	19	13894.33	50.94	18	2.8
202	Casuarina Tree	180	CPP II AREA	1	5	**14.878**	**0.055**	**1**	0.0520
203	Casuarina Tree	120	CPP II AREA	1	5	**9.919**	**0.036**	**1**	0.0346
204	Casuarina Tree	60	CPP III AREA	1	5	**4.959**	**0.018**	**1**	0.0173
205	Melia azadirachta	25	CPP New	8	9	862.05	3.16	9	0.3
206	Melia azadirachta	14	CPP New	9	13	869.07	3.19	10	0.3
207	Melia azadirachta	22	CPP New	14	17	3665.53	13.44	11	1.2
208	Melia azadirachta	19	CPP New	16	19	5163.79	18.93	18	1.0
209	Terminalia Catappa	30	CPP-1 Entrance east	6	9	588.51	2.16	3.6	0.6
210	Derris indica	18	CPP-1 Entrance east	8	14	977.65	3.58	10	0.4
211	Melia azadirachta	30	CPP-1 Entrance east	10	18	3075.35	11.28	10	1.1
212	Eucalyptus	5	CPP-1 Entrance east	14	21	1080.26	3.96	18	0.2
213	Terminalia Catappa	120	CPP-1 Entrance North	6	10	2630.76	9.65	3.6	2.7
214	Eucalyptus	2	CPP-1 Entrance North	14	17	401.12	1.47	11	0.1
215	Fabaceae	4	CPP-1 Entrance North	14	19	684.83	2.51	11	0.2
216	Tectona grandis	67	CPP-1 Entrance North	14	46	33538.04	122.96	18	6.8
217	Tectona grandis	122	CPP-1 Entrance North	16	44	77326.49	283.50	18	15.7
218	Albizia lebbeck	72	CPP-1 Entrance North	17	15	18386.73	67.41	18	3.7
219	Fabaceae	150	CPP2 Transformer	4	10	1518.20	5.57	1.6	3.6
220	Fabaceae	22	CPP2 Transformer	8	13	1036.69	3.80	9	0.4
221	Melia azadirachta	14	CPP2 Transformer	8	11	580.84	2.13	10	0.2
222	Melia azadirachta	46	CPP2 Transformer - North	8	13	2188.58	8.02	9	0.9
223	Fabaceae	24	CPP2 Transformer - North	8	13	1151.88	4.22	10	0.4

224	Fabaceae	78	CPP2 Transformer - North	8	15	4341.04	15.92	10	1.6
225	Melia azadirachta	34	CPP2 Transformer - North	14	14	5030.20	18.44	16	1.1
226	Melia azadirachta	26	CPP2 Transformer - North	15	17	5631.43	20.65	18	1.1
227	Roystonea regia	60	CPP2 Transformer - North	15	40	31074.13	113.93	18	6.3
228	Fabaceae	146	Crusher way Bridge area	9	14	9540.52	34.98	10	3.5
229	Melia azadirachta	47	Crusher way Bridge area	9	17	3725.95	13.66	10	1.4
230	Terminalia Catappa	18	DM plant entrance	5	9	203.74	0.75	2.6	0.3
231	Melia azadirachta	30	DM plant entrance	11	17	3534.34	12.96	10	1.3
232	Ficus religiosa	12	DM plant entrance	16	23	3923.96	14.39	18	0.8
233	Albizia lebbeck	84	Entrance Gate Right side	5	9	1118.04	4.10	2.6	1.6
234	Bambusa arundinacea	66	Entrance Gate Right side	5	10	981.72	3.60	2.6	1.4
235	Carica Papaya	18	Entrance Gate Right side	7	11	560.51	2.05	5	0.4
236	Albizia lebbeck	12	Entrance Gate Right side	8	11	484.03	1.77	9	0.2
237	Melia azadirachta	138	Entrance Gate Right side	8	16	8208.79	30.10	10	3.0
238	Albizia lebbeck	24	Entrance Gate Right side	9	15	1679.59	6.16	10	0.6
239	Albizia lebbeck	18	Entrance Gate Right side	10	15	1621.65	5.95	10	0.6
240	Albizia lebbeck	583	Entrance Gate Right side	10	23	77721.17	284.95	10	28.4
241	Melia azadirachta	60	Entrance Gate Right side	11	18	6766.05	24.81	10	2.5
242	Borassus flabellifer	30	Entrance Gate Right side	14	43	13985.86	51.28	18	2.8
243	Borassus flabellifer	94	Entrance Gate Right side	15	33	39892.08	146.26	18	8.1
244	Derris indica	24	EOF - 1	8	17	1320.43	4.84	7	0.7
245	Terminalia Catappa	18	EOF - 1	8	16	1070.71	3.93	9	0.4
246	Roystonea regia	34	EOF - 1	10	23	4477.76	16.42	10	1.6
247	Melia azadirachta	12	EOF - 1	14	19	2437.60	8.94	18	0.5
248	Eucalyptus	30	EOF - 1	15	34	13178.94	48.32	18	2.7

249	Terminalia Catappa	18	EOF - 2 & MCC-5 entrance	5	11	295.90	1.08	2.6	0.4
250	Melia azadirachta	18	EOF - 2 & MCC-5 entrance	8	11	726.04	2.66	10	0.3
251	Roystonea regia	18	EOF - 2 & MCC-5 entrance	9	13	1086.33	3.98	10	0.4
252	Fabaceae	19	EOF - 2 & MCC-5 entrance	10	17	1877.38	6.88	10	0.7
253	Eucalyptus	4	EOF - 2 & MCC-5 entrance	14	19	684.83	2.51	11	0.2
254	Melia azadirachta	12	Fuel/Flux west	8	11	484.03	1.77	9	0.2
255	Thespesia populnea	23	Fuel/Flux west	8	14	1181.60	4.33	9	0.5
256	Fabaceae	588	Fuel/Flux west	8	14	31936.63	117.09	10	11.7
257	Terminalia Catappa	18	Furnace oil storage tank	7	11	587.11	2.15	5	0.4
258	Fabaceae	18	Furnace oil storage tank	8	11	726.04	2.66	10	0.3
259	Fabaceae	26	Furnace oil storage tank	9	15	1847.55	6.77	10	0.7
260	Albizia lebbeck	216	Generator North	8	20	14255.92	52.27	7	7.4
261	Saraca asoca	12	Generator North	8	26	1035.28	3.80	7	0.5
262	Melia azadirachta	54	Generator North	8	20	4039.34	14.81	10	1.5
263	Ficus Religiosa	30	Generator North	10	17	2889.05	10.59	10	1.1
264	Albizia lebbeck	48	Generator North	10	23	6396.80	23.45	10	2.3
265	Albizia lebbeck	77	Generator North	14	25	19772.09	72.49	12	6.0
266	Albizia lebbeck	48	Generator North	14	26	13433.26	49.25	18	2.7
267	Eucalyptus	98	Generator North	14	29	30773.85	112.83	18	6.3
268	Fabaceae	12	Generator North	17	28	5538.95	20.31	18	1.1
269	Pithecellobium dulce	106	Generator North	21	33	82552.48	302.66	18	16.8
270	Casuarina Tree	12	GIVEN TO METTUR	1	5	**0.992**	**0.004**	**1**	0.0035
271	Casuarina Tree	24	HR OFFICE BACK SIDE	1	5	**1.984**	**0.007**	**1**	0.0069
272	Carica Papaya	101	Jsw Canteen to gate compound boundry	3	8	470.39	1.72	1	1.6
273	Acacia nilotica	60	Jsw Canteen to gate compound boundry	3	8	279.99	1.03	1	1.0
274	Musa paradisiaca	187	Jsw Canteen to gate compound boundry	4	8	1496.12	5.49	1.6	3.5
275	Bambusa arundinacea	2304	Jsw Canteen to gate compound boundry	4	8	18413.81	67.51	1.6	43.6
276	Albizia lebbeck	24	Jsw Canteen to gate compound boundry	5	10	356.99	1.31	2.6	0.5

277	Melia azadirachta	430	Jsw Canteen to gate compound boundry	7	11	13377.40	49.05	5	9.7
278	Melia azadirachta	382	Jsw Canteen to gate compound boundry	8	15	19640.99	72.01	7	10.2
279	Melia azadirachta	780	Jsw Canteen to gate compound boundry	8	15	40146.67	147.19	7	20.9
280	Albizia lebbeck	54	Jsw Canteen to gate compound boundry	8	13	2591.73	9.50	7	1.3
281	Albizia lebbeck	416	Jsw Canteen to gate compound boundry	8	11	16795.82	61.58	9	6.8
282	Fabaceae	324	Jsw Canteen to gate compound boundry	8	11	13068.80	47.91	9	5.3
283	Fabaceae	100	Jsw Canteen to gate compound boundry	8	11	4017.44	14.73	9	1.6
284	Melia azadirachta	432	Jsw Canteen to gate compound boundry	8	16	25697.09	94.21	9	10.4
285	Syzygium cumini	53	Jsw Canteen to gate compound boundry	8	16	3140.76	11.51	9	1.3
286	Melia azadirachta	146	Jsw Canteen to gate compound boundry	8	15	8540.26	31.31	9	3.5
287	Albizia lebbeck	720	Jsw Canteen to gate compound boundry	8	9	24630.02	90.30	10	9.0
288	Albizia lebbeck	348	Jsw Canteen to gate compound boundry	8	13	16702.29	61.24	10	6.1
289	Albizia lebbeck	185	Jsw Canteen to gate compound boundry	8	13	8869.49	32.52	10	3.2
290	Albizia lebbeck	78	Jsw Canteen to gate compound boundry	8	14	4236.49	15.53	10	1.5
291	Melia azadirachta	330	Jsw Canteen to gate compound boundry	9	17	26272.74	96.32	10	9.6
292	Melia azadirachta	540	Jsw Canteen to gate compound boundry	10	15	48649.40	178.36	10	17.7

293	Fabaceae	316	Jsw Canteen to gate compound boundry	10	15	28432.87	104.24	10	10.4
294	Fabaceae	173	Jsw Canteen to gate compound boundry	10	17	16640.92	61.01	10	6.1
295	Melia azadirachta	804	Jsw Canteen to gate compound boundry	11	17	85172.60	312.27	10	31.1
296	Borassus flabellifer	118	Jsw Canteen to gate compound boundry	13	40	40907.69	149.98	10	14.9
297	Borassus flabellifer	468	Jsw Canteen to gate compound boundry	14	43	209502.40	768.10	16	47.9
298	Cocos nucifera	84	Jsw Canteen to gate compound boundry	14	43	39160.40	143.57	18	8.0
299	Borassus flabellifer	138	Jsw Canteen to gate compound boundry	14	43	64334.94	235.87	18	13.1
300	Borassus flabellifer	114	Jsw Canteen to gate compound boundry	14	44	54395.80	199.43	18	11.0
301	Cocos nucifera	100	Jsw Canteen to gate compound boundry	14	44	47524.75	174.24	18	9.7
302	Borassus flabellifer	86	Jsw Canteen to gate compound boundry	16	43	53329.55	195.52	18	10.8
303	Ficus benghalensis	119	Jsw Canteen to gate compound boundry	16	25	42295.25	155.07	18	8.6
304	Cocos nucifera	103	Jsw Canteen to gate compound boundry	16	43	63699.19	233.54	18	12.9
305	Tectona grandis	103	Jsw Canteen to gate compound boundry	16	44	65196.85	239.03	18	13.2
306	Tamarindus indica	1800	Jsw Canteen to gate compound boundry	17	19	559251.63	2050.38	18	113.6
307	Fabaceae	709	JSW Power Plant East Boundry	5	9	8027.35	29.43	2.6	11.5
308	Albizia lebbeck	185	JSW Power Plant East Boundry	8	15	9511.67	34.87	5	6.9
309	Derris indica	187	JSW Power Plant East Boundry	8	13	8984.68	32.94	9	3.6

310	Melia azadirachta	508	JSW Power Plant East Boundry	8	14	26306.23	96.45	9	10.7
311	Fabaceae	12	JSW Power Plant East Boundry	8	9	410.50	1.51	10	0.1
312	Melia azadirachta	12	JSW Power Plant East Boundry	10	17	1173.36	4.30	10	0.4
313	Saraca asoca	58	JSW Power Plant East Boundry	13	28	13954.41	51.16	10	5.1
314	Borassus flabellifer	34	JSW Power Plant East Boundry	13	37	10800.95	39.60	10	3.9
315	Tectona grandis	312	JSW Power Plant East Boundry	14	30	100995.44	370.28	18	20.5
316	Tectona grandis	307	JSW Power Plant East Boundry	14	31	102808.85	376.93	18	20.9
317	Eccoliptics	43	JSW Power Plant East Boundry	15	25	13884.14	50.90	18	2.8
318	Bambusa arundinacea	5050	JSW Power Plant South Boundry	3	8	23564.13	86.39	1	82.3
319	Bambusa arundinacea	600	JSW Power Plant South Boundry	3	6	2053.99	7.53	1	7.2
320	Fabaceae	745	JSW Power Plant South Boundry	4	10	7542.39	27.65	1.6	17.8
321	Bambusa arundinacea	11400	JSW Power Plant South Boundry	5	9	129035.28	473.08	2.6	185.5
322	Melia azadirachta	780	JSW Power Plant South Boundry	6	9	15301.29	56.10	3.6	15.8
323	Melia azadirachta	304	JSW Power Plant South Boundry	6	10	6655.82	24.40	3.6	6.9
324	Fabaceae	720	JSW Power Plant South Boundry	8	11	29041.77	106.48	9	11.8
325	Albizia lebbeck	720	JSW Power Plant South Boundry	8	13	34556.46	126.69	9	14.0
326	Melia azadirachta	238	JSW Power Plant South Boundry	8	16	14133.40	51.82	10	5.2
327	Pithecellobium dulce	323	JSW Power Plant South Boundry	9	16	24145.03	88.52	10	8.8
328	Pithecellobium dulce	151	JSW Power Plant South Boundry	10	14	12682.86	46.50	10	4.6
329	Albizia lebbeck	292	JSW Power Plant South Boundry	10	14	24459.80	89.68	10	8.9
330	Saraca asoca	151	JSW Power Plant South Boundry	10	23	20149.93	73.88	10	7.4
331	Ficus religiosa	223	JSW Power Plant South Boundry	11	19	29476.53	108.07	10	10.8
332	Tectona grandis	307	JSW Power Plant South Boundry	13	28	74423.53	272.86	10	27.2
333	Fabaceae	461	JSW Power Plant South Boundry	14	17	77015.51	282.36	11	25.6

334	Cocos nucifera	190	JSW Power Plant South Boundry	14	30	61374.15	225.02	18	12.5
335	Tectona grandis	187	JSW Power Plant South Boundry	14	33	66752.91	244.74	18	13.6
336	Fabaceae	12	Lime Storage sheed south	8	9	410.50	1.51	9	0.2
337	Eucalyptus	12	Lime Storage sheed south	14	31	4015.97	14.72	18	0.8
338	Terminalia Catappa	120	load center substation-4	3	6	410.80	1.51	1	1.4
339	Pongamia pinnata	180	load center substation-4	5	7	1558.41	5.71	2.6	2.2
340	Eucalyptus	14	load center substation-4	14	11	1600.99	5.87	16	0.4
341	Pithecellobium dulce	32	load center substation-4	23	20	18362.00	67.32	18	3.7
342	Casuarina Tree	7	Main Canteen	1	5	**0.595**	**0.002**	**1**	0.0021
343	Casuarina Tree	23	MAIN GATE	1	5	**1.885**	**0.007**	**1**	0.0066
344	Casuarina Tree	150	MAIN GATE AREA	1	5	**12.399**	**0.045**	**1**	0.0433
345	Casuarina Tree	120	MAIN GATE AREA	1	5	**9.919**	**0.036**	**1**	0.0346
346	Casuarina Tree	48	MAIN GATE AREA	1	5	**3.968**	**0.015**	**1**	0.0139
347	Casuarina Tree	16	MAIN GATE AREA	1	5	**1.289**	**0.005**	**1**	0.0045
348	Casuarina Tree	156	MAIN GATE AREA	1	5	**12.895**	**0.047**	**1**	0.0450
349	Casuarina Tree	50	MAIN GATE ROAD SIDE	1	5	**4.166**	**0.015**	**1**	0.0145
350	Fabaceae	547	MRSS EAST	5	11	8995.51	32.98	2.6	12.9
351	Fabaceae	175	MRSS EAST	6	8	3032.90	11.12	3.6	3.1
352	Fabaceae	34	MRSS EAST	8	11	1355.28	4.97	9	0.5
353	Melia azadirachta	54	MRSS EAST	9	13	3259.00	11.95	10	1.2
354	Cocos nucifera	10	MRSS EAST	14	39	4054.57	14.87	18	0.8
355	Casuarina Tree	8	NEW CANTEEN AREA	1	5	**0.694**	**0.003**	**1**	0.0024
356	Casuarina Tree	204	New Land	1	5	**16.862**	**0.062**	**1**	0.0589
357	Casuarina Tree	396	New Land area	1	5	**32.732**	**0.120**	**1**	0.1143
358	Casuarina Tree	210	New Land area	1	5	**17.358**	**0.064**	**1**	0.0606
359	Casuarina Tree	618	New Land area	1	5	**51.082**	**0.187**	**1**	0.1784
360	Melia azadirachta	1800	New land deep inside	2	7	3581.55	13.13	1	12.5
361	Fabaceae	1080	New land deep inside	2	7	2087.82	7.65	1	7.3
362	Fabaceae	5400	New land deep inside	1	7	3198.06	11.73	2	5.7
363	Acacia nilotica	190	New land deep inside	5	8	1893.80	6.94	2.6	2.7

364	Musa paradisiaca	43	New land deep inside	6	9	847.46	3.11	3.6	0.9
365	Bambusa arundinacea	77	New land deep inside	8	9	2627.20	9.63	9	1.1
366	Albizia lebbeck	170	New land deep inside	8	16	10136.08	37.16	9	4.1
367	Melia azadirachta	79	New land deep inside	8	16	4711.13	17.27	9	1.9
368	Melia azadirachta	50	New land deep inside	8	15	2940.09	10.78	9	1.2
369	Albizia lebbeck	18	New land deep inside	9	15	1259.70	4.62	10	0.5
370	Melia azadirachta	106	New land deep inside	10	15	9513.66	34.88	10	3.5
371	neam	3778	New land deep inside	1	7	761.45	2.79	9	0.3
372	Melia azadirachta	148	New land deep inside	10	15	13297.50	48.75	10	4.9
373	Cocos nucifera	18	New land deep inside	13	28	4360.75	15.99	10	1.6
374	Cocos nucifera	19	New land deep inside	14	29	5748.98	21.08	14	1.5
375	Cocos nucifera	40	New land deep inside	14	34	14554.86	53.36	18	3.0
376	Ficus benghalensis	22	New land deep inside	16	21	6436.19	23.60	18	1.3
377	Cocos nucifera	96	New land deep inside	16	34	46716.52	171.28	18	9.5
378	Fabaceae	67	New R&D entrance	5	10	999.57	3.66	2.6	1.4
379	Fabaceae	22	New R&D entrance	8	11	871.25	3.19	10	0.3
380	Derris indica	23	New R&D entrance	9	11	1156.43	4.24	10	0.4
381	Melia azadirachta	20	New R&D entrance	11	15	2214.37	8.12	10	0.8
382	Roystonea regia	192	New R&D entrance	14	8	15534.96	56.96	10	5.7
383	Fabaceae	212	New R&D North	5	9	2404.13	8.81	2.6	3.5
384	Derris indica	98	New R&D North	8	11	3969.04	14.55	10	1.4
385	Melia azadirachta	113	New R&D North	10	14	9461.82	34.69	10	3.5
386	Cocos nucifera	19	New R&D North	15	43	10698.32	39.22	18	2.2
387	Tectona grandis	76	New R&D North	16	43	46663.36	171.08	18	9.5
388	Casuarina Tree	60	New RESERVOIR	1	5	**4.959**	**0.018**	**1**	0.0173
389	Casuarina Tree	180	New Reservoir	1	5	**14.878**	**0.055**	**1**	0.0520
390	Fabaceae	150	Newland opposite	4	9	1358.51	4.98	1.6	3.2

391	Albizia lebbeck	170	Newland opposite	8	17	10625.50	38.96	9	4.3
392	Borassus flabellifer	74	Newland opposite	14	31	23838.83	87.40	15	5.8
393	Albizia lebbeck	672	Newland opposite	14	17	115500.44	423.46	18	23.5
394	Melia azadirachta	114	Newland opposite	14	19	23157.19	84.90	18	4.7
395	Borassus flabellifer	110	Newland opposite	14	30	35736.85	131.02	18	7.3
396	Casuarina Tree	68	OHC AREA	1	5	**5.654**	**0.021**	**1**	0.0197
397	Terminalia Catappa	18	OHC Entrance	10	14	1509.86	5.54	10	0.6
398	Fabaceae	12	OHC Entrance	14	20	2459.74	9.02	11	0.8
399	Saraca asoca	18	OHC Entrance	15	43	10029.67	36.77	18	2.0
400	Melia azadirachta	6	OHC Entrance south	15	21	1613.94	5.92	18	0.3
401	Fabaceae	2	OHC Entrance south	17	30	1188.26	4.36	18	0.2
402	Saraca asoca	19	Old guest house	13	43	7185.64	26.34	10	2.6
403	Saraca asoca	12	Old guest house	14	44	5498.16	20.16	16	1.3
404	Cocos nucifera	43	Old guest house	14	34	15878.03	58.21	18	3.2
405	Fabaceae	1279	Old gust house East	5	8	12777.12	46.84	2.6	18.4
406	Melia azadirachta	194	Old gust house East	8	13	9330.24	34.21	9	3.8
407	Saraca asoca	79	Old gust house East	11	20	10064.81	36.90	10	3.7
408	Eucalyptus	54	Old gust house East	13	28	13082.26	47.96	10	4.8
409	Carica Papaya	31	Old gust house Front	6	18	1187.62	4.35	3.6	1.2
410	Mangifera indica	720	Old gust house Front	8	30	71848.26	263.42	7	37.4
411	Melia azadirachta	180	Old gust house Front	10	26	27181.80	99.66	10	9.9
412	Saraca asoca	180	Old gust house Front	10	39	41021.55	150.40	10	15.0
413	Saraca asoca	54	Old gust house Front	11	18	6089.44	22.33	10	2.2
414	Saraca asoca	41	Old gust house Front	14	33	13970.11	51.22	15	3.4
415	Fabaceae	56	Old gust house Front	14	21	12693.11	46.54	18	2.6
416	Cocos nucifera	86	Old gust house Front	14	37	34597.13	126.84	18	7.0
417	Fabaceae	4200	Old gust house North	3	6	14377.90	52.71	1	50.2

418	Fabaceae	2866	Old gust house North	5	8	28622.68	104.94	2.6	41.2
419	Derris indica	186	Old gust house North	5	8	1857.84	6.81	2.6	2.7
420	Albizia lebbeck	1800	Old gust house North	8	15	100177.86	367.28	10	36.5
421	Tamarindus indica	180	Old gust house North	9	14	11730.15	43.01	10	4.3
422	Fabaceae	211	Old gust house North	11	17	24881.74	91.22	10	9.1
423	Cocos nucifera	48	Old gust house North	14	30	14876.17	54.54	14	3.9
424	Saraca asoca	113	Old gust house North	14	33	38510.23	141.19	15	9.4
425	Melia azadirachta	190	Old gust house North	14	11	21079.64	77.28	16	4.8
426	Fabaceae	2074	Old gust house West Boundry line	5	8	20711.89	75.94	2.6	29.8
427	Albizia lebbeck	734	Old gust house West Boundry line	8	13	35247.59	129.23	9	14.3
428	Fabaceae	504	Old gust house West Boundry line	8	15	28049.80	102.84	10	10.2
429	Melia azadirachta	220	Old gust house West Boundry line	9	15	15368.29	56.34	10	5.6
430	Ficus religiosa	14	Old gust house West Boundry line	10	17	1408.04	5.16	10	0.5
431	Cocos nucifera	101	Old gust house West Boundry line	14	30	32629.29	119.63	18	6.6
432	Roystonea regia	30	P 2 belt conveyor west	8	13	1439.85	5.28	10	0.5
433	Fabaceae	103	PCTL Entrance	5	10	1535.06	5.63	2.6	2.2
434	Melia azadirachta	20	PCTL Entrance	6	9	400.19	1.47	3.6	0.4
435	Fabaceae	336	PCTL Entrance	6	11	7771.97	28.49	3.6	8.0
436	Fabaceae	18	PF -1 East	8	11	726.04	2.66	9	0.3
437	Melia azadirachta	30	PF -1 East	10	17	2933.41	10.75	10	1.1
438	Tectona grandis	60	PF -1 East	16	34	29197.83	107.05	18	5.9
439	Tectona grandis	18	PF -1 south	15	33	7671.55	28.13	18	1.6
440	Ficus religiosa	1	PF -1 south	25	13	543.20	1.99	18	0.1
441	Fabaceae	456	PF -1 West	5	7	3947.98	14.47	2.6	5.7
442	Fabaceae	97	PF -1 West	8	11	3920.64	14.37	10	1.4
443	Melia azadirachta	53	PF -1 West	9	17	4203.64	15.41	10	1.5

444	Casuarina	246	PF 2 ground hopper	3	6	842.13	3.09	1	2.9
445	Fabaceae	180	PF 2 ground hopper	5	10	2677.43	9.82	2.6	3.8
446	Fabaceae	518	PF 2 ground hopper	7	11	16142.56	59.18	5	11.7
447	Melia azadirachta	30	PF 2 ground hopper	8	15	1544.10	5.66	7	0.8
448	Fabaceae	120	PF 2 hopper east	4	8	959.05	3.52	1.6	2.3
449	Pithecellobium dulce	300	PF 2 hopper east	5	8	2996.51	10.99	2.6	4.3
450	Fabaceae	62	PF 2 hopper east	5	10	928.17	3.40	2.6	1.3
451	Saraca asoca	24	PF 2 hopper east	11	37	5704.44	20.91	10	2.1
452	Fabaceae	2702	plant south side compount	5	9	30588.15	112.15	2.6	44.0
453	Ficus benghalensis	1	plant south side compount	35	34	2767.78	10.15	18	0.6
454	Fabaceae	25	PM - 2 Hopper south	8	14	1305.98	4.79	9	0.5
455	Pithecellobium dulce	40	PM - 2 Hopper south	8	15	2203.91	8.08	10	0.8
456	Fabaceae	20	PM - 2 Hopper south	8	14	1108.01	4.06	10	0.4
457	Saraca asoca	19	PM - 2 Hopper south	15	29	7176.86	26.31	18	1.5
458	Fabaceae	456	PTCL Office	4	8	3644.40	13.36	1.6	8.6
459	Manilkara Zapota	31	PTCL Office	5	8	311.64	1.14	2.6	0.4
460	Terminalia Catappa	65	PTCL Office	5	8	647.25	2.37	2.6	0.9
461	Terminalia Catappa	22	PTCL Office	5	9	287.50	1.05	2.6	0.4
462	Albizia lebbeck	480	PTCL Office	5	9	6388.81	23.42	2.6	9.2
463	Fabaceae	420	PTCL Office	5	10	6247.33	22.90	2.6	9.0
464	Albizia lebbeck	720	PTCL Office	7	11	22420.23	82.20	5	16.3
465	Fabaceae	551	PTCL Office	7	11	17151.47	62.88	5	12.5
466	Fabaceae	420	PTCL Office	7	11	13078.46	47.95	5	9.5
467	Melia azadirachta	60	PTCL Office	8	15	3088.21	11.32	7	1.6
468	Melia azadirachta	306	PTCL Office	8	14	15858.37	58.14	9	6.4
469	Melia azadirachta	79	PTCL Office	8	14	4104.52	15.05	9	1.7
470	Albizia lebbeck	82	PTCL Office	8	9	2791.40	10.23	9	1.1
471	Fabaceae	430	PTCL Office	8	15	23909.12	87.66	9	9.7
472	Albizia lebbeck	480	PTCL Office	8	15	26714.10	97.94	9	10.8
473	Albizia lebbeck	36	PTCL Office	8	16	2141.42	7.85	9	0.9
474	Albizia lebbeck	240	PTCL Office	8	15	13357.05	48.97	10	4.9
475	Melia azadirachta	460	PTCL Office	10	15	41406.05	151.81	10	15.1
476	Tectona grandis	60	PTCL Office	10	17	5778.10	21.18	10	2.1
477	Albizia lebbeck	34	PTCL Office	10	17	3235.73	11.86	10	1.2
478	Fabaceae	301	PTCL Office	11	28	53953.95	197.81	10	19.7
479	Cocos nucifera	587	PTCL Office	14	33	209244.70	767.15	18	42.5
480	Cocos nucifera	816	PTCL Office	14	33	290974.23	1066.80	18	59.1

481	Ficus benghalensis	23	PTCL Office	16	25	8117.27	29.76	18	1.6
482	Ficus benghalensis	120	PTCL Office	17	26	51365.94	188.32	18	10.4
483	Casuarina Tree	12	PTCL OFFICE	1	5	**0.992**	**0.004**	**1**	0.0035
484	Casuarina Tree	24	PTCL OFFICE	1	5	**1.984**	**0.007**	**1**	0.0069
485	Casuarina Tree	180	PTCL OFFICE	1	5	**14.878**	**0.055**	**1**	0.0520
486	Casuarina Tree	240	PTCL OFFICE	1	5	**19.838**	**0.073**	**1**	0.0693
487	Casuarina Tree	144	PTCL OFFICE	1	5	**11.903**	**0.044**	**1**	0.0416
488	Casuarina Tree	60	PTCL OFFICE	1	5	**4.959**	**0.018**	**1**	0.0173
489	Casuarina Tree	102	PTCL OFFICE	1	5	**8.431**	**0.031**	**1**	0.0294
490	Casuarina Tree	120	PTCL OFFICE	1	5	**9.919**	**0.036**	**1**	0.0346
491	Casuarina Tree	162	PTCL OFFICE	1	5	**13.390**	**0.049**	**1**	0.0468
492	Casuarina Tree	72	PTCL ROAD SIDE	1	5	**5.951**	**0.022**	**1**	0.0208
493	Fabaceae	458	QAD south	5	8	4578.67	16.79	2.6	6.6
494	Fabaceae	34	QAD West	8	14	1741.31	6.38	9	0.7
495	Melia azadirachta	12	QAD West	10	15	1081.10	3.96	10	0.4
496	Casuarina Tree	74	R O Plant, Guard Pond	1	5	**6.150**	**0.023**	**1**	0.0215
497	Terminalia Catappa	18	Railway gate opposite site	7	11	560.51	2.05	5	0.4
498	Albizia lebbeck	66	Railway gate opposite site	8	15	3673.19	13.47	9	1.5
499	Pithecellobium dulce	50	Railway gate opposite site	8	15	2804.98	10.28	9	1.1
500	Albizia lebbeck	18	Railway gate opposite site	8	16	1070.71	3.93	9	0.4
501	Albizia lebbeck	25	Railway gate opposite site	10	17	2464.06	9.03	10	0.9
502	Saraca asoca	18	Railway gate opposite site	10	40	4208.61	15.43	10	1.5
503	Melia azadirachta	12	Railway gate opposite site	11	18	1353.21	4.96	10	0.5
504	Cocos nucifera	18	Railway gate opposite site	14	31	5767.46	21.15	14	1.5
505	Cocos nucifera	12	Railway gate opposite site	14	34	4410.56	16.17	18	0.9
506	Cocos nucifera	18	Railway gate opposite site	14	37	7207.73	26.43	18	1.5
507	Tamarindus indica	60	Railway gate opposite site	16	19	16136.85	59.16	18	3.3
508	Ficus benghalensis	12	Railway gate opposite site	16	25	4272.25	15.66	18	0.9
509	Tectona grandis	132	Railway gate opposite site	16	30	56572.78	207.41	18	11.5
510	Tectona grandis	60	Railway gate opposite site	16	30	25714.90	94.28	18	5.2
511	Tamarindus indica	36	Railway gate opposite site	17	19	11185.03	41.01	18	2.3

512	Fabaceae	595	Raw Material Yard North	4	10	6024.20	22.09	1.6	14.2
513	Melia azadirachta	720	Raw Material Yard North	8	14	37313.80	136.80	9	15.1
514	Albizia lebbeck	344	Raw Material Yard North	9	15	24102.19	88.37	10	8.8
515	Saraca asoca	222	Raw Material Yard North	14	26	59483.42	218.08	12	18.1
516	Tectona grandis	211	Raw Material Yard North	14	33	75310.98	276.11	18	15.3
517	Eucalyptus	175	Raw Material Yard North	15	30	67784.09	248.52	18	13.8
518	Fabaceae	1068	Raw Material Yard South	4	10	10809.55	39.63	1.6	25.6
519	Pithecellobium dulce	499	Raw Material Yard South	4	10	5052.55	18.52	1.6	12.0
520	Fabaceae	811	Raw Material Yard South	5	8	8102.57	29.71	2.6	11.6
521	Derris indica	319	Raw Material Yard South	5	10	4747.97	17.41	2.6	6.8
522	Terminalia Catappa	264	Raw Material Yard South	6	8	4570.13	16.76	3.6	4.7
523	Melia azadirachta	551	Raw Material Yard South	6	10	12075.18	44.27	3.6	12.5
524	Melia azadirachta	576	Raw Material Yard South	6	10	12627.64	46.30	3.6	13.0
525	Ficus religiosa	223	Raw Material Yard South	8	16	13276.83	48.68	9	5.4
526	Saraca asoca	67	Raw Material Yard South	11	23	10790.13	39.56	10	3.9
527	Cocos nucifera	106	Raw Material Yard South	14	28	30511.19	111.86	12	9.3
528	Tectona grandis	144	Raw Material Yard South	14	28	43456.53	159.32	18	8.8
529	Saraca asoca	104	Raw Material Yard West	8	20	7809.39	28.63	10	2.8
530	Fabaceae	598	Raw Material Yard West	9	13	36066.28	132.23	10	13.2
531	Tectona grandis	26	Raw Material Yard West	10	26	3986.66	14.62	10	1.5
532	Saraca asoca	67	Raw Material Yard West	10	26	10147.87	37.21	10	3.7
533	Melia azadirachta	395	Raw Material Yard West	14	14	56396.03	206.76	16	12.9
534	Tectona grandis	54	Raw Material Yard West	14	29	16888.09	61.92	18	3.4
535	Casuarina Tree	108	RO PLANT AREA	1	5	**8.927**	**0.033**	**1**	0.0312
536	Casuarina Tree	78	RO PLANT AREA	1	5	**6.447**	**0.024**	**1**	0.0225
537	Casuarina Tree	13	RO PLANT ROAD	1	5	**1.091**	**0.004**	**1**	0.0038

			SIDE						
538	Casuarina Tree	72	RO PLANT ROAD SIDE	1	5	**5.951**	**0.022**	**1**	0.0208
539	Fabaceae	14	Safety & environment entrance	8	11	580.84	2.13	9	0.2
540	Mangifera indica	18	Safety & environment entrance	9	17	1433.06	5.25	10	0.5
541	Tectona grandis	19	Safety & environment entrance	14	19	3756.02	13.77	18	0.8
542	Cocos nucifera	8	Safety & environment entrance	14	34	3087.39	11.32	18	0.6
543	Terminalia Catappa	12	Safety & environment south	6	10	263.08	0.96	3.6	0.3
544	Fabaceae	30	Safety & environment south	8	13	1439.85	5.28	9	0.6
545	Fabaceae	18	Safety & environment south	10	15	1621.65	5.95	10	0.6
546	Melia azadirachta	24	Safety & environment south	11	18	2706.42	9.92	10	1.0
547	Roystonea regia	60	Safety & environment south	14	11	6486.76	23.78	10	2.4
548	Melia azadirachta	7	Safety & environment south	14	19	1369.65	5.02	11	0.5
549	Fabaceae	17	Safety & environment south	14	21	3780.93	13.86	18	0.8
550	Tectona grandis	10	Safety & environment south	14	34	3528.45	12.94	18	0.7
551	Cocos nucifera	12	Safety & environment south	14	44	5725.87	20.99	18	1.2
552	Terminalia Catappa	24	Scrap yard cooling tower	8	11	1014.01	3.72	7	0.5
553	Albizia lebbeck	8	Scrap yard cooling tower	14	17	1403.93	5.15	11	0.5
554	Albizia lebbeck	10	Scrap yard cooling tower	14	21	2160.53	7.92	18	0.4

555	Terminalia Catappa	34	sinter Machine North	8	14	1741.31	6.38	9	0.7
556	Melia azadirachta	12	sinter Machine North	8	16	713.81	2.62	9	0.3
557	Fabaceae	31	sinter Machine North	8	14	1694.60	6.21	10	0.6
558	Fabaceae	36	sinter Machine North	10	15	3243.29	11.89	10	1.2
559	Fabaceae	49	Sinter Machine plant 2 North	6	10	1078.61	3.95	3.6	1.1
560	Melia azadirachta	18	Sinter Machine plant 2 North	8	15	926.46	3.40	5	0.7
561	Fabaceae	52	Sinter Machine plant 2 south	14	16	8460.27	31.02	16	1.9
562	Terminalia Catappa	18	Sinter plant	8	15	1050.03	3.85	9	0.4
563	Fabaceae	30	Sinter plant	8	16	1784.52	6.54	10	0.7
564	Casuarina Tree	240	SINTER PLANT	1	5	**19.838**	**0.073**	**1**	0.0693
565	Casuarina Tree	78	SINTER PLANT	1	5	**6.447**	**0.024**	**1**	0.0225
566	Casuarina Tree	84	Sinter Plant-II	1	5	**6.943**	**0.025**	**1**	0.0
567	Bambusa arundinacea	864	Slag Crushing mining plant	3	5	2420.67	8.87	1	8.5
568	Fabaceae	18	Slag Crushing mining plant	10	17	1760.04	6.45	10	0.6
569	Melia azadirachta	18	Slag Crushing mining plant	11	15	1953.85	7.16	10	0.7
570	Fabaceae	22	SP East	9	17	1719.67	6.30	10	0.6
571	Fabaceae	37	SP south	10	17	3582.42	13.13	10	1.3
572	Melia azadirachta	18	SP south	10	15	1621.65	5.95	10	0.6
573	Casuarina Tree	240	TEMPLE	1	5	**19.838**	**0.073**	**1**	0.0693
574	Casuarina Tree	180	TEMPLE	1	5	**14.878**	**0.055**	**1**	0.0520
575	Casuarina Tree	552	TEMPLE AREA COMPUND SIDE	1	5	**45.627**	**0.167**	**1**	0.1593
576	Casuarina Tree	420	TEMPLE AREA COMPUND SIDE	1	5	**34.716**	**0.127**	**1**	0.1212
577	Fabaceae	511	Temple East	5	11	7146.53	26.20	2.6	10.3
578	Fabaceae	462	Temple East	6	9	9063.07	33.23	3.6	9.4
579	Terminalia Catappa	410	Temple East	6	10	8997.20	32.99	3.6	9.3
580	Melia azadirachta	353	Temple East	8	11	14906.02	54.65	7	7.8
581	Bauhinia purpurea	18	Temple East	8	9	615.75	2.26	9	0.2
582	Tectona grandis	54	Temple East	8	14	2798.54	10.26	9	1.1
583	Albizia lebbeck	182	Temple East	8	13	8754.30	32.10	10	3.2
584	Melia azadirachta	218	Temple East	8	13	10482.13	38.43	10	3.8
585	Pithecellobium dulce	61	Temple East	9	15	4282.97	15.70	10	1.6
586	Fabaceae	191	Temple East	9	17	15190.42	55.69	10	5.5
587	Albizia lebbeck	170	Temple East	9	17	13566.29	49.74	10	4.9
588	Tectona grandis	108	Temple East	10	28	17586.60	64.48	10	6.4
589	Tectona grandis	106	Temple East	11	33	22351.36	81.95	10	8.2
590	Melia azadirachta	330	Temple East	11	17	38877.71	142.54	10	14.2

591	Saraca asoca	347	Temple East	14	29	103840.92	380.71	12	31.6
592	Tectona grandis	720	Temple East	14	37	276843.38	1014.99	15	67.4
593	Ficus religiosa	34	Temple East	14	19	6573.04	24.10	18	1.3
594	Cocos nucifera	194	Temple East	14	33	69320.33	254.15	18	14.1
595	Tectona grandis	366	Temple East	16	40	209975.52	769.83	18	42.7
596	Fabaceae	548	Temple South	3	7	2218.24	8.13	1	7.7
597	Fabaceae	443	Temple South	5	11	6190.30	22.70	2.6	8.9
598	Terminalia Catappa	163	Temple South	5	7	1412.96	5.18	2.6	2.0
599	Derris indica	233	Temple South	5	7	2015.55	7.39	2.6	2.9
600	Roystonea regia	89	Temple South	5	9	1005.12	3.69	2.6	1.4
601	Tectona grandis	288	Temple South	5	9	3259.84	11.95	2.6	4.7
602	Fabaceae	577	Temple South	8	13	27702.76	101.57	9	11.2
603	Melia azadirachta	474	Temple South	8	13	22749.67	83.41	9	9.2
604	Albizia lebbeck	240	Temple South	8	13	11518.82	42.23	9	4.7
605	Bauhinia purpurea	55	Temple South	8	13	2649.33	9.71	10	1.0
606	Melia azadirachta	338	Temple South	11	17	39264.46	143.96	10	14.3
607	Albizia lebbeck	54	Temple South	14	19	10272.41	37.66	11	3.4
608	Tectona grandis	139	Temple South	14	28	40219.30	147.46	12	12.2
609	Eucalyptus	58	Temple South	14	31	19276.66	70.67	18	3.9
610	Tectona grandis	47	Temple South	15	34	20559.15	75.38	18	4.2
611	Ficus religiosa	18	Temple South	19	40	13886.10	50.91	18	2.8
612	Casuarina Tree	336	TOWNSHIP AREA	1	5	**27.773**	**0.102**	**1**	0.0970
613	Casuarina Tree	300	TOWNSHIP AREA	1	5	**24.797**	**0.091**	**1**	0.0866
614	Casuarina Tree	204	TOWNSHIP AREA	1	5	**16.862**	**0.062**	**1**	0.0589
615	Casuarina Tree	120	TOWNSHIP AREA	1	5	**9.919**	**0.036**	**1**	0.0346
616	Casuarina Tree	120	TOWNSHIP AREA	1	5	**9.919**	**0.036**	**1**	0.0346
617	Casuarina Tree	180	TOWNSHIP AREA	1	5	**14.878**	**0.055**	**1**	0.0520
618	Casuarina Tree	120	TOWNSHIP RESERVIOR	1	5	**9.919**	**0.036**	**1**	0.0346
619	Terminalia Catappa	120	wagon loco office	5	8	1198.60	4.39	2.6	1.7
620	Fabaceae	18	wagon loco office	9	17	1433.06	5.25	10	0.5
621	Albizia lebbeck	26	wagon loco office	10	15	2378.42	8.72	10	0.9
622	Melia azadirachta	30	wagon loco office	11	11	2251.65	8.26	10	0.8
623	Fabaceae	30	wagon loco office	14	17	5091.02	18.67	11	1.7
624	Cocos nucifera	12	wagon loco office	14	30	3719.04	13.64	14	1.0
625	Roystonea regia	14	wagon loco office	14	9	1357.78	4.98	16	0.3
626	Albizia lebbeck	22	wagon loco office	14	17	3712.51	13.61	18	0.8
627	Casuarina Tree	120	WAGON TIPPLER	1	5	**9.919**	**0.036**	**1**	0.0346

628	Fabaceae	415	Water Reservoir south Boundary	4	8	3318.32	12.17	1.6	7.8
629	Bambusa arundinacea	4200	Water Reservoir south Boundary	5	7	36363.00	133.32	2.6	52.3
630	Fabaceae	1080	Water Reservoir south Boundary	5	9	12224.40	44.82	2.6	17.6
631	Fabaceae	631	Water Reservoir south Boundary	5	9	7144.48	26.19	2.6	10.3
632	Fabaceae	499	Water Reservoir south Boundary	5	11	8206.43	30.09	2.6	11.8
633	Fabaceae	295	Water Reservoir south Boundary	7	11	9192.29	33.70	5	6.7
634	Fabaceae	3600	Water Reservoir south Boundary	7	11	112101.13	411.00	5	81.4
635	Fabaceae	938	Water Reservoir south Boundary	8	9	32101.12	117.69	9	13.0
636	Fabaceae	830	Water Reservoir south Boundary	8	13	39855.11	146.12	9	16.1
637	Fabaceae	180	Water Reservoir south Boundary	8	15	10017.79	36.73	9	4.1
638	Cassia fistula	18	Water Reservoir south Boundary	8	15	1001.78	3.67	9	0.4
639	Fabaceae	300	Water Reservoir south Boundary	8	14	16294.20	59.74	9	6.6
640	Melia azadirachta	227	Water Reservoir south Boundary	8	15	12622.41	46.28	10	4.6
641	Melia azadirachta	90	Water Reservoir south Boundary	9	17	7165.29	26.27	10	2.6
642	Melia azadirachta	180	Water Reservoir south Boundary	10	15	16216.47	59.45	10	5.9
643	Fabaceae	295	Water Reservoir south Boundary	10	15	26595.01	97.51	10	9.7
644	Melia azadirachta	226	Water Reservoir south Boundary	10	15	20324.64	74.52	10	7.4
645	Fabaceae	370	Water Reservoir south Boundary	10	17	36139.57	132.50	10	13.2
646	Melia azadirachta	182	Water Reservoir south Boundary	10	17	17835.11	65.39	10	6.5
647	Melia azadirachta	342	Water Reservoir south Boundary	10	14	28687.42	105.18	10	10.5
648	Melia azadirachta	52	Water Reservoir south Boundary	10	15	4648.72	17.04	10	1.7
649	Neolamarckia cadamba	52	Water Reservoir south Boundary	10	15	4648.72	17.04	10	1.7
650	Tamarindus indica	107	Water Reservoir south Boundary	14	25	27495.57	100.81	12	8.4
651	Fabaceae	301	Water Reservoir south Boundary	14	29	90187.09	330.65	14	23.5

652	Saraca asoca	67	Water Reservoir south Boundary	14	37	25838.72	94.73	15	6.3
653	Borassus flabellifer	48	Water Reservoir south Boundary	14	40	19971.83	73.22	16	4.6
654	Borassus flabellifer	30	Water Reservoir south Boundary	14	43	13429.64	49.24	16	3.1
655	Borassus flabellifer	40	Water Reservoir south Boundary	14	43	17727.13	64.99	16	4.0
656	Tectona grandis	343	Water Reservoir south Boundary	14	37	137427.48	503.85	18	27.9
657	Cocos nucifera	31	Water Reservoir south Boundary	14	40	13519.35	49.57	18	2.7
658	Borassus flabellifer	8	Water Reservoir south Boundary	14	44	4008.11	14.69	18	0.8
659	Saraca asoca	101	Water Reservoir south Boundary	14	44	48097.34	176.34	18	9.8
660	Cocos nucifera	55	Water Reservoir south Boundary	14	44	26339.02	96.57	18	5.3
661	Cocos nucifera	396	Water Reservoir south Boundary	15	39	199901.37	732.90	18	40.6
662	Tectona grandis	288	Water Reservoir south Boundary	15	39	145382.81	533.02	18	29.5
663	Tectona grandis	102	Water Reservoir south Boundary	15	40	52826.01	193.68	18	10.7
664	Ficus religiosa	94	Water Reservoir south Boundary	16	25	33323.53	122.17	18	6.8
665	Tectona grandis	144	Water Reservoir south Boundary	17	28	66467.42	243.69	18	13.5
666	Tectona grandis	828	Water Reservoir south Boundary	17	40	548763.49	2011.93	18	111.5
667	Tectona grandis	696	Water Reservoir south Boundary	17	30	344595.89	1263.39	18	70.0
Total No of Surviving saplings		175003		Total Carbon Sequestered per annum					**4539**

Annexure- II

CPCB guidelines for Green Belt development

VII. Green Belt

i. Green belt shall be developed in an area equal to 33% of the plant area with a native tree species in accordance with CPCB guidelines. The greenbelt shall inter alia cover the entire periphery of the plant

ii. The project proponent shall prepare GHG emissions inventory for the plant and shall submit the programme for reduction of the same including carbon sequestration including plantation.

Ref : Annexure II III and IV.

F. No. 22-34/2018-IA.III
Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

Annexure- III

Environment Celebration Activities by M/s.JSW

Tree Sapling 2021-2022

Tree Sapling -2021-2022


In house Nursery Development


2022/4/30 11:28

Annexure-IV

List of Recommended species for further improvement **

1. Acacia albida
2. Acacia aunculiformis
3. Acacta catechu
4. Acacia holosericea
5. Acacia nilottca
6. Acacia senegal
7. Albizia amara
8. Albizra lebbeck
9. Azadirachta rndtca
10. Oalberg1a SISSOO
11. Eucalyptus hybrid
12. Erythrina vanegata
13. Gliricidia sepium
14. Grewia tenax
15. Hardwickia binata
16. Leucaena latisiliqua
17. Pithecellobium dulce
18. Ztzyphus nummulan

**** Ref :** PAOBES/75/1999-2000
CENTRAL POLLUTION CONTROL BOARD
(Ministry of Environment & Forests, Govt. of India) Parivesh Bhawan, East Arjun Nagar Delhi -110 032,India.

Copy of the Environmental Clearance dated.10.02.2020

F. No. J-11011/281/2006-IA. II(I)
Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

Indira Paryavaran Bhawan
Jor Bagh Road, Aliganj,
New Delhi – 110003

E-mail: dirind-moefcc@gov.in
Tel: 011-24695368

Dated: 10th February, 2020

To

Shri. BNS. Prakash Rao,
Senior Vice President,
M/s. JSW Steel Limited,
Pottaneri, Mecheri Salem Works,
Mettur, Salem,
Tamil Nadu - 636453
Tel: 04298-272272; E-mail: d.ravichandar@jsw.in

Subject: Installation of 0.8 MTPA slag grinding unit and new facilities related to value addition and technological upgradation within the existing 1.3 MTPA Integrated Steel Plant premises by **M/s JSW Steel Limited** located at village Pottaneri & M.Kalipatti, Mecheri, Taluk Mettur, District Salem, **Tamil Nadu – Environmental Clearance under para 7(ii) of the EIA Notification, 2006** - regarding.

Sir,

1. This refers to the online application of **M/s JSW Steel Limited** made vide proposal no. IA/TN/IND/104947/2019 dated 11/11/2019 along with copy of EIA/EMP report and Form – 2 seeking Environmental Clearance (EC) under the provisions of para 7(ii) of EIA Notification, 2006 for the project mentioned above. The proposed project activity is listed at Sl. No. 3(a) Metallurgical Industries (Ferrous and Non-ferrous) under Category "A" EIA Notification, 2006 and the project is appraised at the Central level.

2. The aforesaid proposal was considered in the 13th meeting of the Reconstituted Expert Appraisal Committee meeting held during 27-29th November, 2019. The EAC proceedings of the proposal is given as below:

Details submitted by the project proponent

3. The project of M/s. JSW Steel Works located in M. Kallipatti and Pottaneri Village, Mettur Tehsil, Salem District, Tamil Nadu was granted environment clearance for the expansion of crude steel capacity from 1.0 to 1.3 MTPA. and additional captive power plant of 1 x 30 MW vide letter No. J-11011/281/2006-IA. II (I) dated 07.07.2017. The Expansion project activities are scheduled in phased manner. At present Phase-I activities of the project are completed and CTO obtained on 25.06.19 for 1.15 MTPA steel production and 97 MW Captive power generation. Balance expansion activities are scheduled in phase II.

4. The implementation status of 1.3 MTPA existing EC are given in the table below:

S. No	Manufacturing Units	Capacity at 1.0 MTPA	Proposed Expansion 1.0 to 1.3 MTPA	Total Capacity after Expansion	Implementation Status
1	Coke Oven Plant -1(Non–Recovery Type)	0.50	-	0.5	In operation
2	Sinter Plant – 1 (20 Square Meter)	0.175	-	0	In operation
3	Sinter Plant – 2 (90 Square Meter)	1.06	-	1.06	In operation
4	Sinter Plant – 3 (90 Square Meter)	-	1.06	1.06	Yet to be installed
5	Blast Furnace – 1 (402 to 650 Cubic Meter)	0.367	0.316	0.683	Yet to be installed
6	Blast Furnace – 2 (550 to 650 Cubic Meter)	0.578	0.105	0.683	In operation
7	Energy Optimizing Furnace – 1	0.41	0.23	0.64	In operation
8	Energy Optimizing Furnace – 2	0.62	-	0.62	In operation
9	Ladle Furnace-1 with Common VD	45 T/heat	20 T/heat	65 T/heat	In operation
10	Ladle Furnace -2	65	-	65 T/heat	In operation
11	Ladle Furnace- 3 common VD	65 T/heat	-	65 T/heat	In operation
12	Ladle Furnace- 4	65	-	65 T/heat	In operation
13	Continuous Casting Machine-1	0.35	-	0.35	In operation
14	Continuous Casting Machine - 2	0.50	-	0.50	In operation
15	Continuous Casting Machine - 3	-	0.45	0.45	In operation
16	Bar & Rod Mill Augmentation	0.4	0.08	0.48	In operation
17	Blooming Mill	0.36	0.12	0.48	In operation
18	Pickling and Annealing Steel unit	-	0.06	0.06	Annealing unit is in operation. Pickling plant
19	Peeled and ground	-	0.04	0.04	0.01 MTPA in operation. 0.03 MTPA installation under
20	Air Separation Plant 1	150 T/day	-	150 T/day	In operation
21	Air Separation Plant 2	390 T/day	-	390 T/day	In operation

S. No	Manufacturing Units	Capacity at 1.0 MTPA	Proposed Expansion 1.0 to 1.3 MTPA	Total Capacity after Expansion	Implementation Status
22	Air Separation Plant 3	-	250 T/day	250 T/day	Yet to be installed
23	Captive Power Plant 1	7 MW	-	7 MW	In operation
24	Captive Power Plant - 2	2 x 30 MW	-	2 x 30 MW	In operation
25	Captive Power Plant - 3	0	1 x 30 MW	1 x 30 MW	In operation

5. An amendment in the existing environmental clearance (EC) of 1.3 MTPA was requested for installation of 0.8 MTPA slag grinding unit and other few technological upgradation of existing facilities. The proposal was appraised in the 36thmeeting of the reconstituted EAC (Industry-I) held on 9/10/2018 and ToR was prescribed on 09.11.2018. Thereafter, amendment to the ToR was requested to include few balancing and modification facilities in the existing ToR. The proposal was considered in the 6th meeting of the reconstituted EAC (Industry-I) held during on 30/04/2019 and MoEF&CC issued amendment to the existing ToR to include the proposed facilities vide letter dated 27/06/2019. Further, the Committee also recommended that the decision to consider the instant proposal under para 7(ii) (a) will be based on findings of the EIA report to be submitted to the Ministry by the project proponent. Thereafter, EAC will consider the proposal in its meeting exercising due diligence, inter-alia, and also ascertain the need for conduct of a fresh public consultation by the project proponent.

6. Based on the ToRs prescribed for the project, JSWSL has submitted an application for grant of environmental clearance under clause 7 (ii) of the EIA notification 2006 to the Ministry vide online application no. IA/TN/IND/104947/2019 dated 11.11.2019.

7. The proposed project is for value addition, modification in the existing facilities for emission reduction and balancing facilities without increasing the production capacity of 1.3 MTPA steel.

8. The modification envisaged in the existing EC dated 7/7/2017 and the details of the value added facilities envisaged are given as below:

Modifications envisaged in the existing EC dated 7/7/2017

Manufacturing Facilities	Existing Capacity	Proposed Expansion for which EC has been issued	Total Capacity after Expansion	Modification
Coke Oven Plant -1 (Non – Recovery Type)	0.50	-	0.5	The existing weakened 80m RCC chimney of Battery 1, is being replaced with

Manufacturing Facilities	Existing Capacity	Proposed Expansion for which EC has been issued	Total Capacity after Expansion	Modification
				two nos. of MS refractory lined chimney of 75m height.
Sinter Plant – 2 (90 Square Meter)	1.06	-	1.06	**Waste heat utilization:** About 6,00,000 m^3/hr of hot air (275°C) planned to be diverted from sinter cooler of SP 2 & 3 to GGBS grinding unit to recover the sensible heat which is presently vented into atmosphere. **Emission reduction:** At present, Sinter machine-2 waste gas stack is operating at an average of 110 mg/Nm^3 of SPM as against the norm of 150 mg/Nm^3, which is planned to be revamped to meet 50 mg/Nm^3 as an voluntary APC measures.
Sinter Plant – 3 (90 SquareMeter)	-	1.06	1.06	
Blast Furnace – 1 (402 to 650 Cubic Meter) – Hot Metal	0.367	0.316	0.683	It is proposed to install 0.8 MTPA slag grinding unit to produce Ground Granulated Blast furnace Slag (GGBS) as a value added facility.
Blast Furnace – 2 (550 to 650 Cubic Meter) – Hot Metal	0.578	0.105	0.683	
Ladle Furnace - 1 with Common VD (45 T to 65 T)	45 T/heat	20 T/heat	65 T/heat	The existing primary de-dusting system of LRF 1 (38000 m^3/hr) has been taken to common secondary

Manufacturing Facilities	Existing Capacity	Proposed Expansion for which EC has been issued	Total Capacity after Expansion	Modification
				de-dusting system of LRF's which is having designed capacity of 5,50,000 m^3/hr but working at 4,00,000 m^3/hr. The existing LRF-1 primary de-dusting stack of 30m height became redundant and planned to be used for CCM-3 billet grinding (surface preparation) fume extraction.
Ladle Furnace – 5 (65 T with VD)	-	-	65 T/heat (New)	Additional facility planned now. Since JSW Salem is producing special steels, the per heat process time increased from 30 min to 105 min due to vacuum degassing. Hence, additional LRF-5 is envisaged.
Continuous Casting Machine – 1	0.35	-	0.35	**Additional stacks** Since, CCM-2 is provided with auto cutter fume extraction system with stack, it is planned to provide the same facility to CCM-1 & 3 APC measures. The height of the chimney will be 20m. In addition, grinding fume extraction facility will be provided with bag filters for CCM 1 to 3 with stack height of 30m.
Continuous Casting Machine – 2	0.5	-	0.5	
Continuous Casting Machine – 3	-	0.45	0.45	
Pickling and Annealing Steel	-	0.06	0.06	A wet scrubber is envisaged to scrub the

Manufacturing Facilities	Existing Capacity	Proposed Expansion for which EC has been issued	Total Capacity after Expansion	Modification
unit				acid fumes generated from the acid bath as APC measures. Three hot water generators are envisaged to meet the following process requirement to minimize fresh acid consumption and to ensure ZLD in the proposed ETP. To maintain the acid temperature of 55^0 in the pickling bath. To maintain the treated spent acid temp. of 55^0 for reuse. To supply hot water to thermal fluidic system of evaporator for ETP to ensure ZLD
Captive Power Plant 2 (2 x 30 MW)	2X30 MW	-	2X30 MW	One coal-based boiler installed in the year 2006 with a capacity of 127 TPH is operating at emission concentration of SPM, SO_2 & NOx with 70, 1000 and 600 mg/Nm^3 respectively. This unit has been planned to be upgraded, to meet the revised emission standard as per CPCB letter dated 16.04.2018 of 50, 600 and 300 mg/Nm^3 respectively.
Captive Power Plant 3 (1 x 30)	-	30 MW	30 MW	The total capacity of 30MW remains unaltered. Since, COP capacity remains same there is no additional waste gas is expected.

Manufacturing Facilities	Existing Capacity	Proposed Expansion for which EC has been issued	Total Capacity after Expansion	Modification
				The additional BF gas as expected due to expansion is planned to be diverted to SMS (VD Boilers) and various shops.
DG sets	3x625 KVA	1x1250 KVA	3x625 KVA and 1x1250 KVA	2x1250 KVA 1x1750 KVA 3x275 KVA 1x650 KVA 1x400 KVA The above DG sets are envisaged to meet the emergency conditions of plant black out requirements.

Installation of value added facilities

S.No.	Name of the unit	Production capacity envisaged	Purpose
i.	Paver block making facility	25000 Nos. of paver block/day	The utilization of the steel slag has been a major challenge in all integrated steel plants. Our R&D has successfully developed a technology for using steel slag in the manufacture of paver blocks. The study has established successful production paver blocks at 30% lower costs than with natural aggregates with lower use of cement and use of steel slag. It is proposed to install a paver block making facility for 25000 Nos. of paver block/day for demonstration purposes. It is intended with its installation, entrepreneurs will utilize this to supply good quality pavers for use in

S.No.	Name of the unit	Production capacity envisaged	Purpose
			construction purposes.
ii.	Etching Lab	Nil	PP is receiving requests from their customers of special steels for the results of macro structure of steel products to assess its internal soundness. In order to carry out this test, the test samples of 25 mm thick will be collected from 160 to 310 mm round, 130 to 340/400 square and rectangle of bar products. The samples are to be immersed in hydrochloric acid in a tank of 100-liter volume for preparing the sample for further testing. It is proposed to install an acid fume extraction system to improve the work area for the laboratory personnel.
iii.	SMS slag crushing plant	Crushing unit of 50 TPH capacity	It is proposed to install a crushing unit of 50 TPH Capacity with suitable air pollution control facilities for crushing and separation of iron bearing material from slag.
iv.	Batching plant	Batching plant of 30 m^3/hr capacity	The construction activity for the expansion units in the 1.3 MTPA steel plant expansion is under progress. For this purpose, it is proposed to install a batching plant within the steel works with suitable air pollution control facilities for catering to the ready mix

S.No.	Name of the unit	Production capacity envisaged	Purpose
			concrete for construction
v.	Coke oven plant	Installation of bag filter with associated equipment to capture the coke dust emission	Existing Coke oven, fugitive emissions are observed while transporting coke in the conveyors (width: 1200mm) whenever it is in operation. In order to control this visible emission, it is proposed to install a bag filter with associated equipment to capture the coke dust emission
vi.	Coke Oven Plant	Coke Oven Stack 2A (COP)	Coke Oven battery # 2 existing 80m RCC chimney is found weakened, will be replaced with two nos. of MS refractory lined chimney of 75m height.
vii.	Coke Oven Plant	Coke Oven Stack 2B (COP)	
viii.	Coke Oven Plant	Coke oven # III chimney	To maintain and control draft at ovens the existing stack height of 38m will be increased to 65m.
ix.	Coke Oven Plant	Waste Heat Recovery Boiler# III	It is envisaged that additional sensible heat source from COP battery # 3 and to meet the requirement the existing stack dia and height will be modified to 1.8m and 35m respectively.
x.	SMS – CCM# 3	Steam Exhaust System stack #2	To maintain draft in the casting area an additional steam exhaust stack will be provided with the height of 26m
xi.	Pickling plant ETP	Hot water generator to ATFD	It is anticipated that Agitated Thin Film Drier (ATFD) will be installed after evaporator of ETP. To supply heat source to ATFD a Hot water generator (HSD based) will be installed

S.No.	Name of the unit	Production capacity envisaged	Purpose
xii.	Pickling plant ETP	ETP plant ATFD vent	It is anticipated that there is a vent stack to release water vapor from ATFD.
xiii.	CPP II	ETP plant ATFD vent	It is proposed to install a ETP (ZLD) plant in CPP II and steam will be used for heating application. It is anticipated that there is a vent stack to release water vapor from ATFD.

9. The certified compliance report for the existing environmental clearance was obtained from Regional office, Chennai vide letter No. EP/12.1/2016-17/20/TN/1687 dated 18.10.2019 wherein the conditions related to installation of solar panel, implementation of ESC related activities are yet to be complied. In this regard, project proponent has submitted action taken report for the conditions which are partially completed vide letter JSWSL/ENVT/MoEF&CC/ROC/2019-20/112 dated 01.11.2019.

10. The total land available including township is 268.08 ha. The plant site is 237.28 ha and township area is 30.80 ha. The land has been classified as Industrial Land use. The land required for the proposed changes/facilities is about 5.36 ha and the same exists within the plant premises. Hence, no additional land is required for the proposed changes. The greenery is about 33.5% of the total land area. Geographically, the proposed plant is located at 11°49'30.00" N & 77°54'22.34" E to 11°48'44.80" N to 77°55'37.51" E. The entire area falls in Survey of India topo sheet nos. C43F13, C43F14 & C44A1, C44A2.

11. There are No National parks, Wildlife sanctuaries, Biosphere reserves, Tigers/Elephant reserves, Wildlife corridors etc. within 10 km from the project site. There is no water body passing through project site.

12. The raw materials used in the plant are Iron ore lumps and fines, Coking/Non-coking and thermal coals, Dolomite Quartzite, Dunite, Anthracite and lime stone. The requirement of raw materials remains the same as noted in the existing EC of 1.3 MTPA except the addition of 0.04 MTPA of lime stone for SO_2 control in coal based boiler.

13. An agreement already exists between PWD and JSW to utilize 5 MGD (22730 KLD) of raw water from downstream of Mettur dam. The total estimated water requirement after the modification and installation of value added facilities will be about 17727 KLD (3.9 MGD) against the existing consumption of 17007 KLD (3.74 MGD). The additional water requirement 0.16 MGD is mainly for the proposed LRF# 5. As per existing EC dated 7/7/2017, the estimated fresh water consumption is 4.45 MGD (20245 KLD). Due to the RO plant installation and Air Cooled Condenser installation in CPP II (Unit # 3), about 2500 KLD of fresh water consumption was reduced per day.

14. The power requirement of the proposed project is estimated as 11.5 MW, The existing Captive power plant of the industry have power generation capacity of 97 MW and power purchase agreement with TNEB is about 34 MW. After the proposed changes the total power requirement would be 101.5 MW which will be cater through CPP and TNEB grid.

15. Baseline Environmental Studies were conducted during winter season from December 1st 2018 to 28th February 2019. Ambient Air Quality Monitoring (AAQM) was carried out at eight (8) locations during December 2018 to February 2019 and the baseline data indicates the ranges of concentrations as PM_{10} – 54.71 to 70.98 µg/m^3; SO_2 – 9.55 to 14.68 µg/m^3; NO_2 – 19.63 to 27.53 µg/m^3. AAQ modelling study emissions indicates that the maximum incremental GLCs after the proposed amendment is 4.17 µg/m^3 with respect to PM_{10}, 0.62 µg/m^3 with respect to SO_2, 0.38 µg/m^3 with respect to NO_2.The proposed technological upgradation and other facilities will lead to reduction in pollution load – SPM by 11.8%, SO_2 by 4.33% & NO_x by 8.14 %.

16. Ground water quality has been monitored at eight locations in the study area and analyzed. pH: 7.14 - 7.69, Total Hardness: 116.7 – 357.2 mg/l, Chlorides: 38.7 to 560.8 mg/l. Heavy metals are within the limits. Surface water samples were analyzed from 8 locations. Surface water samples were analyzed from 5 locations: pH: 6.52 – 7.56, Total Hardness: 126.0 – 216.2 mg/l, Chlorides: 32.4 to 85.3 mg/l. Heavy metals are within the limits.

17. Noise levels are in the range of 49.6 to 55.2 dB(A) for day time and 38.7 to 51.4 dB(A) for night time.

18. With the installation of the proposed facilities, there will be an additional waste generation from pollution control facilities viz dust about 3 TPD and will be reused in sinter plant. From pickling plant Phosphate Sludge about 0.27 TPD will be generated and the same will be used as fertilizer and also disposed to TSDF. Chemical Sludge/salt from the waste water treatment will be generated about 2.06 TPD and the same will be disposed to TSDF.

19. The Public hearing for the existing EC was held on 12.08.2016 as per the provisions laid down in the EIA Notification, 2006.

20. Total cost of the proposed modification and value addition facility is INR 234.2 crores. An allocation of Rs.13 Crores has been earmarked towards the implementation of CER related activities. The additional employment generation from the proposed project is about 50 nos.

21. Green belt is established in an area of 79.52 ha (33.50%)and further the green belt around the project will be developed (10000 saplings for the FY 2019-2020). Local and native tree species such as Mango, Neem, Eucalyptus, Ficus, Mahogany, Vagai, Teak, Puvarasu, Banyan, etc. are planted.

22. The resource requirement, pollution load comparison for the proposed modification vis-à-vis with existing EC dated 7/7/2017 is given as below.

S.No.	Description	UoM	At 1.3 MTPA as per Earlier EC	Installation of facilities proposed / modification	After EC modification and value added facilities	Remarks
1	Land Requirement					
a.	Total land	Ha	268.08	0	268.08	No change
2	Raw materials Requirement					
a.	Iron ore fines	MTPA	1.47	0	1.47	No change
b.	Iron Ore Pellets	MTPA	0.5	0	0.5	
c.	Lump ore	MTPA	0.705	0	0.705	
d.	Coking/Non-coking coal	MTPA	0.947	0	0.947	
e.	Power plant coal	MTPA	0.172	0	0.172	
f.	Coke breeze for SP	MTPA	0.023	0	0.023	
g.	Dolomite	MTPA	0.147	0	0.147	
h.	Quartzite	MTPA	0.039	0	0.039	
i.	Dunite	MTPA	0.039	0	0.039	
j.	Lime powder	MTPA	0.0945	0	0.0945	
k.	Mill scale	MTPA	0.158	0	0.158	
l.	Purchase coke	MTPA	0.156	0	0.156	
m.	Anthracite	MTPA	0.095	0	0.095	
n.	Limestone	MTPA	0.135	0.04	0.175	To control SO_2 in CPP II coal based boiler
	Total	MTPA	4.6805	0.04	4.7205	
3	Power Requirement					
a.	Power Requirement	MW	90	11.5	101.5	LRF #5, Slag grinding unit
b.	Captive Power generation	MW	97	0	97	
c.	From grid	MW	34	0	34	
	Total power availability	MW	131	0	131	
4	Fuel Requirement					

S.No.	Description	UoM	At 1.3 MTPA as per Earlier EC	Installation of facilities proposed / modification	After EC modification and value added facilities	Remarks
a.	High Speed Diesel	KLD	1.7	1.6	3.3	Pickling plant and DG sets - emergency operations
b.	Liquid Petroleum Gas	TPD	1.0	0.015	1.015	
5	Water Requirement					
a.	Approved water allocation	MGD (m^3/day)	5.0 (22730)	0	5.0 (22730)	No Change
b.	Make up water consumption	MGD (m^3/day)	4.45 (20245)	0.16 (720)	3.90 (17727)	LRF #5 with VD, Slag grinding unit. Water reduction due to installation of RO plant and Air Cooled Condenser in CPPII - unit III
6	Man power Requirement					
a.	Man power Requirement	Numbers	5341	50	5391	For slag grinding unit
5	Waste water generation	m^3/day	3040	235	3275	Additional effluent from RO 200 KLD,LRF#5 - 15 KLD and CPP II –unit III - 20 KLD. Zero waste water discharge by reuse in steel plant
6	Pollution load					
	PM_{10}	kg/hr	341.31	-40.34	300.97	Reduction in pollution due to Technological Modification.
	SO_2	kg/hr	280.53	-12.16	268.37	
	NO_x	kg/hr	207.01	-16.86	190.15	

S.No.	Description	UoM	At 1.3 MTPA as per Earlier EC	Installation of facilities proposed / modification	After EC modification and value added facilities	Remarks
7	Waste generation					
	Non Hazardous					
	BF Slag	TPD	1350	0	1350	No change
	SMS slag	TPD	720	0	720	No change
	Dust, Sludge	TPD	197	2.66	199.66	Additional dust generation from dedusting systems which is proposed for modification. The same will be reused in sinter plant
	Hazardous	TPD	0.41	2.33	2.74	Additional generation from pickling unit-Phosphate sludge 0.27 TPD will be used as fertilizer and salt from ZLD ETP 2.06 TPD will be disposed to TSDF.

23. The proponent has mentioned that there is no court case or violation under EIA Notification to the project or related activity.

24. Name of the consultant: Vimta Labs Limited [Sr. No. 160, List of Accredited Consultant Organizations (Alphabetically) Rev. 81, Nov., 2019].

Observations of the Committee

25. The Committee noted that as per the findings of the EIA report, there is no change in land requirement and there is reduction in water requirement and pollution load due to the technological modification. Besides, the Committee also noted that the installation of value added facilities such as slag grinding unit and its allied facilities are environment friendly. Further, there will be no increase in the production capacity of 1.3 MTPA steel. Therefore, the Committee consider the instant proposal under para 7(ii) (a) of the EIA Notification, 2006 and dispense with the requirement of conducting fresh public consultation.

Recommendations of the Committee

26. In view of the foregoing and after detailed deliberations, the committee recommended the project for grant of Environmental Clearance under para 7(ii) of EIA Notification, 2006 subject to the following specific conditions in addition to the applicable general conditions as per the Ministry's Office Memorandum No. 22-34/2018-III dated 9/8/2018 for integrated steel plants.

    i. Particulate emission from the rod mill of slag grinding unit shall be less than 10 mg/Nm^3.
    ii. Green belt shall be developed in an area of 85 ha (210 acres) in and around the plant in a time frame of two years.

Decision of MoEF&CC

27. The Ministry of Environment, Forest and Climate Change (MoEF&CC) has considered the application based on the recommendations of the Expert Appraisal Committee (Industry-I) and hereby decided to accord environmental clearance for project cited above under para 7(ii) of the EIA Notification, 2006 subject to the following specific and applicable general conditions prescribed in the Ministry's Office Memorandum No. 22-34/2018-III dated 9/8/2018 for Integrated Steel Plants.

A. Specific Conditions

    i. Particulate emission from the rod mill of slag grinding unit shall be less than 10 mg/Nm^3.
    ii. Green belt shall be developed in an area of 85 ha (210 acres) in and around the plant in a time frame of two years.

B. General conditions

I. Statutory compliance:

    i. The project proponent shall obtain Consent to Establish / Operate under the provisions of Air (Prevention & Control of Pollution) Act, 1981 and the Water (Prevention & Control of Pollution) Act, 1974 from the concerned State Pollution Control Board/ Committee.
    ii. The project proponent shall obtain the necessary permission from the Central Ground Water Authority, in case of drawl of ground water / from the competent authority concerned in case of drawl of surface water required for the project.
    iii. The project proponent shall obtain authorization under the Hazardous and other Waste Management Rules, 2016 as amended from time to time.

II. Air quality monitoring and preservation

i. The project proponent shall install 24x7 continuous emission monitoring system at process stacks to monitor stack emission with respect to standards prescribed in Environment (Protection) Rules 1986 vide G.S.R 277 (E) dated 31st March 2012(Integrated iron & Steel); G.S.R 414 (E) dated 30th May 2008 (Sponge Iron) as amended from time to time; S.O. 3305 (E) dated 7th December 2015 (Thermal Power Plants)as amended from time to time and connected to SPCB and CPCB online servers and calibrate these system from time to time according to equipment supplier specification through labs recognised under Environment (Protection) Act, 1986 or NABL accredited laboratories.

ii. The project proponent shall monitor fugitive emissions in the plant premises at least once in every quarter through labs recognised under Environment (Protection) Act, 1986.

iii. The project proponent shall install system to carryout Continuous Ambient Air Quality monitoring for common/criterion parameters relevant to the main pollutants released (e.g. PM10 and PM2.5 in reference to PM emission, and SO2 and NOx in reference to SO2 and NOx emissions) within and outside the plant area at least at four locations (one within and three outside the plant area at an angle of 120°each), covering upwind and downwind directions.

iv. The cameras shall be installed at suitable locations for 24X7 recording of battery emissions on the both sides of coke oven batteries and videos shall be preserved for at least one-month recordings.

v. Sampling facility at process stacks and at quenching towers shall be provided as per CPCB guidelines for manual monitoring of emissions.

vi. The project proponent shall submit monthly summary report of continuous stack emission and air quality monitoring and results of manual stack monitoring and manual monitoring of air quality /fugitive emissions to Regional Office of MoEF&CC, Zonal office of CPCB and Regional Office of SPCB along with six-monthly monitoring report.

vii. Appropriate Air Pollution Control (APC) system shall be provided for all the dust generating points including fugitive dust from all vulnerable sources, so as to comply prescribed stack emission and fugitive emission standards.

viii. The project proponent shall provide leakage detection and mechanised bag cleaning facilities for better maintenance of bags.

ix. Secondary emission control system shall be provided at SMS Converters.

x. Pollution control system in the steel plant shall be provided as per the CREP Guidelines of CPCB.

xi. Sufficient number of mobile or stationery vacuum cleaners shall be provided to clean plant roads, shop floors, roofs, regularly.

xii. Recycle and reuse iron ore fines, coal and coke fines, lime fines and such other fines collected in the pollution control devices and vacuum cleaning devices in the process after briquetting/ agglomeration.

xiii. The project proponent use leak proof trucks/dumpers carrying coal and other raw materials and cover them with tarpaulin.

xiv. Facilities for spillage collection shall be provided for coal and coke on wharf of coke oven batteries (Chain conveyors, land based industrial vacuum cleaning facility).

xv. Land-based APC system shall be installed to control coke pushing emissions.

xvi. Monitor CO, HC and O_2 in flue gases of the coke oven battery to detect combustion efficiency and cross leakages in the combustion chamber.

xvii. Vapour absorption system shall be provided in place of vapour compression system for cooling of coke oven gas in case of recovery type coke ovens.

xviii. In case concentrated ammonia liquor is incinerated, adopt high temperature incineration to destroy Dioxins and Furans. Suitable NOx control facility shall be provided to meet the prescribed standards.

xix. The coke oven gas shall be subjected to desulphurization if the sulphur content in the coal exceeds 1%.

xx. Wind shelter fence and chemical spraying shall be provided on the raw material stock piles.

xxi. Design the ventilation system for adequate air changes as per ACGIH document for all tunnels, motor houses, Oil Cellars.

xxii. The project proponent shall install Dry Gas Cleaning Plant with bag filter for Blast Furnace and SMS converter.

xxiii. Dry quenching (CDQ) system shall be installed along with power generation facility from waste heat recovery from hot coke

III. Water quality monitoring and preservation

i. The project proponent shall install 24x7 continuous effluent monitoring system with respect to standards prescribed in Environment (Protection) Rules 1986 vide G.S.R 277 (E) dated 31st March 2012 (Integrated iron & Steel); G.S.R 414 (E) dated 30th May 2008 (Sponge Iron) as amended from time to time; S.O. 3305 (E) dated 7th December 2015 (Thermal Power Plants) as amended from time to time and connected to SPCB and CPCB online servers and calibrate these system from time to time according to equipment supplier specification through labs recognised under Environment (Protection) Act, 1986 or NABL accredited laboratories. The project proponent shall monitor

regularly ground water quality at least twice a year (pre and post monsoon) at sufficient numbers of piezometers/sampling wells in the plant and adjacent areas through labs recognised under Environment (Protection) Act, 1986 and NABL accredited laboratories.

ii. The project proponent shall submit monthly summary report of continuous effluent monitoring and results of manual effluent testing and manual monitoring of ground water quality to Regional Office of MoEF&CC, Zonal office of CPCB and Regional Office of SPCB along with six-monthly monitoring report.

iii. The project proponent shall provide the ETP for coke oven and by-product to meet the standards prescribed in G.S.R 277 (E) dated 31st March 2012 (Integrated iron & Steel); G.S.R 414 (E) dated 30th May 2008 (Sponge Iron) as amended from time to time; S.O. 3305 (E) dated 7th December 2015 (Thermal Power Plants) as amended from time to time as amended from time to time.

iv. Adhere to 'Zero Liquid Discharge'.

v. Sewage Treatment Plant shall be provided for treatment of domestic wastewater to meet the prescribed standards.

vi. Garland drains and collection pits shall be provided for each stock pile to arrest the run-off in the event of heavy rains and to check the water pollution due to surface run off.

vii. Tyre washing facilities shall be provided at the entrance of the plant gates.

viii. CO_2 injection shall be provided in GCP of SMS to reduce pH in circulating water to ensure optimal recycling of treated water for converter gas cleaning.

ix. The project proponent shall practice rainwater harvesting to maximum possible extent.

x. Treated water from ETP of COBP shall not be used for coke quenching.

xi. Water meters shall be provided at the inlet to all unit processes in the steel plants.

xii. The project proponent shall make efforts to minimize water consumption in the steel plant complex by segregation of used water, practicing cascade use and by recycling treated water.

IV. Noise monitoring and prevention

i. Noise level survey shall be carried as per the prescribed guidelines and report in this regard shall be submitted to Regional Officer of the Ministry as a part of six-monthly compliance report.

ii. The ambient noise levels should conform to the standards prescribed under E(P)A Rules, 1986 viz. 75 dB(A) during day time and 70 dB(A) during night time.

V. Energy Conservation measures

i. The project proponent shall provide TRTs to recover energy from top gases of Blast Furnaces.

ii. Coke Dry Quenching (CDQ) shall be provided for coke quenching for both recovery and non-recovery type coke ovens.

iii. Waste heat shall be recovered from Sinter Plants coolers and Sinter Machines.

iv. Use torpedo ladle for hot metal transfer as far as possible. If ladles not used, provide covers for open top ladles.

v. Use hot charging of slabs and billets/blooms as far as possible.

vi. Waste heat recovery systems shall be provided in all units where the flue gas or process gas exceeds 300°C.

vii. Explore feasibility to install WHRS at Waste Gases from BF stoves; Sinter Machine; Sinter Cooler, and all reheating furnaces and if feasible shall be installed.

viii. Restrict Gas flaring to < 1%.

ix. Provide solar power generation on roof tops of buildings, for solar light system for all common areas, street lights, parking around project area and maintain the same regularly;

x. Provide LED lights in their offices and residential areas.

xi. Ensure installation of regenerative type burners on all reheating furnaces.

VI. Waste management

i. An attrition grinding unit to improve the bulk density of BF granulated slag from 1.0 to 1.5 Kg/l shall be installed to use slag as river sand in construction industry.

ii. In case of Non-Recovery coke ovens, the gas main carrying hot flue gases to the boiler, shall be insulated to conserve heat and to maximise heat recovery.

iii. Tar Sludge and waste oil shall be blended with coal charged in coke ovens (applicable only to recovery type coke ovens).

iv. Carbon recovery plant to recover the elemental carbon present in GCP slurries for use in Sinter plant shall be installed.

v. Waste recycling Plant shall be installed to recover scrap, metallic and flux for recycling to sinter plant and SMS.

vi. Used refractories shall be recycled as far as possible.

vii. SMS slag after metal recovery in waste recycling facility shall be conditioned and used for road making, railway track ballast and other applications. The project proponent shall install a waste recycling facility to recover metallic and flux for recycle to sinter plant. The project proponent shall establish linkage for 100% reuse of rejects from Waste Recycling Plant.

viii. 100% utilization of fly ash shall be ensured. All the fly ash shall be provided to cement and brick manufacturers for further utilization and Memorandum of Understanding in this regard shall be submitted to the Ministry's Regional Office.

ix. Oil Collection pits shall be provided in oil cellars to collect and reuse/recycle spilled oil. Oil collection trays shall be provided under coils on saddles in cold rolled coil storage area.

x. The waste oil, grease and other hazardous waste like acidic sludge from pickling, galvanising, chrome plating mills etc. shall be disposed of as per the Hazardous & Other waste (Management & Transboundary Movement) Rules, 2016. Coal tar sludge / decanter shall be recycled to coke ovens.

xi. Kitchen waste shall be composted or converted to biogas for further use.

VII. Green Belt

i. Green belt shall be developed in an area equal to 33% of the plant area with a native tree species in accordance with CPCB guidelines. The greenbelt shall inter alia cover the entire periphery of the plant

ii. The project proponent shall prepare GHG emissions inventory for the plant and shall submit the programme for reduction of the same including carbon sequestration including plantation.

VIII. Public hearing and Human health issues

i. Emergency preparedness plan based on the Hazard identification and Risk Assessment (HIRA) and Disaster Management Plan shall be implemented.

ii. The project proponent shall carry out heat stress analysis for the workmen who work in high temperature work zone and provide Personal Protection Equipment (PPE) as per the norms of Factory Act.

iii. 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, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

iv. Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.

IX. Corporate Environment Responsibility

i. The project proponent shall comply with the provisions contained in this Ministry's OM vide F.No. 22-65/2017-IA.III dated 1st May 2018, as applicable, regarding Corporate Environment Responsibility.

ii. The company shall have a well laid down environmental policy duly approve by the Board of Directors. The environmental policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/deviation/violation of the environmental / forest / wildlife norms / conditions. The company shall have defined system of reporting infringements / deviation / violation of the environmental / forest / wildlife norms / conditions and / or shareholders' / stake holders. The copy of the board resolution in this regard shall be submitted to the MoEF&CC as a part of six-monthly report.

iii. A separate Environmental Cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly to the head of the organization.

iv. Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional Office along with the Six Monthly Compliance Report.

v. Self-environmental audit shall be conducted annually. Every three years third party environmental audit shall be carried out.

vi. All the recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the Iron and Steel plants shall be implemented.

X. Miscellaneous

i. The project proponent shall make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the District or State, of which one shall be in the vernacular language within seven days and in addition this shall also be displayed in the project proponent's website permanently.

ii. The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.

iii. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and update the same on half-yearly basis.

iv. The project proponent shall monitor the criteria pollutants level namely; PM_{10}, SO_2, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the projects and display the same at a convenient location for disclosure to the public and put on the website of the company.

v. The project proponent shall submit six-monthly reports on the status of the compliance of the stipulated environmental conditions on the website of the ministry of Environment, Forest and Climate Change at environment clearance portal.

vi. The project proponent shall submit the environmental statement for each financial year in Form-V to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently and put on the website of the company.

vii. The project proponent 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, commencing the land development work and start of production operation by the project.

viii. The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board and the State Government.

ix. The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Expert Appraisal Committee.

x. No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change (MoEF&CC).

xi. Concealing factual data or submission of false/fabricated data may result in revocation of this environmental clearance and attract action under the provisions of Environment (Protection) Act, 1986.

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

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

xiv. The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information/monitoring reports.

xv. 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 and Other Wastes (Management and Transboundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other orders passed by the Hon'ble Supreme Court of India / High Courts and any other Court of Law relating to the subject matter.

xvi. Any appeal against this EC shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

28. The project proponent shall obtain fresh environmental clearance in case of change in scope of the project if any.

29. This issues with the approval of Competent Authority.

Yours faithfully,

(A.K. Agrawal)
Director

Copy to:-

i. The Secretary, Department of Environment, Government of Tamil Nadu Secretariat, Chennai.
ii. The Dy. Director General (C), Ministry of Environment, Forest and Climate Change, Regional Office (SEZ), Ist and IInd Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai – 34.
iii. The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-Cum-Office Complex, East Arjun Nagar, New Delhi-110 032.
iv. The Chairman, Tamil Nadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai-600 032, Tamil Nadu.
v. The Member Secretary, Central Ground Water Authority, West Block –II, Wing -3, Sector I, R.K.Puram, New Delhi – 110086.
vi. The District Collector, District, Salem, Government of Tamil Nadu.
vii. Guard File/Record File/Monitoring File.
viii. MoEF&CC Website

(A.K. Agrawal)
Director

Copy of the Environmental Clearance dated.07.07.2017

F. No. J-11011/281/2006-IA.II (I)
Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

Indira Paryavaran Bhawan
Jor Bagh Road, Aliganj,
New Delhi - 110003
E-mail: sharath.kr@gov.in
Tel: 011-24695319

Dated: 7th July, 2017

To

M/s JSW Steel Ltd.,
Mecheri, Taluk Mettur,
District Salem, Tamil Nadu - 636453
e-mail: d.ravichandar@jsw.in

Subject: Expansion of Integrated Steel Plant (1.0 MTPA to 1.3 MTPA) of M/s JSW Steel Ltd., located at Mecheri, Taluk Mettur, District Salem, Tamil Nadu – Environmental Clearance under EIA Notification, 2006 Regarding.

Sir,

This has reference to your online application vide proposal no. IA/TN/IND/26508/2015, dated 28th October 2016 along with copies of EIA/EMP report seeking environmental clearance under the provisions of the EIA Notification, 2006 for the project mentioned above. The proposed project activity is listed at Sl. No. 3 (a) metallurgical (Ferrous and Non-Ferrous) under Category "A" under the provisions of EIA Notification 2006.

2.0 The proposed expansion of 1.0 to 1.3 MTPA Special Alloy Steel of M/s JSW Salem Works was initially received in the Ministry 16.01.2015 for obtaining Terms of Reference (ToR) as per EIA Notification, 2006. The project was appraised by the Expert Appraisal Committee (Industry-I) [EAC(I)] during its meeting held on 11.02.2015 and prescribed ToRs to the project for undertaking detailed EIA study for obtaining environmental clearance. Accordingly, the Ministry had prescribed ToRs to the project on 12.06.2015 vide letter No. J-11011/281/2006-IA.II(I). Based on the ToRs prescribed to the project, the project proponent applied for environmental clearance to the Ministry online on 28.10.2016. The proposal was placed in the 15th meeting of Appraisal Committee (Industry-I) [EAC(I)] held during 2nd – 3rd February 2017. The committee sought additional information and the PP submitted reply on 28.03.2017.

3.0 M/s. JSW Salem Works operating 1.0 MTPA Integrated Steel Plant located at M. Kallipatti and Pottaneri Village, Mettur Tehsil, Salem District, Tamil Nadu for which environmental clearance was granted vide Lr. No. J-11011/281/2006-IA.II(I) dated 02.01.2007. Certified compliance status of existing plant was obtained vide Lr. No. EP/12.1/2016-17/20/TN/0162, dated 31.01.2017.

4.0 Now, it is proposed to expand the capacity from 1.0 MTPA to 1.3 MTPA. The details of existing and the proposed capacities are given below:

Sl. No.	Manufacturing Facilities	Existing Capacity	Proposed Expansion	Total Capacity after Expansion
1	Coke Oven Plant – 1 (Non-Recovery type)	0.5	-	0.5
2	Sinter plant – 1 (20 m^2)	0.175	-	0
3	Sinter plant – 2 (90 m^2)	1.06	-	1.06
4	Sinter plant – 3 (90 m^2)	-	1.06	1.06
5	Blast Furnace – 1 (402 to 650 m^3)	0.367	0.316	0.683
6	Blast Furnace – 2 (550 to 650 m^3)	0.578	0.105	0.683
7	Energy Optimizing Furnace - 1 (45 to 65 T)	0.41	0.23	0.64
8	Energy Optimising Furnace-2 (45 T)	0.62	-	0.62
9	Ladle Furnace – 1 (45 to 65 T)	45 T/heat	20 T/heat	65 T/heat
10	Ladle Furnace – 2 (65 T)	65 T/heat	-	65 T/heat
11	Ladle Furnace – 3 (65 T)	65 T/heat	-	65 T/heat
12	Ladle Furnace – 4 (65 T)	65 T/heat	-	65 T/heat
13	Continuous Casting Machine - 1	0.35	-	0.35
14	Continuous Casting Machine - 2	0.5	-	0.5
15	Continuous Casting Machine - 3	-	0.45	0.45
16	Bar & Rod Mill augmentation	0.4	0.08	0.48
17	Blooming Mill augmentation	0.36	0.12	0.48
18	Pickling and Annealing steel unit	-	0.06	0.06
19	Peeled and ground	-	0.04	0.04
20	Air separation plant – 1 (150 T/day)	150 T/day	-	150 T/day
21	Air separation plant – 2 (390 T/day)	390 T/day	-	390 T/day
22	Air separation plant – 3 (250 T/day)	-	250 T/day	250 T/day
23	Captive power plant – 1	7 MW	-	7 MW
24	Captive power plant – 2	2 X 30 MW	-	2 X 30 MW
25	Captive power plant – 3	-	30 MW	30 MW

5.0 The total available plant site is 237.28 ha and township is 30.80 ha. The land required for the proposed expansion project is 11.74 ha, out of total plant site and township area, scrub land is 37.89 ha, vegetation area is 47.83 ha, open scrub is 27.19, built-up area is 69.27 ha, water bodies like rainwater harvesting pond, guard pond etc is 5.34 ha, open land is 62.50 ha, stock yard is 3.82 ha, roads 9.57 ha and rocky terrain 4.711 ha. No forest land is involved. The entire land has been already acquired for the project. No river/stream passes through the project area. It has been reported that no water body exist around the project and no modification/diversion in the existing natural drainage pattern at any stage has not been proposed.

6.0 The topography of the area is slightly undulating and reported to lie between 11^0 48' 16" to 11^0 49' 2" N latitude and 77^0 0' 54" to 77^0 55' 43" E longitude in Survey of India topo sheet No. 58 E/13, 58 E/14, 58 I/1 and 58 I/2, at an elevation of 339 to 368 m AMSL. The ground water table is reported to range between 1.0 to 31.23 m below the land surface during March to May 2015. Based on hydro-geological studies, it has been reported that the radius of influence of pumped out water will be 60 m. Further, the stage of groundwater development is reported to be 0% and 100% in core and buffer zone respectively and thereby these are designated as critically exploited areas.

7.0 No national park/wildlife sanctuary/biosphere reserve/tiger reserve/elephant reserve etc. are reported in the core and buffer zone of the project. The area also does not report to form corridor for Schedule-I fauna.

8.0 The raw material requirement for the project are listed below:

Sl. No.	Raw material	Present Quantity (MTPA)	Post Exp. Quantity(MTPA)	Source
1	Iron ore fines	0.845	1.47	Indigenous/Imported
2	Iron ore pellets	NA	0.5	Indigenous source
3	Lump ore	0.806	0.705	Indigenous/Imported
4	Coking coal	0.585	0.585	Imported
5	Non-coking coal for COP	0.147	0.147	Imported
6	Non-coking coal for PCI	0.147	0.215	Imported
7	Power plant coal	0.172	0.172	Indigenous/Imported
8	Coke breeze for SP	0.023	0.023	In house
9	Limestone	0.08	0.135	Imported/indigenous
10	Dolomite	0.091	0.147	Indigenous
11	Quartzite	0.030	0.039	Indigenous
12	Dunite	0.030	0.039	Indigenous
13	Lime powder	0.0585	0.0945	Imported/indigenous
14	Mill scale	0.097	0.158	Indigenous
15	Purchase coke	0	0.156	Imported
16	Anthracite	0.039	0.095	Imported

9.0 The proposed expansion of 0.3 MTPA Integrated Steel Plant (ISP) has been contemplated to adopt conventional BF (Blast Furnace) - EOF (Energy Optimizing Furnace) - CC (Continuous Casting) and RM (Rolling Mill) route. In expansion, additional 1 X 30 MW using the WHR boilers of COP and BF gas is planned.

10.0 The targeted production capacity of the proposed expansion is 1.3 MTPA. The ore for the plant would be procured from imported. The ore transportation will be done through rail.

11.0 An agreement exists between PWD and JSW to utilize 5 MGD of raw water from downstream of river Cauvery. The present requirement is about 3.17 MGD of raw water, which is met from the intake well located at downstream of Mettur dam which meets the 1 MTPA capacity of steel plant and captive power plant of 67 MW. Total fresh water requirement after expansion will be to the tune of about 4.4 MGD.

12.0 The average power demand of the plant after expansion is estimated to be about 90 MW. It is expected that the power to the tune of 97 MW will be generated from the steel plant facilities after expansion. It is proposed to meet the entire energy requirement from the captive sources taking the support of state electricity grid for stability. Provision will be made to sell out the surplus power if any, through the grid.

13.0 Ambient air quality monitoring has been carried out at 8 locations during March to May 2015 and the data submitted indicated: PM_{10} (23.28 $\mu g/m^3$ to 76.0 $\mu g/m^3$), $PM_{2.5}$ (8.90 to 34.83 $\mu g/m^3$), SO_2 (1.21 to 9.50 $\mu g/m^3$) and NO_x (11.41 to 60.76 $\mu g/m^3$). The results of the modelling study indicates that the maximum increase of GLC for the proposed expansion project is 83.0 $\mu g/m^3$ with respect to the PM_{10}, 10.6 $\mu g/m^3$ with respect to the SO_2, 20.5 $\mu g/m^3$ with respect to the NO_x. There is no habitant in the core zone of the project. No R&R is involved.

14.0 Samples of ground (8) and surface (4) water samples were collected during monitoring season. The results indicate that most of parameters are within the prescribed norms of groundwater except for total hardness, calcium and TDS. The reason could be attributable to mixing of surface water. The area is encountered by hard rock overlined by sedimentary rock which may contain calcium and magnesium and leads to increase in hardness. Whereas, the surface water parameters are meeting the norms.

15.0 It has been reported that a total of 80 TPD of scrap waste will be generated due to the expansion project from CCM and rolling mill, and the entire waste will be dumped in the earmarked dump yard. It has been already developed that an area of 78.9 ha as green belt around the project site to attenuate the noise levels and trap the dust generated due to the project development activities.

16.0 The Public hearing for the project was held on 12.08.2016 for production of 1.0 to 1.3 million TPA of Special Alloy Steels, in the existing premises under the chairmanship of District Collector, Salem. The issues raised during the public hearing were employment to the local people; pollution due to the project; water scarcity; etc.

17.0 The capital cost of the project is Rs. 1025 Crores and the capital cost for environmental protection measures is proposed as Rs. 50.5 Crores. The annual recurring cost towards the environmental protection measures is proposed as Rs. 8.05 Crores. The project is scheduled to be completed in a period of 36 months.

18.0 The manpower working in existing project are 5041 including 4000 contractual employees. It has been planned to retain the existing man power for the proposed expansion programme. The company had spent Rs. 455.04 Lakhs for development of region as a part of CSR in last four financial years.

19.0 The proponent has mentioned that there is no court case to the project or related activity. There is no violation under EIA Notification, 2016.

20.0 The proposal was considered in the 15th meeting of Expert Appraisal Committee (Industry-I) [EAC(I)] held during 2nd – 3rd February 2017. Based on the presentation made and discussions held, the Committee desired additional information. The project proponent has submitted reply on 28.03.2017. The revised list of raw materials along with the source of the raw material given as follows:

Sl. No.	Raw material	Present Quantity (MTPA)	Post Exp. Quantity(MTPA)	Source
1	Iron ore fines	0.845	1.47	Jharkhand
2	Iron ore pellets	NA	0.5	Karnataka
3	Lump ore	0.806	0.705	Monitoring committee, Karnataka
4	Coking coal	0.585	0.585	Australia/Russia
5	Non-coking coal for COP	0.147	0.147	Australia/Russia
6	Non-coking coal for PCI	0.147	0.215	Australia/Russia
7	Power plant coal	0.172	0.172	Australia/Russia
8	Coke breeze for SP	0.023	0.023	In-house
9	Limestone	0.08	0.135	Oman
10	Dolomite	0.091	0.147	Tamil Nadu
11	Quartzite	0.030	0.039	Tamil Nadu, Andhra Pradesh
12	Dunite	0.030	0.039	South Africa
13	Lime powder	0.0585	0.0945	Malaysia
14	Mill scale	0.097	0.158	Tamil Nadu
15	Purchase coke	0	0.156	Tamil Nadu
16	Anthracite	0.039	0.095	Australia/Russia

21.0 It was informed that the iron ore lumps purchase through "Monitoring committee of Karnataka", Auction No: 107 for a quantity of about 20000 MT. The iron ore fines quantity of about 150000 MT is being purchased from M/s. Rungta mines, Jharkhand.

22.0 The Effluent Treatment Plant (ETP) is designed for 920 m^3/hr capacity with inlet suspended solids level of 2500 ppm and Outlet suspended solid level of 50 ppm.

23.0 The revised table on the cost component for environmental pollution control measures is given below:

Sl. No	Item	Capital Cost (Rs in Crores)	Recurring cost per annum (Rs in Crores)
1	Air Pollution Control	30	4
2	Water Pollution Control	1	0.2
3	Solid Waste Management	10	1
4	Noise Pollution Control	2	0.2
5	Occupational health	3	0.3
6	Environmental survey and sampling	5	0.5
	Total	51	6.2

24.0 The cost break up for the ESC component along with the time line to implement is given below:

Sl.No	Activity wise fund Allocation in Rs in Crores.		Commitment period (Year)					Total
	Description of activities	Numbers	I	II	III	IV	V	
1	Toilets	2000	0.5	0.75	0.75	0.5	0.5	3
2	Health centre	1	0.25	0.25	0.25	0.25		1
3	Community hall	2		0.5	0.5			1
4	Hospital	1	0.5	0.5	0.5	0.25	0.25	2
5	Modern school New with GYM and Play ground	1			1	0.5	0.5	2
6	Water shed program	1		0.25	0.25	0.25	0.25	1
7	Water body strengthening /Drinking water bore well drilling			0.25	0.25	0.25	0.25	1
8	Drainage		0.25	0.25	0.25	0.25		1
9	Government school improvement	1		0.25	0.25	0.25	0.25	1
10	Total		1.5	3	4	2.5	2	13

25.0 Based on the reply submitted the proposal was placed on 18th meeting of Expert Appraisal Committee (Industry-I) held during 3rd - 5th May 2017. After detailed deliberations, the committee recommended the project for Environmental Clearance with following stipulated Specific Conditions along with other environmental conditions while considering for accord of environmental clearance by the ministry.

26.0 The Ministry of Environment, Forest and Climate Change has considered the application based on the recommendations of the Expert Appraisal Committee (Industry-I) and hereby decided to grant environmental clearance for the proposed expansion of Integrated Steel Plant (1.0 MTPA to 1.3 MTPA) of M/s JSW Steel Ltd., located at Mecheri, Taluk Mettur, District Salem, Tamil Nadu under the provision of EIA Notification dated 14th September, 2006, as amended, subject to strict compliance of the following Specific and General conditions:

A. SPECIFIC CONDITION:

i. The occupational health survey of the active workmen involved shall be carried as per the ILO guidelines and all the employees shall cover in every 5 years @ 20% every year.

ii. The amount allocated for ESC i.e. Rs. 13 Crores shall be provided as CAPEX and the ESC shall be treated as project and monitored annually and the report of same shall be submitted to Regional office of MoEF&CC.

iii. The project proponent shall provide for solar light system for all common areas, street lights, villages, parking around project area and maintain the same regularly.

iv. The project proponent shall provide for LED lights in their offices and residential areas.

v. The project proponent should install 24x7 air monitoring devices to monitor air emission and submit report to Ministry and its Regional Office.

vi. The ETP for Blast furnace effluent should be designed to meet Cyanide standards as notified by the MoEFCC.

vii. No effluent shall be discharged outside the plant premises and 'zero' discharge shall be adopted.

viii. The ETP for coke oven by-product should be designed to meet EPA notified standards especially the cyanide and phenol.

ix. Coke oven plant should meet visible emission standards notified by the MoEFCC.

x. The Standards issued by the Ministry vide G.S.R. 277(E) dated 31st March 2012 shall be strictly adhered to and the Standards prescribed for the Coke Oven plant shall be monitored and the report should be submitted along with the six-monthly compliance report

xi. The emission standards specified in the Environmental (Protection) Amendment Rules, 2015 issued by vide S.O. 3305 (E) dated 7th December 2015 for the Thermal Power Plant shall be strictly adhered to.

xii. The National Ambient Air Quality Emission Standards issued by the Ministry vide G.S.R. No. 826(E) dated 16th November 2009 shall be followed.

xiii. 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), and bag filters etc. shall be provided.

xiv. A statement on carbon budgeting including the quantum of equivalent CO_2 being emitted by the existing plant operations, the amount of carbon sequestered annually by the existing green belt and the proposed green belt and the quantum of equivalent CO_2 that will be emitted due to the proposed expansion shall be prepared by the project proponent and submitted to the Ministry and the Regional Office of the Ministry. This shall be prepared every year by the project proponent. The first such budget shall be prepared within a period of 6 months and subsequently it should be prepared every year.

xv. For the employees working in high temperature zones falling in the plant operation areas, the total shift duration would be 4 hrs or less per day where the temperature is more than 50°C. Moreover, the jobs of these employees will be alternated in such a way that no employee is subjected to working in high temperature area for more than 1 hr continuously. Such employees would be invariably provided with proper protective equipment, garments and gears such as head gear, clothing, gloves, eye protection etc. There should also be an arrangement for sufficient drinking water at site to prevent dehydration etc.

xvi. In-plant control measures and dust suppression system shall be provided to control fugitive emissions from all the vulnerable sources. Dust extraction and suppression system shall be provided at all the transfer points, coal handling plant and coke sorting plant of coke oven plant. Bag filters shall be provided to hoods and dust collectors to coal and coke handling to control dust emissions. Water sprinkling system shall be provided to control secondary fugitive dust emissions generated during screening, loading, unloading, handling and storage of raw materials etc.

xvii. 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.

xviii. Hot gases from DRI Kiln should be passed through dust settling chamber (DSC) to remove coarse solids and After Burning Chamber (ABC) to burn CO completely and used in Waste Heat Recovery Boiler (WHRB). The gas then shall be cleaned in ESP before dispersion out into the atmosphere through ID fan and stack. ESP shall be installed to control the particulate emission from WHRB.

xix. Efforts shall further be made to use maximum water from the rain water harvesting sources. If needed, capacity of the reservoir shall be enhanced to meet the maximum water requirement.

xx. Risk and Disaster Management Plan along with the mitigation measures shall be prepared and a copy submitted to the Ministry's Regional Office, SPCB and CPCB within 3 months of issue of environment clearance letter.

xxi. All the blast furnace (BF) slag shall be granulated and provided to cement manufacturers for further utilization. Flue dust from sinter plant and SMS and sludge from BF shall be re-used in sinter plant. Coke breeze from coke oven plant shall be used in sinter and pellet plant. SMS Slag shall be given for metal recovery and properly utilized. All the other solid waste including broken refractory mass shall be properly disposed off in environment-friendly manner.

xxii. Coal and coke fines shall be recycled and reused in the process. The breeze coke and dust from the air pollution control system shall be reused in sinter plant. The waste oil shall be properly disposed of as per the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016.

xxiii. 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.

xxiv. All the recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the Steel Plants and Coke Oven Plants shall be implemented.

xxv. At least 2.5% of the total cost of the project shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues, locals need and item-wise details along with time bound action plan shall be prepared and submitted to the Ministry's Regional Office. Implementation of such program shall be ensured by constituting a Committee comprising of the proponent, representatives of village Panchayat and District Administration. Action taken report in this regard shall be submitted to the Ministry's Regional Office.

xxvi. The proponent shall prepare a detailed CSR Plan for every year for the next 5 years for the existing-cum-expansion project, which includes village-wise, sector-wise (Health, Education, Sanitation, Health, Skill Development and infrastructure requirements such as strengthening of village roads, avenue plantation, etc) activities in consultation with the local communities and administration. The CSR Plan will include the amount of 2% retain annual profits as provided for in Clause 135 of the Companies Act, 2013 which provides for 2% of the average net profits of previous 3 years towards CSR activities for life of the project. A separate budget head shall be created and the annual capital and

revenue expenditure on various activities of the Plan shall be submitted as part of the Compliance Report to RO. The details of the CSR Plan shall also be uploaded on the company website and shall also be provided in the Annual Report of the company. The plan so prepared shall be based on SMART (Specific, Measurable, Achievable, Relevant and Time bound) concept. The expenditure should be aimed at sustainable development and direct free distribution and temporary relief should not be included.

xxvii. All the commitments made to the public during the Public Hearing / Public Consultation meeting shall be satisfactorily implemented and a separate budget for implementing the same shall be allocated and information submitted to the Ministry's Regional Office at Bhubaneswar.

xxviii. 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, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

B. GENERAL CONDITIONS:

i. The project authorities must strictly adhere to the stipulations made by the concerned State Pollution Control Board and the State Government.

ii. No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change (MoEF&CC).

iii. 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 NO_X 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 Chennai and the SPCB/CPCB once in six months.

iv. 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 from time to time. The treated wastewater shall be utilized for plantation purpose.

v. The overall noise levels in and around the plant area shall be kept well within the standards (85 dB(A)) 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 dB(A) during day time and 70 dB(A) during night time.

vi. Occupational health surveillance of the workers shall be done on a regular basis and records maintained as per the Factories Act.

vii. The company shall develop rain water harvesting structures to harvest the rain water for utilization in the lean season besides recharging the ground water table.

viii. The project proponent shall also comply with all the environmental protection measures and safeguards recommended in the EIA/EMP report. Further, the company must undertake socio-economic development activities in the surrounding villages like community development programmes, educational programmes, drinking water supply and health care etc.

ix. 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 (MoEF&CC) 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 Chennai. The funds so provided shall not be diverted for any other purpose.

x. 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.

xi. 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 MoEF&CC at Chennai. 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.

xii. 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 MoEF&CC, the respective Zonal Office of CPCB and the SPCB. The Regional Office of this Ministry at Chennai/ CPCB / SPCB shall monitor the stipulated conditions.

xiii. 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 MoEF&CC at Chennai by e-mail.

xiv. 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, Forests and Climate Change (MoEF&CC) 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 Bhubaneshwar.

xv. 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.

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

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

29.0 The PP shall abide by all the commitments and recommendations made in the EIA/EMP report and also that during their presentation to the EAC. The commitment made by the project proponent to the issue raised during Public Hearing shall be implemented by the proponent.

30.0 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 and Other Wastes (Management and Transboundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and rules.

31.0 This EC supersedes the earlier EC granted vide letter Lr. No. J-11011/281/2006-IA.II(I) dated 02.01.2007 for the 1.0 MTPA capacity.

32.0 Any appeal against this EC shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

This issues with the approval of Competent Authority.

7/7/17

(Sharath Kumar Pallerla)
Scientist 'F'/Director

Copy to:-

1). **The Secretary**, Department of Environment, Government of Tamil Nadu, Chennai.

2). **The Secretary**, Department of Forests, Government of Tamilnadu, Chennai

3). **The Additional Principal Chief Conservator of Forests**, Ministry of Environment, Forest and Climate Change,Regional Office (SEZ), 1st and 2nd Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai – 34

4). **The Chairman**, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032.

5). **The Chairman**, Tamil Nadu Pollution Control Board, 76, Mount Salai, Guindy, Chennai- 600 032, Tamil Nadu.

6). **The Member Secretary**, Central Ground Water Authority, A2, W- 3 Curzon Road Barracks, K.G. Marg, New Delhi-110001.

7). **The District Collector, Salem** District, State of Tamil Nadu.

8). **Guard File / Record file / Monitoring file.**

9). **MOEF&CC Website.**

7/7/17

(Sharath Kumar Pallerla)
Scientist 'F'/Director