Shyam Steel Manufacturing Limited

[Expansion of Steel Plant – DRI Kilns (Sponge Iron from 2,25,000 TPA to 7,86,000 TPA), Induction Furnaces along with CCM & LRF (MS Ingots / Billets/ Hot Charging from 2,34,300 TPA to 6,95,800 TPA), Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod - 2,90,000 TPA to 7,19,000 TPA), 2 x 9 MVA Ferro Alloys, 1 x 30 T Electric Arc Furnace, WHRB based Power Plant from 10 MW to 46 MW, FBC based Power Plant from 7 MW to 25 MW, New 1.2 MTPA of I/O Beneficiation plant, New 0.8 MTPA of I/O Pellet Plant]

Category – A Project

at

J.L.No. 11, Jemua Mouza, Mejia Block,
Bankura District, West Bengal-722143

DRAFT
Environmental Impact Assessment Report

[Based on Standard TOR letter issued by MoEF&CC, New Delhi vide No. F.No. J-11011/724/2007 - IA.II (I) dated 1st June, 2021]

Monitoring Period
March 2021 to 31st May 2021

February,2022

Prepared by

PIONEER ENVIRO
LABORATORIES & CONSULTANTS PVT. LTD.

Accredited by NABET

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SHYAM STEEL

Shyam Steel Manufacturing Limited
Shyam Towers, EN-32, Sector V, Salt Lake, Kolkata 700091
Tel +91 33 4007 4007 | www.shyamsteel.com
CIN : U28999WB1991PLC051823

UNDERTAKING

I, **MANOJ DAGA, GENERAL MANAGER (COMMERCIAL)** of **SHYAM STEEL MANUFACTURING LTD.,** give this undertaking, that the **Draft EIA** report has been prepared by M/s. Pioneer Enviro Laboratories & Consultants Pvt. Ltd., Hyderabad incorporating the Terms of Reference (ToRs) prescribed by MoEF&CC, New Delhi vide letter no. **J-11011/724/2007-IA.II (I)** dated **1st June 2021** for our proposed Expansion of Steel Plant – DRI Kilns (Sponge Iron from 2,25,000 TPA to 7,86,000 TPA), Induction Furnaces along with CCM & LRF (MS Ingots / Billets/ Hot Charging from 2,34,300 TPA to 6,95,800 TPA), Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod - 2,90,000 TPA to 7,19,000 TPA), 2 x 9 MVA Ferro Alloys, 1 x 30 T Electric Arc Furnace, WHRB based Power Plant from 10 MW to 46 MW, FBC based Power Plant from 7 MW to 25 MW, New 1.2 MTPA of I/O Beneficiation plant, New 0.8 MTPA of I/O Pellet Plant at JL.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal-722143. It is here by confirmed that the data given in the EIA report are factually correct & owe the contents of this report.

Date : 10-02-2022
Place : Mejia

For & behalf of **SHYAM STEEL MANUFACTURING LTD.,**

MANOJ DAGA
GENERAL MANAGER (COMMERCIAL)

DECLARATION

Declaration by Experts contributing to the EIA report for the proposed expansion of Steel Plant i.e., DRI Kilns (Sponge Iron from 2,25,000 TPA to 7,86,000 TPA), Induction Furnaces along with CCM & LRF (MS Ingots / Billets/ Hot Charging from 2,34,300 TPA to 6,95,800 TPA), Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod - 2,90,000 TPA to 7,19,000 TPA), 2 x 9 MVA Ferro Alloys, 1 x 30 T Electric Arc Furnace, WHRB based Power Plant from 10 MW to 46 MW, FBC based Power Plant from 7 MW to 25 MW, New 1.2 MTPA of I/O Beneficiation plant, New 0.8 MTPA of I/O Pellet Plant by **M/s. Shyam Steel Manufacturing Ltd.** located at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal-722143.

We, hereby, certify that we were part of the EIA team in the following capacity that developed the above EIA.

EIA Coordinator : Metallurgical Industries (Ferrous & Non-ferrous)

Name : Mr. Y. Maheshwara Reddy

Signature : Y M Reddy **Date** 10/02/2022

EIA Coordinator (as Team Member) : Metallurgical Industries (Ferrous & Non-ferrous)

Name : Mr. Nagarjuna SRD

Signature : **Date** 10/02/2022

DECLARATION BY FUNCTIONAL AREA EXPERTS INVOLVED IN THE PREPARATION OF EIA REPORT

Functional Area	Name of the Expert	Involvement (Period)	Signature
AP	Mr. Y. Maheshwara Reddy	from February 2021 to till date	Y M Reddy
WP	Mr. Y. Maheshwara Reddy	from February 2021 to till date	Y M Reddy
SW	Mr. Y. Maheshwara Reddy	from February 2021 to till date	Y M Reddy
SE	Mr. I. Durga Prasad	from March 2021 to till date	
EB	Prof. Bayyapu Reddy	from March 2021 to till date	
HG	Mr. V. Tarun Chander	from March 2021 to till date	

Functional Area	Name of the Expert	Involvement (Period)	Signature
GEO	Mr. V. Tarun Chander	from March 2021 to till date	
SC	Prof. Bayyapu Reddy	from March 2021 to till date	
AQ	Mr. Y. Maheshwara Reddy	from February 2021 to till date	Y M Reddy
NV	Mr. Sri Latha	from March 2021 to till date	
LU	Dr. Y. Ramamohan	from March 2021 to till date	
RH	Mr. D.H. Patel	from March 2021 to till date	

Involved as	Name of the person	Involvement (Period)	Signature
Team Member (Under FAE – EB)	Mr. Nagarjuna SRD	from March 2021 to till date	
Team Member (Under FAE – AP)	Mr. Sudhir Singh Mourya	from March 2021 to till date	
Team Member (Under FAE – WP)	Mr. B. Shravan Goud	from March 2021 to till date	K. Santhosh Kumar
Team Member (Under FAE – AQ)	Mr. K. Santhosh Kumar	from March 2021 to till date	

Declaration by the Head of the Accredited Consultant Organization

I, **Y. Maheshwara Reddy**, hereby, confirm that the above-mentioned experts prepared the EIA for **M/s. Shyam Steel Manufacturing Ltd.** for their proposed expansion of Steel Plant situated at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal-722143. I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.

Signature : Y M Reddy

Name : Y. Maheshwara Reddy

Designation : Managing Director

Organization : Pioneer Enviro Laboratories & Consultants Pvt. Ltd., Hyderabad

Date : 10/02/2022

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ABBREVIATIONS

MoEF&CC	Ministry of Environment, Forest & Climate Change
EIA	Environmental Impact Assessment
EC	Environmental Clearance
EMP	Environmental Management Plan
MTPA	Million Tons Per Annum
CTE	Consent to Establish
CTO	Consent to Operate
MW	Mega Watts
TOR	Terms of Reference
Std.ToR	Standard TOR
Add. TOR	Additional ToR
Spec. TOR	Specific ToR
NABET	National Accreditation Board for Education and Training
DRI	Direct Reduced Iron
SMS	Steel Melting Shop
WHRB	Waste Heat Recovery Boiler
CFBC	Circulated Fluidized Bed Combustion
IF	Induction Furnace
TPA	Tons Per Annum
TPD	Tons Per Day
GoI	Govt. of India
Ha.	Hectares
Ac.	Acres
SIPB	State Investment Promotion Board
kVA	kilo-volt-ampere
Kwh	Kilowatt Hour
CGWA	Central Ground Water Authority
MW	Megawatt
OSHA	Occupational Safety and Health Administration
D.G. set.	Diesel Generator Set
dBA	Decibels
KL	Kilo Liters
GEL	Global Enviro Labs
IMD	India Meteorological Department
PM	Particulate Matter,
SO_2	Sulphur Di-oxide
NOx	Oxides of Nitrogen
CO	Carbon Monoxide

NAAQS	National Ambient Air Quality Standards
Ldn	day night sound level
Leq	equivalent noise levels
Ld	day sound level
Ln	night sound level
mg/l	Milligram Per Litre
bgl	Below ground level
CGWB	Central Ground Water Board
MSL	Mean Sea Level
LULC	Land Use & Land Cover
RET	Rare or endangered or the threatened
IUCN	International Union for Conservation of Nature
REET	rare or endangered or endemic or threatened
TCLP	Toxic Chemical Leachibility Potential
USEPA	United States Environment Protection Agency
CPCB	Central Pollution Control Board
APCS	Air Pollution Control Systems
KLD	Kilo Liters per Day
PCU	Passenger Car units
CER	Corporate Environment Responsibility
SPCB	State pollution Control Board
CECB	Chhattisgarh Environment Conservation Board
CUM	Cubic Meters

No.J-11011/724/2007-IA.II(I)

Goverment of India

Minister of Enviroment,Forest and Climate Change

Impact Assessment Division

***

Indira Paryavaran Bhavan,
Vayu Wing,3rd Floor,Aliganj,
Jor Bagh Road,New Delhi-110003
01 Jun 2021

To,

M/s SHYAM STEEL MANUFACTURINGLIMITED
Shyam Tower, En-32, Salt Lake, Sector V, Kolkata 700091,
Bankura-700091
West Bengal

Tel.No.033-40074007; Email:mdaga@shyamsteel.com

Sir/Madam,

This has reference to the proposal submitted in the Ministry of Environment, Forest and Climate Change to prescribe the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the proponent had submitted online information in the prescribed format (Form-1) along with a Pre-feasibility Report. The details of the proposal are given below:

1. Proposal No.:	IA/WB/IND/213508/2021
2. Name of the Proposal:	Shyam Steel Manufacturing Limited
3. Category of the Proposal:	Industrial Projects - 1
4. Project/Activity applied for:	3(a) Metallurgical industries (ferrous & non ferrous)
5. Date of submission for TOR:	30 May 2021

In this regard, under the provisions of the EIA Notification 2006 as amended, the Standard TOR for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed with public consultation as follows:

3(a):STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR METALLURGICAL INDUSTRIES (FERROUS & NON FERROUS) PROJECTS AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

A. STANDARD TERMS OF REFERENCE (TOR)

1) Executive Summary

2) Introduction

i. Details of the EIA Consultant including NABET accreditation

ii. Information about the project proponent

iii. Importance and benefits of the project

3) Project Description

i. Cost of project and time of completion.

ii. Products with capacities for the proposed project.

iii. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.

iv. List of raw materials required and their source along with mode of transportation.

v. Other chemicals and materials required with quantities and storage capacities

vi. Details of Emission, effluents, hazardous waste generation and their management.

vii. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)

viii. Process description along with major equipments and machineries, process flow sheet (quantative) from raw material to products to be provided

ix. Hazard identification and details of proposed safety systems.

x. Expansion/modernization proposals:

a. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing Iexisting operation of the project from SPCB shall be attached with the EIA-EMP report.

b. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.

4) Site Details

i. Location of the project site covering village, Taluka/Tehsil, District and State, Justification for selecting the site, whether other sites were considered.

ii. A toposheet of the study area of radius of 10km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (including all eco-sensitive areas and environmentally sensitive places)

iii. Details w.r.t. option analysis for selection of site

iv. Co-ordinates (lat-long) of all four corners of the site.

v. Google map-Earth downloaded of the project site.

vi. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.

vii. Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.

viii. Landuse break-up of total land of the project site (identified and acquired), government/ private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for industrial area)

ix. A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area

x. Geological features and Geo-hydrological status of the study area shall be included.

xi. Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects)

xii. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.

xiii. R&R details in respect of land in line with state Government policy

5) Forest and wildlife related issues (if applicable):

i. Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable)

ii. Landuse map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (in case of projects involving forest land more than 40 ha)

iii. Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.

iv. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden-thereon

v. Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area

vi. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife

6) Environmental Status

i. Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.

ii. AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.

iii. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.

iv. Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.

v. Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.

vi. Ground water monitoring at minimum at 8 locations shall be included.

vii. Noise levels monitoring at 8 locations within the study area.

viii. Soil Characteristic as per CPCB guidelines.

ix. Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.

x. Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.

xi. Socio-economic status of the study area.

7) Impact and Environment Management Plan

i. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.

ii. Water Quality modelling - in case of discharge in water body

iii. Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined.

iv. A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.

v. Details of stack emission and action plan for control of emissions to meet standards.

vi. Measures for fugitive emission control

vii. Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.

viii. Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.

ix. Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.

x. Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.

xi. Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.

xii. Action plan for post-project environmental monitoring shall be submitted.

xiii. Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.

8) Occupational health

i. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers

ii. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.

iii. Details of existing Occupational & Safety Hazards. What are the exposure levels of hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved,

iv. Annual report of heath status of workers with special reference to Occupational Health and Safety.

9) Corporate Environment Policy

i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.

ii. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.

iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.

iv. Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report

10) Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.

11) Enterprise Social Commitment (ESC)

i. Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time

bound action plan shall be included. Socio-economic development activities need to be elaborated upon.

12) Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.

13) 'A tabular chart with index for point wise compliance of above TOR.

B. SPECIFIC TERMS OF REFERENCE FOR EIASTUDIES FOR METALLURGICAL INDUSTRIES (FERROUS & NON FERROUS)

1) Complete process flow diagram describing each unit, its processes and operations, along with material and energy inputs & outputs (material and energy balance).

2) Details on blast furnace/ open hearth furnace/ basic oxygen furnace/ladle refining, casting and rolling plants etc.

3) Details on installation/activation of opacity meters with recording with proper calibration system

4) Details on toxic metals including mercury, arsenic and fluoride emissions

5) Details on stack height requirement for integrated steel

6) Details on ash disposal and management -Non-ferrous metal

7) Complete process flow diagram describing production of lead/zinc/copper/ aluminium, etc.

8) Raw materials substitution or elimination

9) Details on smelting, thermal refining, melting, slag fuming, and Waelz kiln operation

10) Details on Holding and de-gassing of molten metal from primary and secondary aluminum, materials pre-treatment, and from melting and smelting of secondary aluminium

11) Details on solvent recycling

12) Details on precious metals recovery

13) Details on composition, generation and utilization of waste/fuel gases from coke oven plant and their utilization.

14) Details on toxic metal content in the waste material and its composition and end use (particularly of slag).

15) Trace metals Mercury, arsenic and fluoride emissions in the raw material.

16) Trace metals in waste material especially slag.

17) Plan for trace metal recovery

18) Trace metals in water

C. ADDITIONAL TOR FOR INTEGRATED STEEL PLANT

1). Iron ore/coal linkage documents along with the status of environmental clearance of iron ore and coal mines

2). Quantum of production of coal and iron ore from coal & iron ore mines and the projects they cater to. Mode of transportation to the plant and its impact

3). For Large ISPs, a 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site. MRL details of project site and RL of nearby sources of water shall be indicated.

4). Recent land-use map based on satellite imagery. High-resolution satellite image data having 1m-5m spatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc. for the 10 Km radius area from proposed site. The same shall be used for land used/land-cover mapping of the area.

5). Respirable Suspended particulate matter (RSPM) present in the ambient air must be analysed for source analysis - natural dust/RSPM generated from plant operations (trace elements). The RSPM shall also be analysed for presence of poly-aromatic hydrocarbons (PAH), i.e. Benzene soluble fraction, where applicable. Chemical characterization of RSPM and incorporating of RSPM data.

6). All stock piles will have to be on top of a stable liner to avoid leaching of materials to ground water.

7). Plan for the implementation of the recommendations made for the steel plants in the CREP guidelines.

8). Plan for slag utilization

9). Plan for utilization of energy in off gases (coke oven, blast furnace)

10). System of coke quenching adopted with justification.

***

TORs COMPLIANCE

Compliance made on Standard TOR issued by Ministry of Environment, Forest and Climate Change (MoEF&CC)

vide letter No. J-11011/724/2007-IA.II (I) dated 1st June 2021

A. Standard TORs for Metallurgical Industries (Ferrous & Non-Ferrous)

TOR No.	Standard TOR point issued	TOR Compliance
1.	**Executive Summary**	Kindly refer to **page no. 11.1 of CHAPTER # 11** of EIA report.
2.	**Introduction**	
	i. Details of the EIA Consultant including NABET accreditation	Kindly refer to **CHAPTER # 12 of EIA report.**
	ii. Information about the project proponent	Kindly refer to **page no. 1.4 of CHAPTER # 1** of EIA report.
	iii. Importance and benefits of the project	Kindly refer to **page no. 1.7 of CHAPTER # 1** of EIA report.
3.	**Project Description**	
	i. Cost of project and time of completion.	Kindly refer to **page no. 2.18 & 2.17 of CHAPTER # 2** of EIA report.
	ii. Products with capacities for the proposed project.	Kindly refer to **page no. 2.16 of CHAPTER # 2** of EIA report.
	iii. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.	**SHYAM STEEL MANUFACTURING LTD.** operating Steel plant at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal. Kindly refer to **page no. 2.15 to 2.16 of CHAPTER # 2** of EIA report for existing and proposed plant configuration and production capacity. Existing plant has obtained Environment Clearance from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 4th August 2008. Accordingly obtained Consent to Establishment and Consent to Operate from the WBPCB for few units and same are under operation. Subsequently another EC has been obtained from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 24th May 2019 for expansion of steel plant.

TOR No.	Standard TOR point issued	TOR Compliance
		Later obtained NIPL Certificate (for capacities of EC dt. 4th August 2008) vide dt. vide letter no. 406-2N-29/2019 (E)-PT-II dt. 26th April 2021 from West Bengal Pollution Control Board (WBPCB) for increase in production capacity of Sponge Iron, Induction Furnaces & Rolling Mill. Consent to Operate obtained from the CECB vide order no. 600/dr-co-s/11/1579 dated 29-03-2019, which is valid upto 31st December 2023. Total land after the proposed expansion will be 91.34 Ha. (225.64 Acres). Existing (66.1 Ha./ 163.3 Acres) is in possession of management and agreement of sale have been done for additional land (25.24 Ha./ 62.34 Acres). Kindly refer to **Annexure – 1** for agreement of sale for additional land. Kindly refer to **page no. 2.12** of **CHAPTER # 2** of EIA report for land details for proposed project.
	iv. List of raw materials required and their source along with mode of transportation	Kindly refer to **page no. 2.18 of CHAPTER # 2** of EIA report Copy of MoU for supply of Imported Coal is enclosed as **Annexure # 2 &** Copy of MoU for supply of Iron Ore is enclosed as **Annexure # 3.**
	v. Other chemicals and materials required with quantities and storage capacities.	Maximum quantity of LSHS / LDO (Light Diesel Oil) & HFO (Fuel Oil) stored at site will be 3 x 50 m^3 & 1 x 25 m^3 capacity respectively. Kindly refer to **Page no. 7.4 of CHAPTER # 7** of EIA report
	vi. Details of Emission, effluents, hazardous waste generation and their management	Kindly refer to **page no. 4.10 of CHAPTER # 4** of EIA report for Stack emission details. Kindly refer to page no. **2.39 to 2.45 of CHAPTER # 2** of EIA report for Air Emission Management details. Kindly refer to **page no. 2.45 of CHAPTER # 2** of EIA report for effluent generation and its management details.

TOR No.	Standard TOR point issued	TOR Compliance
		Kindly refer to **page no. 2.47 of CHAPTER # 2** of EIA report for hazardous waste generation and is management.
	vii. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)	Water required in the existing plant is 1050 KLD and same being sourced from Damodar river. Water required for the proposed expansion project will be 3420 KLD and same will be sourced from Damodar river. Total water requirement after the proposed expansion will be 4470 KLD. Water permission from Damodar Valley Corporation has already been obtained for 1.3 MGD (i.e. 5909.75 KLD). A copy of the Agreement for drawl of water from Damodar river, between Damodar Valley Corporation (DVC) and Shyam Steel Manufacturing Ltd. (Earlier Sova Ispat Ltd.) is enclosed as **Annexure # 4.** Kindly refer to **page no. 4.20 to 4.23 of CHAPTER # 4 EIA report** for detailed water requirement breakup and water balance diagram. Power requirement for the existing plant is 41.70 MW and same is being met from Captive Power plant and Damodar Valley Corporation (DVC). Power required for proposed expansion will be105.5MW and will be met partly from proposed 54 MW captive power plant and remaining 51.5 MW from Damodar Valley Corporation (DVC). Kindly refer to **page no. 2.37 of CHAPTER # 2** of EIA report Power requirement to each unit. Kindly refer to **page 2.38 of CHAPTER # 2 & page 8.1 of CHAPTER # 8** of EIA report for Man power requirement (regular & contract).

TOR No.	Standard TOR point issued	TOR Compliance
	viii. Process description along with major equipment's and machineries, process flow sheet (quantitative) from raw material to products to be provided	Kindly refer to **page no. 2.23 to 2.36 of CHAPTER # 2** of EIA report for process description.
	ix. Hazard identification and details of proposed safety systems	Kindly refer to **Page no. 7.4 to 7.17 of CHAPTER # 7** of EIA report
	x. Expansion / modernization proposals	
	a. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30thMay, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing /existing operation of the project from SPCB shall be attached with the EIA-EMP report.	Shyam Steel Manufacturing Ltd. is an existing plant located J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal. Existing plant has obtained Environment Clearance from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 4th August 2008. Subsequently another EC has been obtained from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 24th May 2019 for expansion of steel plant. A copy of Environment Clearance issued earlier is enclosed as **Annexure # 5.** A request letter has been submitted to IRO, MOEF&CC, Kolkata for issue of Certified Compliance report of conditions stipulated in E.C issued is enclosed as **Annexure # 6.**
	b. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.	NOT APPLICABLE as Environment Clearance has obtained for existing plant.

TOR No.	Standard TOR point issued	TOR Compliance
4.	**Site Details**	
	i. Location of the project site covering village, Taluka/Tehsil, District and State, Justification for selecting the site, whether other sites were considered.	Kindly refer to **page no. 2.2 of CHAPTER # 2** of EIA report for location of the project site. Kindly refer to **page no. 2.8 of CHAPTER # 2** of EIA report for Environmental Setting within 10 Km. radius of the project site. Kindly refer to **page no. 5.1 of CHAPTER # 5** of EIA report for Justification for selecting the site & other Alternate sites considered.
	ii. A toposheet of the study area of radius of 10km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet, (including all eco-sensitive areas and environmentally sensitive places)	Kindly refer to **page no. 2.11 of CHAPTER # 2** of EIA report.
	iii. Co-ordinates (lat-long) of all four corners of the site.	Kindly refer to **page no. 2.2 & 2.3 of CHAPTER # 2** of EIA report for coordinates of the Existing plant.
	iv. Google map-Earth downloaded of the project site.	Kindly refer to **page no. 2.4 of CHAPTER # 2** of EIA report for Google Earth map showing location of the of the Existing plant.
	v. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.	Kindly refer to **page no. 2.14 of CHAPTER # 2** for Plant layout showing existing & proposed units including storage area, plant area, greenbelt area, utilities etc.
	vi. Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.	Kindly refer to **page no. 2.5 to 2.7 of CHAPTER # 2** of EIA report.
	vii. Landuse break-up of total land of the project site (identified and acquired), government/private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included, (not required for industrial area)	Kindly refer to **page no. 2.12 of CHAPTER # 2** of EIA report.

TOR No.	Standard TOR point issued	TOR Compliance
	viii. A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area	Kindly refer to **page no. 2.9 of CHAPTER # 2** of EIA report for major industries within 10 Km radius of the project site. Kindly refer to **page no. 3.39 of CHAPTER # 3** of EIA report for land use details of the study area.
	ix. Geological features and Geo-hydrological status of the study area shall be included.	Kindly refer to **page no. 3.34 to 3.37 of CHAPTER # 3** of EIA report.
	x. Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided, (mega green field projects)	There is no major river within 1 Km. radius of the project. Damodar river is flowing at a distance of 1.5 Kms. from the plant. kindly refer to **page no. 3.40 of CHAPTER # 3** for Drainage Pattern map of the study area.
	xi. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.	Existing steel plant located at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal. Existing plant is located in 66.1 Ha./ 163.3 Acres of land. Additional 25.24 Ha. (62.34 Acres) of land is envisaged by management adjacent to the existing plant. Total land after the proposed expansion will be 91.34 Ha. (225.64 Acres). Existing (66.1 Ha./ 163.3 Acres) is in possession of management and agreement of sale have been done for additional land (25.24 Ha./ 62.34 Acres). Kindly refer to **Annexure – 1** for agreement of sale for additional land.
	xii. R & R details in respect of land in line with state Government policy	Not applicable as there are no habitations in the additional land proposed for expansion.
5.	**Forest and Wildlife related issues (if applicable)**	
	i. Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department, (if applicable)	Not applicable, as there is no forest land involved in the proposed project site.

TOR No.	Standard TOR point issued	TOR Compliance
	ii. Landuse map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (*in case of projects involving forest land more than 40 ha*)	Kindly refer to **page no. 3.41 to 3.42** for Satellite imagery and LULC map.
	iii. Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.	Not applicable, as there is no forest land involved in the proposed Project site.
	iv. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-a-vis the project location and the recommendations or comments of the Chief Wildlife Warden-thereon	There are no notified National Park/ Wild life sanctuary / Biosphere reserve / Tiger Reserve/ migratory routes for Birds with in 10 Km. radius of the plant.
	v. Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area	Not applicable, as there is no Schedule 1 fauna exists in the study area
	vi. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife	Not applicable, as there is no forest land involved in the additional land.
6.	**Environmental Status**	
	i. Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall;	Kindly refer to **page no. 4.2 of CHAPTER # 4** of EIA report. Kindly refer to **page no. 3.2 of CHAPTER # 3** of EIA report.
	ii. AAQ data (except monsoon) at 8 locations for PM_{10}, $PM_{2.5}$, SO_2, NOx, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.	Kindly refer to **page no. 3.6 to 3.13 of CHAPTER # 3** of EIA report.

TOR No.	Standard TOR point issued	TOR Compliance
	iii. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with -min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.	Kindly refer to **Annexure # 7** for One Season data
	iv. Surface water quality of nearby River (60m upstream and downstream) and, other surface drains at eight locations as per CPCB/MoEF&CC guidelines.	2 no. of Samples are collected from Damodar River, 1 no. of sample collected from Gaighata Jhor Nallah, Chouphari Nallah & Mejia Bil Reservoir. The analysis of samples shows that all the parameters are in accordance with BIS-2296 specifications. The analysis is furnished in **page no. 3.20 to 3.23 of CHAPTER # 3** of EIA report.
	v. Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC.	No, proposed site does not falls near to polluted stretch of river identified by CPCB/MoEFCC.
	vi. Ground water monitoring at minimum at 8 locations shall be included.	Eight (8) numbers of ground water samples from bore wells were collected from the nearby villages to assess ground water quality impacts. The ground water characteristics are furnished in **page no. 3.23 to 3.34 of CHAPTER # 3** of EIA report.
	vii. Noise levels monitoring at 8 locations within the study area.	Kindly refer to **page no. 3.16 to 3.18 of CHAPTER # 3** of EIA report.
	viii. Soil Characteristic as per CPCB guidelines	Eight (8) no. of soil samples were collected and for analyzed for various parameters like texture, infiltration rate, bulk density, pH, Ca, Mg, Na, K, Zn, Mn etc. Kindly refer to **page no. 3.43 to 3.46 of CHAPTER # 3** of EIA report.
	ix. Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.	Kindly refer to **page no. 4.26 to 4.28 of CHAPTER # 4** of EIA report for Traffic Study.
	x. Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.	Kindly refer to **page no. 3.48 of CHAPTER # 3** of EIA report for detailed description of flora and fauna existing in the study area.

TOR No.	Standard TOR point issued	TOR Compliance
	xi. Socio-economic status of the study area	Kindly refer to **page no. 3.64 to 3.81 of CHAPTER # 3** & **page no. 7.34 to 7.46 of CHAPTER # 7** of EIA report for details Socio Economic Study.
7.	**Impact Assessment and Environment Management Plan**	
	i. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modeling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be well assessed. Details of the model used and the input data used for modeling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.	Kindly refer to **page no. 4.2 to 4.10 of CHAPTER # 4** of EIA report. Air Quality isopleths are **page no. 4.12 to 4.19 of CHAPTER # 4** of EIA report.
	ii. Water Quality modelling - in case, if the effluent is proposed to be discharged in to the local drain, then Water Quality Modelling study should be conducted for the drain water taking into consideration the upstream and downstream quality of water of the drain.	There will be no wastewater discharge in the I/O Beneficiation, Pellet Plant, DRI Unit, Induction Furnace Unit, Ferro Alloys as closed circuit cooling system will be adopted. Effluent from Rolling mill will be sent to oil separator followed settling tank and will be recycled through closed circuit cooling system. Effluent from power plant will be treated in ETP and after ensuring compliance with WBPCB norms, it will be utilized for dust suppression, ash conditioning and for greenbelt development. Air cooled condenser will be provided in the power plant, which will reduce the water consumption significantly. Hence wastewater generation will be also be minimized.

TOR No.	Standard TOR point issued	TOR Compliance
		Sanitary waste water will be treated in STP and after treatment it will be utilized for greenbelt development. During monsoon the treated effluent will be utilized as makeup water in Rolling Mill. Accordingly, the makeup water for Rolling mill also reduces during the rainy period. Zero liquid effluent discharge practice will be continued in the proposed expansion also. No effluent will be discharged. It is a ZLD plant.
	iii. Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined.	Kindly refer to **page no. 4.26 of CHAPTER # 4** of EIA report.
	iv. A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.	Kindly refer to **page no. 2.45 of CHAPTER # 2** & **page no. 10.11 to 10.13 of CHAPTER # 10** of EIA report for a note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes & Complete scheme of effluent treatment. Kindly refer to **page no. 4.24 of CHAPTER # 4** of EIA report for Characteristics of untreated effluent. Kindly refer to **page no. 10.12 of CHAPTER # 10** of EIA report for Characteristics of treated effluent.
	v. Details of stack emission and action plan for control of emissions to meet standards.	Kindly refer to **page no. 4.10 of CHAPTER # 4** of EIA report for Stack emission details.

TOR No.	Standard TOR point issued	TOR Compliance
		Kindly refer to **page no. 10.3 of CHAPTER # 10** of EIA report for control of emissions to meet standards.
	vi. Measures for fugitive emission control	Kindly refer to **page no.2.44 of CHAPTER # 2** & **page no. 10.8 of CHAPTER # 10** of EIA report.
	vii. Details, of hazardous waste generation and their storage, utilization and disposal. Copies of MOU regarding utilization of solid and hazardous waste shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.	Kindly refer to **page no. 2.47 of CHAPTER # 2** & **page no. 10.13 of CHAPTER # 10** of EIA report for solid waste generation and their storage, utilization and its disposal. Tailings from thickener will be taken to filter press and the dewatered tailings cake be stored in the yard with 30 days capacity. This will be given to Ceramic industries / cement plants. Ash generated will be utilized in existing brick manufacturing unit (partly) and surplus ash after utilization in owned brick plant will be given to outside brick manufacturers. Kiln Accretion slag & Wet scrapper sludge will be road contractors for road laying & will be given to brick manufacturing units. SMS slag will be used in owned brick manufacturing unit after recovery of metal. Kindly refer to **Annexure # 8 (a), (b) & (c)** for expression of Interest letters for utilization various solid waste generated from proposed expansion. Kindly refer to **page no. 2.38 of CHAPTER # 2** of EIA report for Energy conservation measures proposed.

TOR No.	Standard TOR point issued	TOR Compliance
	viii. Proper 'utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.	The fly ash generated will be stored in Silos & will be utilized in own proposed Brick making unit. Kindly refer to **page no. 10.13 of CHAPTER # 10** of EIA report for Fly ash utilization and its disposal.
	ix. Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.	Kindly refer to **page no.10.18 to 10.21 of CHAPTER # 10** of EIA report.
	x. Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.	Kindly refer to **page no.10.21 to 10.22 of CHAPTER # 10** of EIA report.
	xi. Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.	Kindly refer to **page no.10.24 to 10.25 of CHAPTER # 10** of EIA report for break-up of budget for Total capital cost and recurring cost/annum for environmental pollution control measures.
	xii. Action plan for post-project environmental monitoring shall be submitted.	Kindly refer to **page no.6.2 of CHAPTER # 6** of EIA report. Budget for Environment Monitoring is furnished in **page no.6.3 of CHAPTER # 6** of EIA report.
	xiii. Onsite and Offsite Disaster (Natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.	Kindly refer to **page no. 7.1 to 7.27 of CHAPTER # 7** of EIA report.
8.	**Occupational Health**	
	i. Details of existing Occupational & Safety Hazards. What are the exposure levels of above mentioned hazards and	Kindly refer to **page no. 7.28 to 7.34 of CHAPTER # 7** of EIA report.

TOR No.	Standard TOR point issued	TOR Compliance
	whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved,	
	ii. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre-placement and periodical examinations give the details of the same. Details regarding last month analyzed data of abovementioned parameters as per age, sex, duration of exposure and department wise.	Kindly refer to **ANNEXURE # 9** of Health report of employees
	iii. Annual report of health status of workers with special reference to Occupational Health and Safety.	Kindly refer to **ANNEXURE # 9** of Health report of employees
	iv. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers.	Kindly refer to **page no. 7.32 of CHAPTER # 7** of EIA report.
9.	**Corporate Environment Policy**	
	i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	The company has well laid down Environment Policy, approved by Managing Director. Plant Head will be authorized by the Board to sign, issue & modify the Environment Policy. Kindly refer to **page no. 10.25** of **CHAPTER # 10** of EIA report.
	ii. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.	The organization has developed procedure detailing compliance with all aspects of Environmental norms including the process of corrective actions for its improvement. The policy provides a framework for setting and reviewing environmental objectives, which includes a commitment to fulfil its compliance obligations, to the protection of the environment, including prevention of pollution and other specific commitment(s) relevant to the context of the organization.

TOR No.	Standard TOR point issued	TOR Compliance
	iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	An Environmental Officer will look all the environmental issues and ensure the compliance with Environmental Clearance conditions and will report to the Plant Head and ultimate reporting would be to the Managing Director & Board of Directors. Subsequently it will be discussed in the Board meeting.
	iv. Does the company have system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report	An Environmental Officer will look all the environmental issues and ensure the compliance with Environmental Clearance conditions and will report to the Plant Head and ultimate reporting would be to the Managing Director & Board of Directors. Subsequently it will be discussed in the Board meeting. Kindly refer to **page no. 10.27** of **CHAPTER # 10** of EIA report.
10.	Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.	Kindly refer to **page no. 10.2 of CHAPTER # 10** of EIA report.
11.	**Corporate Environment Responsibility (CER)**	
	i. Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment (ESC) based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.	Kindly refer to **page no. 8.2 of CHAPTER # 8** of EIA report.
12.	Any litigation pending against the project and / or any direction / order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance / ATR to the notice(s) and present status of the case.	No litigation is pending against the project and / or any direction / order passed by any Court of Law against the project.
13.	A tabular chart with index for point wise compliance of above TORs	Noted

B. Specific TOR for Metallurgical Industries (Ferrous & Non-Ferrous)

TOR No.	Specific TOR issued	TOR Compliance
1.	Complete process flow diagram describing each unit, its processes and operations, along with material and energy inputs & outputs (material and energy balance).	Kindly refer to **page no. 2.23 to 2.36 of CHAPTER # 2** of EIA report for process description. Kindly refer to **page no. 2.20 to 2.22 of CHAPTER # 2** of EIA report for material inputs & outputs. Kindly refer to **page no. 2.37 of CHAPTER # 2** of EIA report for energy requirement.
2.	Details on blast furnace/ open hearth furnace/ basic oxygen furnace/ladle refining, casting and rolling plants etc.	Not Applicable as the proposed project is not envisaged blast furnace/ open hearth furnace/ basic ox`ygen furnace. Kindly refer to **page no. 2.23 to 2.36 of CHAPTER # 2** of EIA report for process description ladle refining, casting and rolling plants.
3.	Details on installation/activation of opacity meters with recording with proper calibration system	Opacity meters with recording with proper calibration system will be installed for proposed units.
4.	Details on toxic metals including mercury, arsenic and fluoride emissions	There will not be any flouride emissions from the proposed expansion project.
5.	Details on stack height requirement for integrated steel	Stack height details are furnished in **page no. 4.6 to 4.9** of **CHAPTER # 4** of EIA report.
6.	Details on ash disposal and management -Non-ferrous metal	Ash generated is being utilized in existing brick manufacturing unit (partly) and surplus ash after utilization in owned brick plant is given to outside brick manufacturers. In the proposed expansion, same practice will be continued. SMS slag will be used in owned brick manufacturing unit after recovery of metal.
7.	Complete process flow diagram describing production of lead/zinc/copper/ aluminium, etc.	Not Applicable as there will not be any facility of process of lead/zinc/copper/ aluminium etc. in the existing as well as in expansion project.

TOR No.	Specific TOR issued	TOR Compliance
8.	Raw materials substitution or elimination	Kindly refer to **page no. 2.18 of CHAPTER # 2** of EIA report.
9.	Details on smelting, thermal refining, melting, slag fuming, and Waelz kiln operation	Not Applicable as the proposed plant is not an Aluminium processing unit.
10.	Details on Holding and de-gassing of molten metal from primary and secondary aluminum, materials pre-treatment, and from melting and smelting of secondary aluminium	Not Applicable as the proposed plant is not an Aluminium processing unit.
11.	Details on solvent recycling	Not Applicable as the proposed plant not proposed solvent recycling
12.	Details on precious metals recovery	SMS slag will be used in owned brick manufacturing unit after recovery of metal.
13.	Details on composition, generation and utilization of waste/fuel gases from coke oven plant and their utilization.	Kindly refer to **page no. 2.47 to 2.48 of CHAPTER # 2** of EIA report for waste generation and their storage, utilization and its disposal. Flue gases generated from DRI kilns will be taken to WHRB and after heat recovery it will be used for Power Generation. A total of 46 MW will be generated through flue gases from the existing & proposed DRI units.
14.	Details on toxic metal content in the waste material and its composition and end use (particularly of slag)	Kindly refer to **page no. 2.47 to 2.48 of CHAPTER # 2** of EIA report for waste generation and their storage, utilization and its disposal.
15.	Trace metals Mercury, arsenic and fluoride emissions in the raw material	Not Applicable as the raw material doesn't contain any Mercury, arsenic and fluoride emissions.
16.	Trace metals in waste material especially slag	Details on Slag composition is furnished in **page no. 10.15** of **CHAPTER # 10** of EIA report.
17.	Plan for trace metal recovery	SMS slag will be sent to M/s. Shyam Steel Industries Ltd. (Sister Concern Unit) at Bamunara Industrial Estate, where it is processed for metal recovery. The remaining material after the recovery process is further used as Raw material for Brick manufacturing unit at M/s. Shyam Steel Industries Ltd.

TOR No.	Specific TOR issued	TOR Compliance
18.	Trace metals in water	Kindly refer to **page no.3.23 to 3.34** of **CHAPTER # 3** of EIA report. Heavy metals are within the limits.

C. <u>Additional TOR for Integrated Steel Plant</u>

TOR No.	Additional TOR issued	TOR Compliance
1.	Iron ore/coal linkage documents along with the status of environmental clearance of iron ore and coal mines	Copy of MoU for supply of Imported Coal is enclosed as **ANNEXURE # 2 &** Copy of MoU for supply of Iron Ore is enclosed as **ANNEXURE # 3.**
2.	Quantum of production of coal and iron ore from coal & iron ore mines and the projects they cater to. Mode of transportation to the plant and its impact	Kindly refer to **page No. 2.18 of CHAPTER # 2** of EIA report for source of Raw material & quantity required. Kindly refer to **page no. 4.26 of CHAPTER # 4** of EIA report for Impact of the transport of the raw materials and end products.
3.	For Large ISPs, a 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site. MRL details of project site and RL of nearby sources of water shall be indicated	Not applicable, as proposed expansion project is Steel Plant.
4.	Recent land-use map based on satellite imagery. High-resolution satellite image data having 1m-5mspatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc. for the 10 Km radius area from proposed site. The same shall be used for land used/land-cover mapping of the area	Kindly refer to **page no. 3.40 of CHAPTER # 3** of EIA report for land use map & satellite imagery.
5.	Respirable Suspended particulate matter (RSPM) present in the ambient air must be analysed for source analysis - natural dust/RSPM generated from plant operations (trace elements). The RSPM shall also be analysed for presence of poly-aromatic hydrocarbons (PAH), i.e. Benzene soluble fraction, where applicable. Chemical characterization of RSPM and incorporating of RSPM data	Kindly refer to **page no. 3.6 to 3.13 of CHAPTER # 3** of EIA report.

TOR No.	Additional TOR issued	TOR Compliance
6.	All stock piles will have to be on top of a stable liner to avoid leaching of materials to ground water.	All the raw material required for the proposed steel plant will be stored on pucca platform above ground level. Kindly refer to **page No. 2.19 of CHAPTER # 2** of EIA report. Solid wastes such as dolochar, accretion slag, will be stored in designated storage yard. Ash generated will be stored in silos only. There will not be any open storage of fly ash. All other storage yards will be on top of stable liner to avoid leaching of material to ground water. Kindly refer to **page no. 2.48 of CHAPTER # 2** of EIA report.
7.	Plan for the implementation of the recommendations made for the steel plants in the CREP guidelines	Kindly refer to **page no. 10.10 of CHAPTER # 10** of EIA report.
8.	Plan for slag utilization	SMS slag will be used in owned brick manufacturing unit after recovery of metal.
9.	Plan for utilization of energy in off gases (coke oven, blast furnace)	Not applicable, as coke oven and blast furnace are not envisaged in the proposed expansion project. However, gases from DRI Kilns will be utilized in the WHRB to generate power. Kindly refer to **page no. 2.38 of CHAPTER – 2** of EIA report.
10.	System of coke quenching adopted with justification	Not applicable, as coke oven is not envisaged in the proposed expansion project

CHAPTER – 1
INTRODUCTION

1.1 PURPOSE OF THE REPORT

Environmental management plays a vital role in sustainable development of a country. Recognizing its importance, the Ministry of Environment and Forest, Government of India had formulated policies and procedures governing the industrial and other developmental activities to prevent indiscriminate exploitation of natural resources and to promote integration of environmental concern in developmental projects.

Ministry of Environment, Forest & Climate Change (MoEF&CC) has made prior Environmental Clearance (EC) for certain developmental projects mandatory through its notification issued on 14th September 2006 and its subsequent amendment.

Environmental Impact Assessment (EIA) is systematic process to identifying, predicting, evaluating and mitigating the biophysical, social and other relevant environmental effects due to the proposed developmental project. It plays a vital role in providing information for decision-making on the environmental consequences of proposed projects. It promotes environmentally sound and sustainable development through the identification appropriate enhancement and mitigation measures.

The proposed project activity has both positive and negative impacts on the environment. The negative impacts include environmental degradation and adverse socio-economic changes. It is the responsibility of the company to document the associated positive and negative impacts, so that the attempts can be made to minimize the effects due to the negative impacts and maximize the benefits due to the positive impacts. In this regard, Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) have been considered as the most important documentation in understanding the environmental implications and safeguarding the environment.

1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

Indian demand is projected to rise to 300 million tonnes by 2025. Given the strong demand scenario, most global steel players are in a massive capacity expansion mode, either through brownfield or Greenfield route. Steel production capacity in India is expected to touch 170 million tonnes by 2020. While Greenfield projects are slated to add 30 million tonnes, brownfield expansions are estimated to add 50 million tonnes to the existing capacity of 90 million tonnes. Steel is manufactured as a globally tradable product with no major trade barriers across national boundaries to be seen currently. There is also no inherent resource related constraints which may significantly affect production of the same or its capacity creation to respond to demand increases in the global market. Even the government policy restrictions have been negligible worldwide and even if there are any the same to respond to specific conditions in the market and have always been temporary. Therefore, the industry in general and at a global level is unlikely to throw up substantive competition issues in any national policy framework. Further, there are no natural monopoly characteristics in steel. Therefore, one may not expect complex competition issues as those witnessed in industries like telecom, electricity, natural gas, oil, etc.

About the Project

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

Chronology of permission obtained:

- Existing plant has obtained Environment Clearance from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 4th August 2008. Accordingly obtained Consent to Establishment and Consent to Operate from the WBPCB for few units and same are under operation.
- Subsequently another EC has been obtained from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 24th May 2019 for expansion of steel plant.
- Later obtained NIPL Certificate (for capacities of EC dt. 4th August 2008) vide dt. vide letter no. 406-2N-29/2019 (E)-PT-II dt. 26th April 2021 from West Bengal Pollution Control Board (WBPCB) for increase in production capacity of Sponge Iron, Induction Furnaces & Rolling Mill.

Proposed Project

Now as part of expansion, company proposed to the expand the existing capacity of steel plant i.e. DRI Kilns (Sponge Iron from 2,25,000 TPA to 7,86,000 TPA), Induction Furnaces along with CCM & LRF (MS Ingots / Billets/ Hot Charging from 2,34,300 TPA to 6,95,800 TPA), Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod - 2,90,000 TPA to 7,19,000 TPA), 2 x 9 MVA Ferro Alloys, 1 x 30 T Electric Arc Furnace, WHRB based Power Plant from 10 MW to 46 MW, FBC based Power Plant from 7 MW to 25 MW, New 1.2 MTPA of I/O Beneficiation plant, New 0.8 MTPA of I/O Pellet Plant.

Proposed expansion which will be taken up partly in existing plant and the partly in the land adjacent to the existing plant premises.

As per the Ministry of Environment, Forests & Climate Change, New Delhi, EIA notification dated 14th September, 2006 & its subsequent amendments, all Primary metallurgical processing industries are listed under S.No. 3(a), under Category 'A'.

In order to obtain Environmental Clearance for the proposed expansion of Steel plant, Form-I, proposed TOR along with Pre-Feasibility Report were submitted to the Honourable Ministry of Environment, Forests & Climate Change (MoEF&CC), New Delhi on **30th May 2021**. Accordingly, Standard TOR has been issued for the proposed expansion of steel plant vide No. **J-11011/724/2007-IA.II(I)** dated **1st June 2021**. Subsequently, Draft EIA report has been prepared incorporating the Terms of Reference issued & report is being submitted to West Bengal Pollution Control Board (WBPCB) for conducting Public hearing / consultation.

Pioneer Enviro Laboratories & Consultants Private Limited, Hyderabad, which is accredited by NABET, Quality Council of India, vide certificate No. NABET/EIA/1922/RA0149, for preparing Environmental Impact Assessment (EIA) report for Metallurgical Unit, has prepared EIA report for the proposed project.

This report furnishes the details of location of Site, Description of the project, prevailing baseline status w.r.t Air Environment, Water Environment, Noise Environment, Land Environment, Flora & Fauna and Socio-economic environment. This report also helps in identification of environmental impacts and suggesting mitigation measures to be followed during Construction and Operation of the proposed project as a part of Environmental

Management Plan. This report also acts as guidance manual for the proponent for following the Environmental Management Plan (EMP) and for adopting post project Environmental Monitoring Program as per statutory norms.

About Project Proponent [Std. TOR # 2 (ii)]

Shyam Steel Manufacturing Ltd. is established in 1953, Shyam Steel Group is one of the leading TMT Bar Producers in India, manufacturing TMT Rebar, Billets and Sponge Iron. Guided by a philosophy to produce safe and sustainable steel, it is a pioneer in quality production of steel.

Shyam Steel has established itself as one of the leading TMT Bar manufacturers in the country. Its founder, Sri Shriram Beriwal had dreamt of building a legacy in the manufacturing industry in the country. In 1953 he laid the foundation of Shyam Steel with a small factory in Howrah. Later, he was joined by his younger brother Shyam Sunder Beriwal. Their leadership contributed to Shyam Steel's world-class technology, quality control and complete professionalism, which enables the company to meet the stringent requirements of its reputed customers both in India and abroad. Operating for over six decades and now an INR 30 billion group, Shyam Steel has emerged as a large, growing, competitive and multi-product steel organization by delivering quality material through innovation, excellence, and dedication.

Shyam Steel is operated through its Steel Manufacturing Plants located in West Bengal. The products of the company are manufactured at its integrated steel plant in Durgapur & Mejia and marketed under the brand Shyam Steel's flagship product – Shyam TMT Rebars are earthquake proof and corrosion resistant. Shyam TMT Rebar has a wide market presence across various infrastructure segments such as urban development, irrigation and it also used in various projects for rail, roads, bridges, ports, airports, defense and energy.

Shyam steel is among the first companies to invest in the most upgraded and advanced international technology of Electric Arc Furnace. Our dedicated pursuit of the latest technology and intensive in-house R&D over the years has made us one of the most cost-efficient producers of steel in India.

The company is associated with the largest institutional projects in India. Our quality steel products are used for large government entities including public sector undertakings such as

National Highway Authority of India (NHAI), railways, military engineering services, Nuclear Power Corporation of India (NPCI)and various state governments.

Shyam Steel's superior design, engineering and quality manufacturing process provide the ideal strength and flexibility to the TMT steel bars that is required in today's construction industry.

1.3 BRIEF DESCRIPTION

1.3.1 NATURE OF THE PROJECT

Shyam Steel Manufacturing Ltd. is an existing steel plant located at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal. Now the company intends to

- Establishment of New Iron ore Beneficiation plant & Pellet Plant as part of backward integration.
- Reduction in FBC Power plant capacity from 25 to 18 MW as per EC permission accorded by MoEF&CC vide dated 24th May 2019.
- DRI, SMS, Rolling Mill units have not been implemented. Now it has been proposed to install 4 x 425 TPD of DRI Kilns instead of 3 x 350 TPD of DRI Kilns as permitted in EC dt. 24thMay 2019.
- Installation of 3 x 15 T & 5 x 17 T Induction Furnaces along with CCM & LRF instead of 8 x 15 T Induction Furnaces as permitted in EC dated 24th May 2019.
- Change in Rolling Mill configuration to 1 x 1,000 TPD & 1 x 300 TPD instead of 2 x 650 TPD as permitted in EC dated 24th May 2019.

1.3.2 SIZE OF THE PROPOSED PROJECT

The following are the existing & proposed expansion products and their production capacities:

Table No. 1.3.1: Plant Configuration and Production Capacity

S. No.	Unit (Product)	Existing Operating plant	Capacity for which EC obtained in 24thMay, 2019	Present Proposal	Final Configuration after Present Proposal
		[1]	[2]	[3]	[4] = [1] + [3]
1.	Iron Ore Beneficiation plant (Concentrated Iron ore)	---	---	1.2 MTPA	1.2 MTPA
2.	Iron Ore Pellet Plant (I/o Pellets)	---	---	0.8 MTPA	0.8 MTPA

S. No.	Unit (Product)	Existing Operating plant	Capacity for which EC obtained in 24th May, 2019	Present Proposal	Final Configuration after Present Proposal
		[1]	[2]	[3]	[4] = [1] + [3]
3.	DRI Kilns (Sponge Iron)	2,25,000 TPA	3,46,500 TPA (3 x 350 TPD)	5,61,000 TPA (**4 x 425 TPD will be installed instead of 3 x 350 TPD**)	7,86,000 TPA
4.	Induction Furnace with CCM & LRF (MS Ingots / Billets /Hot Billets)	2,34,300 TPA	3,96,000 TPA (8 x 15T)	4,61,500 TPA (**3x15T& 5x17Twith 5 x 15T LRF will be installed instead of 8 x 15 T)**	6,95,800TPA
5.	Electric Arc Furnace	Nil	1,98,000 TPA (1 x 30 T)	1,98,000 TPA (1 x 30 T) **[Retained EC permitted capacity]**	1,98,000 TPA (1 x 30 T)
6.	Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars / Wire Rod) (80 % Hot charging with Hot Billets and remaining 20% through 2X20TPH RHF)	2,90,000 TPA	4,29,000 TPA (2 x 650 TPD)	4,29,000 TPA (**Change in configuration of EC permitted capacity to 1 x 1000 TPD + 1 x 300 TPD**)	7,19,000 TPA
7.	Ferro Alloy Plant (FeSi/FeMn/SiMn/FeCr)	2 x 9 MVA (FeMn 32,400 TPA / SiMn 32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA)	2 x 9 MVA (FeMn 32,400 TPA / SiMn 32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA)	2 x 9 MVA (FeMn 32,400 TPA / SiMn 32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA) **[Retained EC permitted capacity]**	4 x 9 MVA (FeMn64,800 TPA / SiMn64,800 TPA / FeCr – 54,000 TPA / FeSi – 31,200 TPA)
8.	Power Plant (WHRB)	10 MW	24 MW	Increase in WHRB Power from 24 MW **to 36 MW (4 x 9 MW)**	46 MW
9.	Power Plant (FBC)	7 MW	25 MW (1 x 25 MW)	**Reduction in Power Plant from 25 MW to 18 MW**	25 MW
10.	Oxygen Plant	Nil	4,000 TPA	4,000 TPA	4,000 TPA

S. No.	Unit (Product)	Existing Operating plant	Capacity for which EC obtained in 24th May, 2019	Present Proposal	Final Configuration after Present Proposal
		[1]	[2]	[3]	[4] = [1] + [3]
				[Retained EC permitted capacity]	
11.	Cement Plant	75,000 TPA	Nil	---	75,000 TPA
12.	Coal / Coke / Chrome fines Briquette	Nil	1,00,000 TPA	1,00,000 TPA [Retained EC permitted capacity]	1,00,000 TPA

1.3.3 LOCATION OF THE PROJECT

- Existing steel plant located at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal.
- Existing plant is located in 66.1 Ha. / 163.3 Acres of land
- Proposed expansion will be taken up partly in the Existing plant (i.e. 66.1 Ha. / 163.3 Acres) and partly in the land adjacent to the existing plant (i.e. 25.24 Ha./ 62.34 Acres) and agreement of sale have been done for the additional land.
- Total land after proposed expansion will be 91.34Ha. / 225.64 Acres.
- Mouza no. of total land area are furnished in **Pg. no.2.13 of Chapter # 2** of EIA report.

1.3.4 IMPORTANCE OF PROJECT [Std. TOR # 2 (iii)]

- Steel has been regarded as the most useful product for mankind.
- It reaches every home, and has a wide range of applications from a small pin to the manufacture of automobiles, building of the railway systems, ships, big construction projects, housing, oilrigs, nuclear power stations and so on.
- All these products play a key role in the growth of a country's more important sectors like construction, power, oil and gas, engineering, railway and road transportation, port, irrigation etc.

Benefits:

- Developmental activities will be carried out in the villages under CER activities.
- The proposed project will generate lot of employment opportunities for the local people apart from several indirect benefits.

- During the construction of the plant, it is expected that about 700 persons will get an employment directly or indirectly whereas during operation about 1800 persons will be benefited.

1.4 SCOPE OF THE STUDY

The scope of work includes a detailed characterization of the environment in an area of 10 Km. radius of the project site for various environmental parameters like Air, Water, Noise, Land, Biological and Social-economic aspects.

The EIA Report is prepared in accordance with the Terms of Reference issued vide by the Honorable Ministry of Environment, Forest & Climate Change, New Delhi.

Generic Structure of the Environmental Impact Assessment (EIA) report as per the EIA notification of the MoEF&CC, GoI dated 14th September 2006 and its subsequent amendments is detailed below:

Ch.No.	Heading
1.	Introduction
2.	Project Description
3.	Description of the Environment
4.	Anticipated Environmental Impact & Mitigation Measures
5.	Analysis of Alternatives (Technology & Site)
6.	Environmental Monitoring Program
7.	Additional Studies
8.	Project Benefits
9.	Environmental Cost – Benefit Analysis
10.	Environmental Management Plan (EMP)
11.	Summary & Conclusion
12.	Disclosure of Consultant engaged

CHAPTER – 2
PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

Shyam Steel Manufacturing Ltd is proposed to expand the existing steel plant at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal.

- Establishment of New Iron ore Beneficiation plant & Pellet Plant as part of backward integration.
- Reduction in FBC Power plant capacity from 25 to 18 MW as per EC permission accorded by MoEF&CC vide dated 24th May 2019.
- DRI, SMS, Rolling Mill units have not been implemented. Now it has been proposed to install 4 x 425 TPD of DRI Kilns instead of 3 x 350 TPD of DRI Kilns as permitted in EC dt. 24thMay 2019.
- Installation of 3 x 15T & 5 x 17 T Induction Furnaces along with CCM & LRF instead of 8 x 15 T Induction Furnaces as permitted in EC dated 24th May 2019.
- Change in Rolling Mill configuration to 1 x 1,000 TPD & 1 x 300 TPD instead of 2 x 650 TPD as permitted in EC dated 24th May 2019.

2.2 NEED FOR THE PROJECT

Steel is considered the backbone of national economical development. A vibrant steel industry has historically been the foundation of a nation's rapid industrial development and is considered a yardstick for the improving standard of living of the people in a country. From a small capacity of 22 million tons in FY 1991-92 prior to deregulation, India has become the third largest producer of steel in the world with a production of over 100 million tons in FY 2017-18. However per capita steel used in the country is still very low at 69 Kg against the world average of 218 Kg.

The current pace of growth and capacity creation in the country is in line with latest National Steel Policy 2017. The Steel Policy envisages creation of a capacity of 300 million tons by 2030 from a current installed capacity of 125 million tons by end of 2017. Steel industry is contributing about 2% of the country's GDP. Its multiplier factor of growth is 1.4% on GDP and

has an employment generation multiplier factor of 6.8%. The new policy reflects long term vision of Indian Government and focuses on enhancing domestic consumption to a robust per capita consumption of 158 Kgs by 2030-31, through intensive development all over the country in Infrastructure, Construction, Engineering & Fabrication, Automotive, Railways Packaging, Energy, Ship Building, Oil & Gas and Defense Sectors.

Infrastructure & Construction Sector is the largest consumer of steel with 62% of total steel consumption followed by 22% by Engineering & Fabrication Sector, 10% by Automotive Sector, 3% by other Transport Sector & balance 3% by other end users.

TMT Bars & wire rods will be used for Infrastructure & Construction Sector. Wire rods will be used for Automobile Sector, Railway Wagon Industry & white goods manufacture.

In the light of the above scenario, **Shyam Steel Manufacturing Ltd** has proposed to expand the existing plant.

2.3 LOCATION OF THE PROJECT [Std. TOR # 4 (i)]

- Existing steel plant located at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal.
- Proposed expansion will be taken up partially in the Existing plant and partially in the land adjacent to the existing plant.

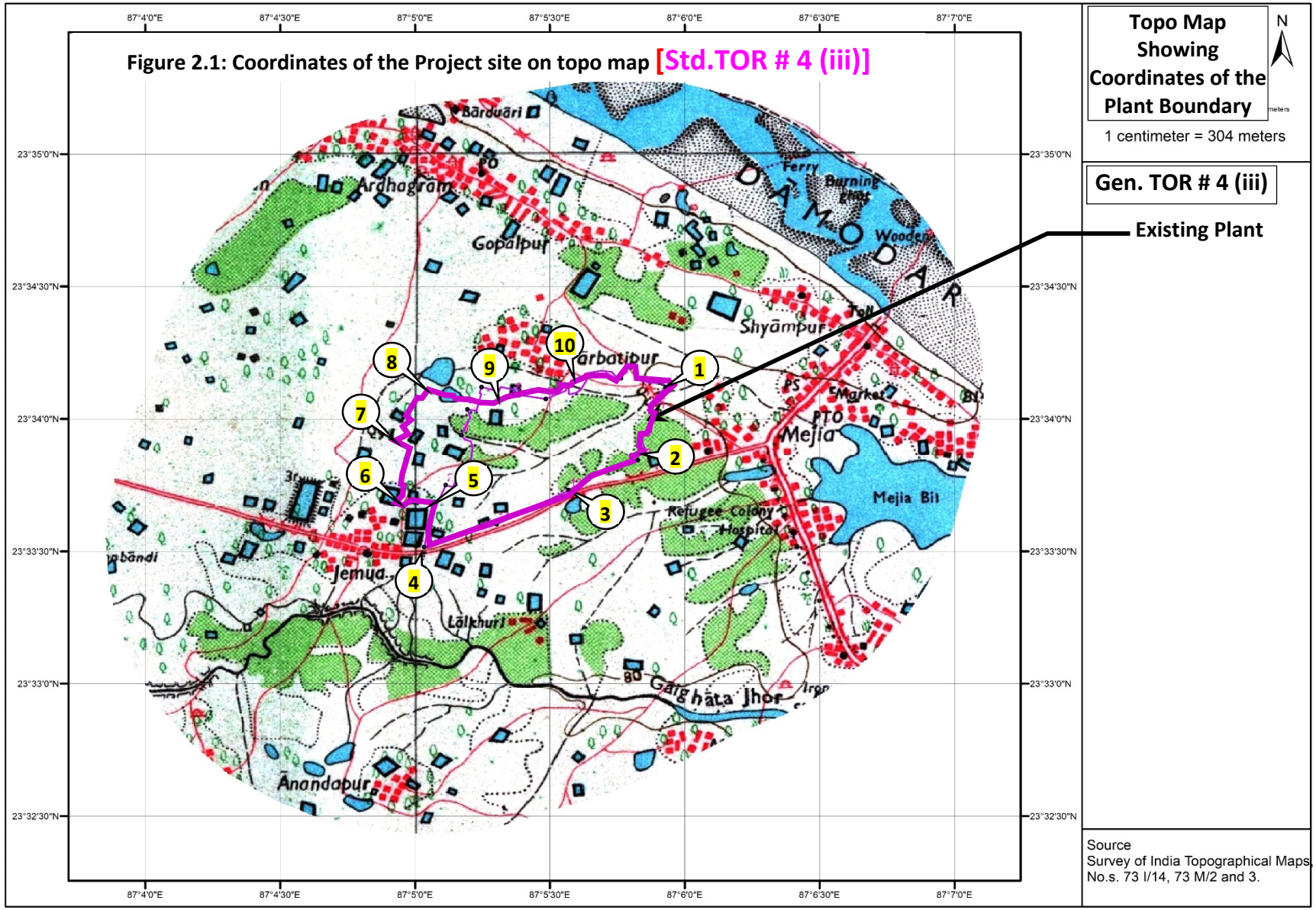
2.3.1 COORDINATES OF THE PROJECT SITE [Std.TOR # 4 (iii)]

The project site falls in Survey of India Topo sheet no. 73 I/14, 73 M/2 & 73 M/3 and same are depicted on Topo map shown in Fig. 2.1.

Table No. 2.3.1: Coordinates of the Project Site

Point	Coordinates
Point # 1	23°34'05.43"N 87°05'42.40"E
Point # 2	23°33'50.57"N 87°05'35.69"E
Point # 3	23°33'42.29"N 87°05'20.44"E
Point # 4	23°33'33.53"N 87°04'51.96"E
Point # 5	23°33'42.34"N 87°04'53.35"E
Point # 6	23°33'42.98"N 87°04'45.38"E
Point # 7	23°33'56.37"N 87°04'45.60"E
Point # 8	23°34'07.38"N 87°04'52.87"E
Point # 9	23°34'03.60"N 87°05'06.58"E
Point # 10	23°34'07.01"N 87°05'22.52"E

Figure 2.1: Coordinates of the Project site on topo map [Std.TOR # 4 (iii)]



Topo Map Showing Coordinates of the Plant Boundary

N

1 centimeter = 304 meters

Gen. TOR # 4 (iii)

Existing Plant

Source
Survey of India Topographical Maps, No.s. 73 I/14, 73 M/2 and 3.

Figure :2.2 – Google Earth Map showing Existing plant and additional adjoining land [Std.TOR # 4 (iv)]

Figure 2.3: Photographs of the Existing Plant & Air Pollution Control Systems attached [Std.TOR # 4 (vi)]

ESPs attached DRI Kilns & FBC based Power Plant

Figure 2.4: Photographs of the Greenbelt and Internal Road in the existing plant [Std.TOR # 4 (vi)]

Internal Roads

2.3.2 ENVIRONMENTAL SETTING WITHIN 10 Km. RADIUS OF THE PROJECT SITE

[Std. TOR # 4 (i)]

The following is the environmental setting within the 10 Km. radius of the plant site:

Table No. 2.3.2: Environmental Setting Within 10 Km. Radius

S.No.	Salient Features / Environmental features	Distance w.r.t. site / Remarks
1.	Type of Land	Existing Plant (Industrial land) Additional land will be converted to Industrial purpose.
2.	Type of Land (Study Area)	As per LULC the land use within 10 Km. is as follows: Settlements – 6.1 %; Industrial Area- 3.8 %; , Tanks / River/ Major canal/ Reservoir etc – 10.5%; Scrub Forest & Dense Forest area – 1.5 %; Single crop land –56.4 %; Double Crop Land – 3.7 %; Land with scrub – 7.1 %; Land without scrub – 5.7 % ; Mining area – 3.9% & Sheet rock area –1.3%.
3.	National Park/ Wild life sanctuary / Biosphere reserve / Tiger Reserve / Elephant Corridor / migratory routes for Birds	There are no notified National Park/ Wild life sanctuary / Biosphere reserve / Tiger Reserve/ migratory routes for Birds with in 10 Km. radius of the plant.
4.	Historical places / Places of Tourist importance / Archeological sites	Nil
5.	Critically polluted area as per MoEF&CC Office Memorandum dated 13th January 2010	Nil And also the Plant area does not fall in the areas given in Hon'ble NGT order issued vide dated 10thJuly 2019.
6.	Defence Installations	Nil
7.	Nearest village	Jemua Village at 0.1 Kms.
8.	No. of Villages in the Study Area	54 nos.
9.	Nearest Hospital	Nearest Hospital is at Mejia at 1.2 Kms.
10.	Nearest School	Nearest School is at Mejia at 0.4 Kms.
11.	Forests	No PF present within the study area of the project site.
12.	Water body	Damodar River (NE Direction) – 1.5 Kms., Galghata Jhor Nallah (South Direction) – 0.5 Kms., Chouphari Nallah (SE Direction) – 3.7 Kms., Mejia Bil Reservoir (East Direction) – 1.3 Kms. 4 no.s of rain fed pond are present in the additional land proposed for expansion proposal and same will not be disturbed & will be utilised as water reservoirs.
13.	Nearest Highway	National Highway # 60 - 0.8 Kms.
14.	Nearest Railway Station	Raniganj Railway Station – 4.4 Kms. (Aerial)
15.	Nearest Port facility	Nil
16.	Nearest Airport	Kazi Nazrul Islam Airport, Andal – 15.0 Kms.
17.	Nearest Interstate Boundary	Nil within 10 Km. radius

S.No.	Salient Features / Environmental features	Distance w.r.t. site / Remarks
18.	Seismic zone as per IS-1893	Seismic zone – II
19.	R & R	Not applicable as there are no habitations in the additional land proposed for expansion.
20.	Litigation / court case is pending against the proposed project / proposed site and or any direction passed by the court of law against the project	Nil

2.3.3 LIST OF INDUSTRIES WITHIN 10 Km. RADIUS OF THE PROJECT SITE [Std. TOR # 4 (viii)]

Following are list of Industries within 10 Kms. Radius of the plant site:

Table No. 2.3.3: List of Industries (Major) Located Within 10 Km Radius

S.No.	Name of Industry	Type of Industry	Distance w.r.t plant site (in Kms.)	Capacity / Unit
1.	M/s. Maa Amba Sponge Iron Ltd.	Steel Plant	0.1	DRI Kilns 2 x 100 TPD (60,000 TPA)
2.	M/s. Ballavpur Paper Mfg. Ltd.	Paper Unit	3.1	50,000 tons of Kraft paper
3.	M/s. Amiya Steel Pvt. Ltd.	Steel Plant	1.3	DRI Kilns 2 x 100 TPD (60,000 TPA)
4.	M/s. DivyaJyoti Sponge Iron Pvt. Ltd.	Steel Plant	6.7	DRI Kiln 400 TPD (1,20,000 TPA)
5.	M/s. Shree Gopal Govind Sponge Pvt. Ltd.	Steel Plant	6.6	Sponge Iron Kilns 2 x 100 TPD (60,000 TPA)
6.	M/s. Jai Balaji Industries Ltd. (Unit – 1)	Steel Plant	6.8	DRI Kiln (7 x 50 TPD – 1,05,000 TPA), Coal Wahsery (2,16,000 TPA) & Ferro Alloys Unit (2 x 7 MVA)
7.	M/s. Gwalior Cement (Khaitan Cement)	Cement Plant	7.7	1,00,000 TPA
8.	M/s. Shyam Super Cement Ltd.	Cement Plant	7.7	80,000 TPA
9.	M/s. Tirupati Sponge & Steel Ltd.	Steel Plant	6.0	DRI Kilns 2 x 100 TPD (60,000 TPA)

The general location of the project site is shown in Figure 2.5. The topographical map showing the location of the proposed project site is shown in Figure 2.6.

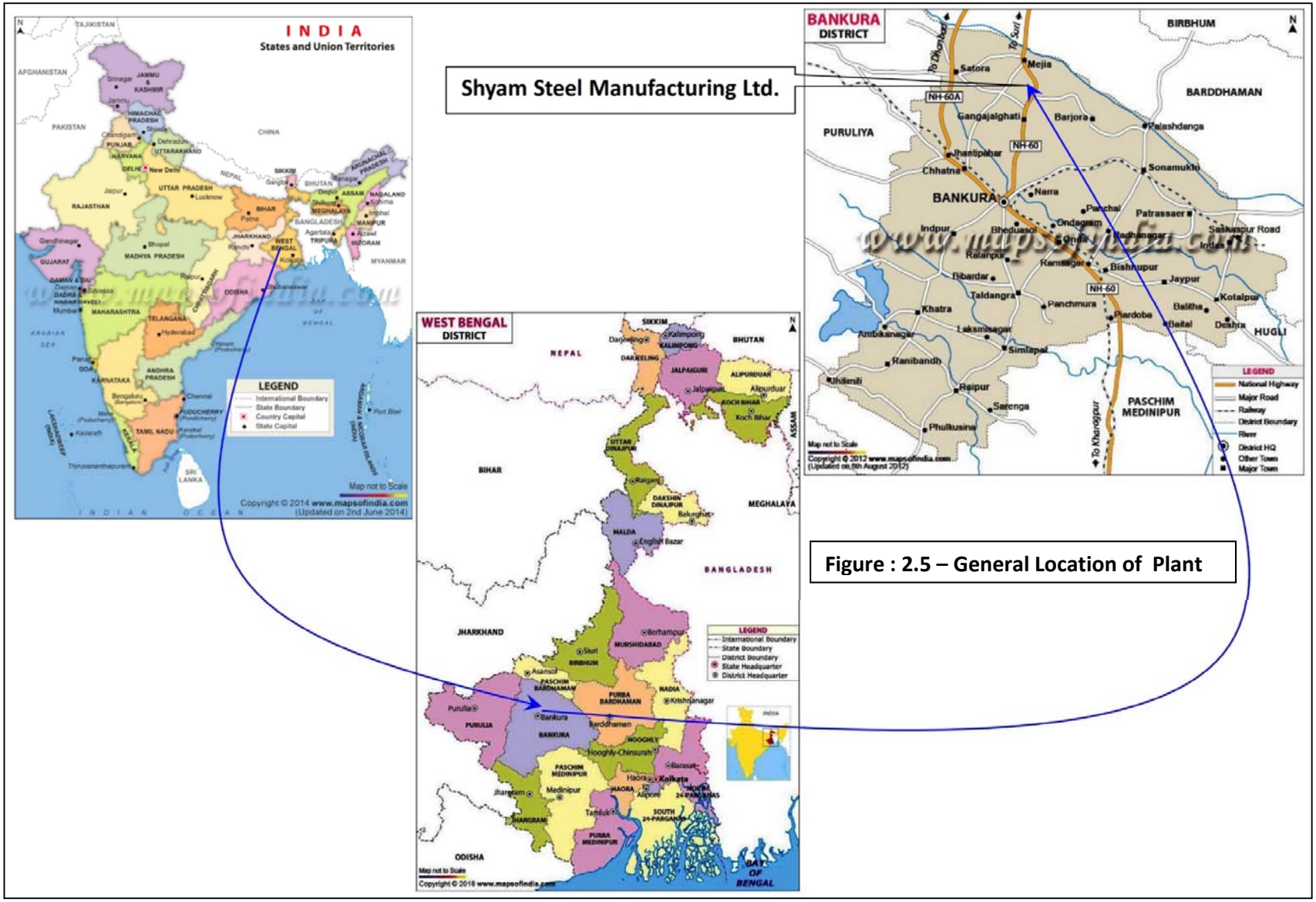
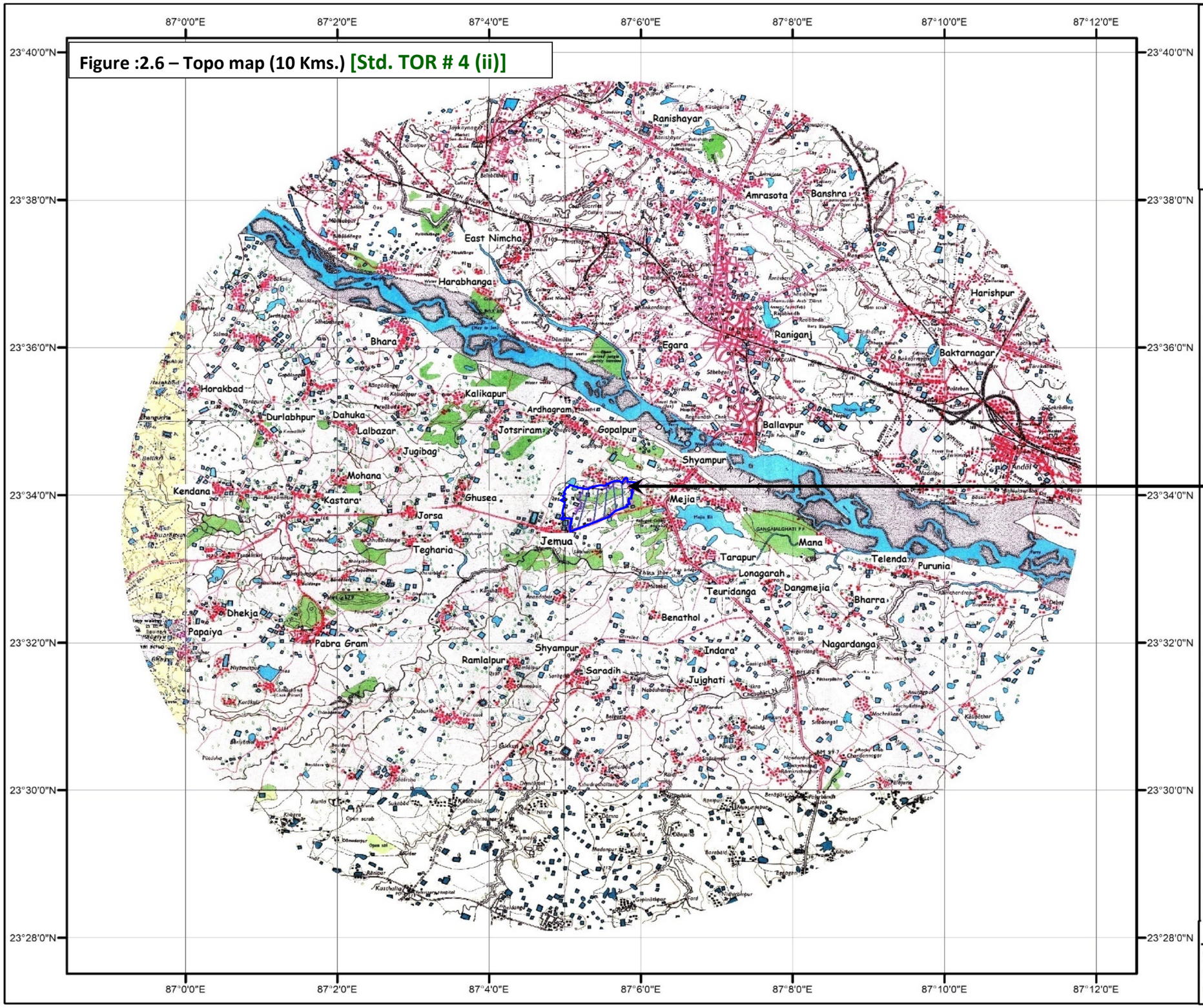


Figure : 2.5 – General Location of Plant

Figure :2.6 – Topo map (10 Kms.) [Std. TOR # 4 (ii)]



10 Km RADIUS TOPO MAP SHOWING SITE SURROUNDINGS

N

1 0.5 0 1 2 3 4 Kilometers

1 centimeter = 1,208 meters

Coordinates of the project site

Point	Coordinates
Point # 1	23°34'5.43"N 87° 5'42.40"E
Point # 2	23°33'50.57"N 87° 5'35.69"E
Point # 3	23°33'42.29"N 87° 5'20.44"E
Point # 4	23°33'33.53"N 87° 4'51.96"E
Point # 5	23°33'42.34"N 87° 4'53.35"E
Point # 6	23°33'42.98"N 87° 4'45.38"E
Point # 7	23°33'56.37"N 87° 4'45.60"E
Point # 8	23°34'7.38"N 87° 4'52.87"E
Point # 9	23°34'3.60"N 87° 5'6.58"E
Point # 10	23°34'7.01"N 87° 5'22.52"E

CONVENTIONAL SYMBOLS

Source
Survey of India Topographical Maps, No.s. 73 I/14, 73 M/2 and 3.

2.4 DETAILS OF LAND [Std. TOR # 3 (iii) & 4 (vii)]

Existing steel plant located at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal. Existing plant is located in 66.1 Ha./ 163.3 Acres of land. Additional 25.24 Ha. (62.34 Acres) of land is envisaged by management adjacent to the existing plant.

Total land after the proposed expansion will be 91.34 Ha. (225.64 Acres). Existing (66.1 Ha./ 163.3 Acres) is in possession of management and agreement of sale have been done for additional land (25.24 Ha./ 62.34 Acres). Kindly refer to **Annexure – 1** for Agreement of sale for additional land proposed.

Table No. 2.4.1 :Land Use Classification

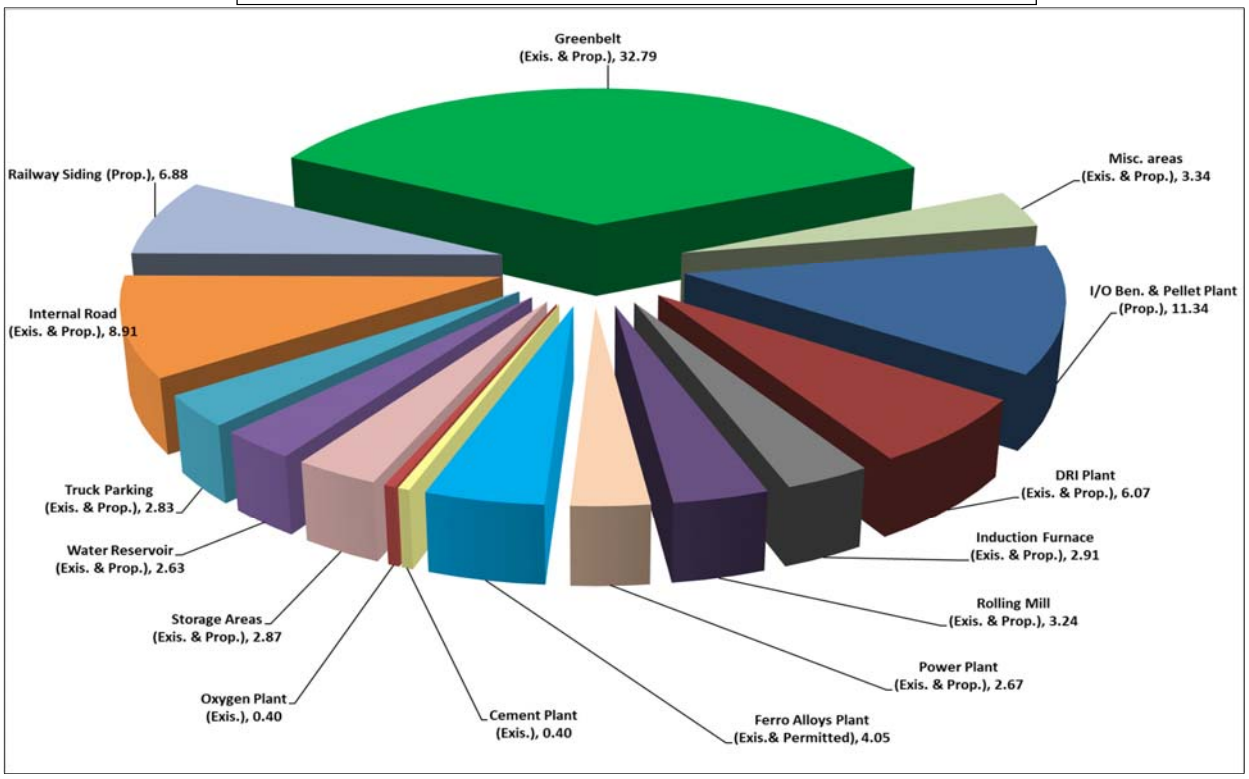
S.No.	Type of Land	Area (in Ha.)	Area (in Acres)	Status of Acquisition
1	Private Land	25.24	62.34	Agreement have been entered
2	Govt. Land	Nil	Nil	
3	Forest Land	Nil	Nil	
4	Industrial Land	66.1	163.3	Already Acquired
	Total land	**91.34**	**225.64**	

Table No. 2.4.2:Land Use Statement Of Plant Area

S.No.	Land Use	Status	Area (in Ha.)	Area (in Acres)
1	I/O Beneficiation 1.2MTPA & Pellet Plant 0.8MTPA	Proposed	10.12	25
2	DRI Plant - 2,25,000 TPA	Existing	5.67	14
3	DRI Plant - 4 x 425 TPD (5,61,000 TPA)	Proposed		
4	Induction Furnace - 6 x 11 T (2,34,300 TPA) with Billet Yard	Existing	2.43	6
5	Induction Furnace - 3 x 15 T + 5 x 17 T (4,61,500 TPA) with Billet Yard and 5 X 15T LRF	Proposed		
6	30T Electric Arc Furnace	Permitted	0.28	0.7
7	Rolling Mill - 2,90,000 TPA	Existing	3.24	8
8	Rolling Mill - 1 x 1000 TPD + 1 x 300 TPD with 2 X 20TPH RHF	Proposed		
9	Power Plant (WHRB 10MW + FBC 7MW)	Existing	3.48	8.58
10	Power Plant (WHRB 36MW + FBC 18MW)	Proposed		
11	Ferro Alloys Plant - 2 x 9 MVA	Existing	3.52	8.7
12	Ferro Alloys Plant - 2 x 9 MVA	Permitted		
13	Cement Plant - 75,000 TPA	Existing	0.35	0.86
14	Oxygen Plant - 4,000 TPA	Permitted	0.40	1
15	Storage Areas	Existing + Proposed	3.24	8
16	Water Reservoir	Existing + Proposed	4.38	10.8

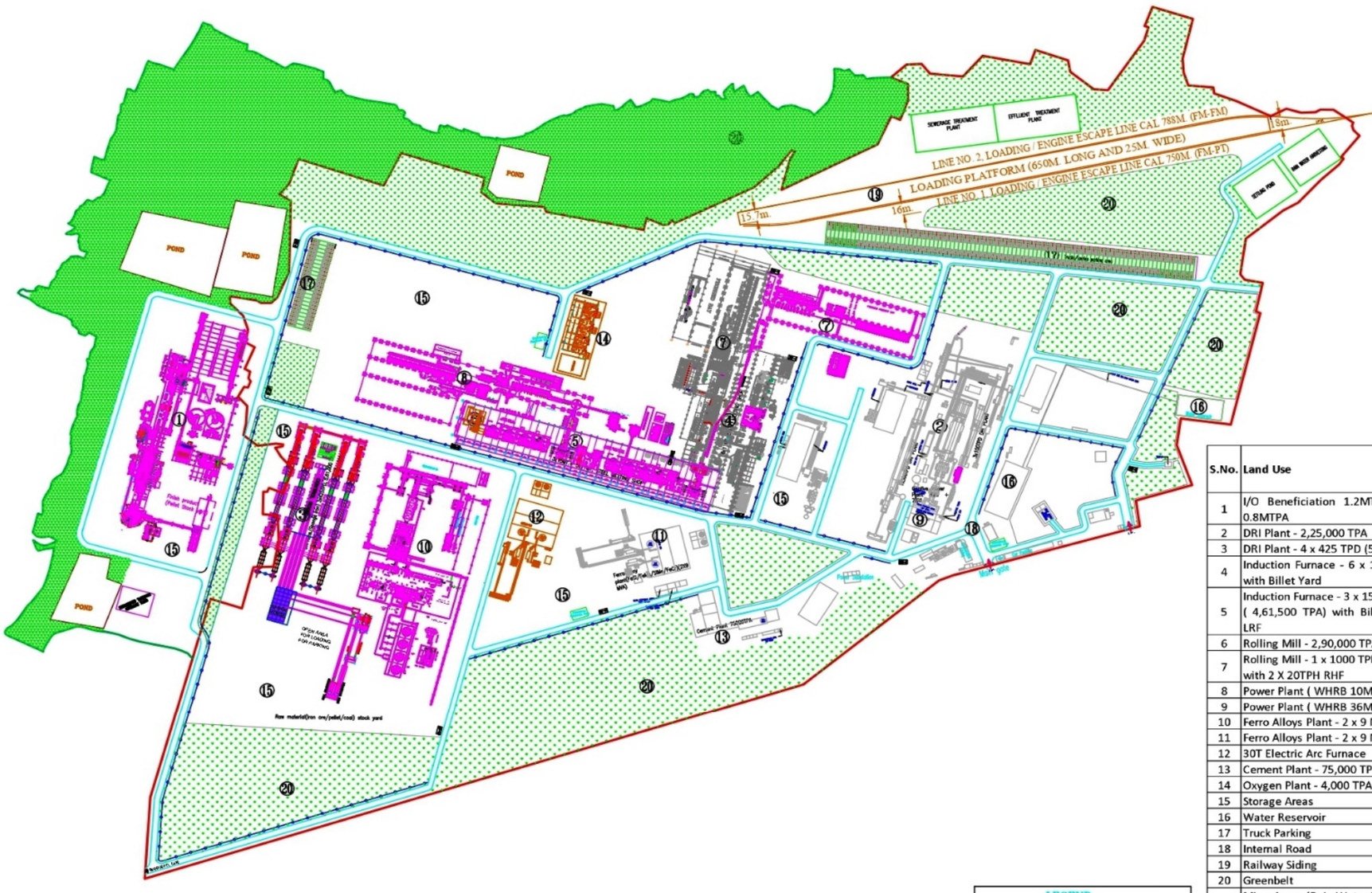
S.No.	Land Use	Status	Area (in Ha.)	Area (in Acres)
17	Truck Parking	Existing + Proposed	2.83	7
18	Internal Road	Existing + Proposed	8.50	21
19	Railway Siding	Permitted	6.88	17
20	Greenbelt	Existing + Proposed	32.79	81
21	Misc. Areas (Rain Water Harvesting, ETP&STP, Power Sub-Station.Admin. Building, Occupational Health Centre, Emergency Response Area etc.)	Existing + Proposed	3.24	8
	Total		**91.34**	**225.64**

Figure 2.7: Pie Diagram showing Land use Statement



Plant lay-out showing proposed units including storage area, plant area, greenbelt area, utilities etc. is shown as Fig: 2.8.

Figure :2.8 – Plant Layout **[Std. TOR # 4 (vi)]**



S.No.	Land Use	Status	Area (in Ha.)	Area (in Acres)
1	I/O Beneficiation 1.2MTPA & Pellet Plant 0.8MTPA	Proposed	10.12	25
2	DRI Plant - 2,25,000 TPA	Existing	5.67	14
3	DRI Plant - 4 x 425 TPD (5,61,000 TPA)	Proposed		
4	Induction Furnace - 6 x 11 T (2,34,300 TPA) with Billet Yard	Existing	2.43	6
5	Induction Furnace - 3 x 15 T + 5 x 17 T (4,61,500 TPA) with Billet Yard and 5X15T LRF	Proposed		
6	Rolling Mill - 2,90,000 TPA	Existing	3.24	8
7	Rolling Mill - 1 x 1000 TPD + 1 x 300 TPD with 2 X 20TPH RHF	Proposed		
8	Power Plant (WHRB 10MW + FBC 7MW)	Existing	3.48	8.58
9	Power Plant (WHRB 36MW + FBC 18MW)	Proposed		
10	Ferro Alloys Plant - 2 x 9 MVA	Existing	3.52	8.7
11	Ferro Alloys Plant - 2 x 9 MVA	Permitted		
12	30T Electric Arc Furnace	Permitted	0.28	0.7
13	Cement Plant - 75,000 TPA	Existing	0.35	0.86
14	Oxygen Plant - 4,000 TPA	Permitted	0.40	1
15	Storage Areas	Existing + Proposed	3.24	8
16	Water Reservoir	Existing + Proposed	4.38	10.8
17	Truck Parking	Existing + Proposed	2.83	7
18	Internal Road	Existing + Proposed	8.50	21
19	Railway Siding	Permitted	6.88	17
20	Greenbelt	Existing + Proposed	32.79	81
21	Misc. Areas (Rain Water Harvesting, ETP&STP, Power Sub-Station.Admin. Building, Occupational Health Centre, Emergency Response Area etc.)	Existing + Proposed	3.24	8
	Total		**91.34**	**225.64**

Land	Acres
Existing Land	163.3
Additional Land	62.34
	225.64

LEGEND
- EXISTING OPERATING PLANT
- PRESENT PROPOSAL
- EC PERMITTED CAPACITY (2019)
- EXISTING GREEN BELT
- PROPOSED GREEN BELT
- STREET LIGHT
- EXISTING BOUNDARY
- ADDITIONAL LAND BOUNDARY
- INTERNAL ROAD

Rev. Description

Client: M/S. SHYAM STEEL MANUFACTURING LIMITED
VILL. JEMUA MOUZA, P.O. MEJIA DIST. BANKURA

Title: EXISTING,PERMITTED & PROPOSED PLANT LAYOUT

Scale :-1:1 Size A3

Design : SK.S.ALI
Drawn : SK.S.ALI
Chkd. : H.K.GUPTA
Appd. : M.DAGA
Date : 06.04.2021

2.5 SIZE / MAGNITUDE OF OPERATION [Std. TOR # 3 (ii) & 3 (iii)]

Shyam Steel Manufacturing Ltd. operating Steel plant at L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal. Now it has proposed expand the existing steel plant.

Table No. 2.5.1: Existing & Proposed Plant Configuration and Production Capacity

S. No.	Unit (Product)	Existing Operating plant	Capacity for which EC obtained in 24th May, 2019	Present Proposal	Final Configuration after Present Proposal
		[1]	[2]	[3]	[4] = [1] + [3]
1.	Iron Ore Beneficiation plant (concentrated Iron ore)	---	---	1.2 MTPA	1.2 MTPA
2.	Iron Ore Pellet Plant (I/o Pellets)	---	---	0.8 MTPA	0.8 MTPA
3.	DRI Kilns (Sponge Iron)	2,25,000 TPA	3,46,500 TPA (3 x 350 TPD)	5,61,000 TPA (**4 x 425 TPD will be installed instead of 3 x 350 TPD**)	7,86,000 TPA
4.	Induction Furnace with CCM & LRF (MS Ingots / Billets /Hot Billets)	2,34,300 TPA	3,96,000 TPA (8 x 15T)	4,61,500 TPA (**3x15T& 5x17Twith 5 x 15T LRF will be installed instead of 8 x 15 T)**	6,95,800TPA
5.	Electric Arc Furnace	Nil	1,98,000 TPA (1 x 30 T)	1,98,000 TPA (1 x 30 T) **[Retained EC permitted capacity]**	1,98,000 TPA (1 x 30 T)
6.	Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars / Wire Rod) (80 % Hot charging with Hot Billets and remaining 20% through 2x20TPH RHF)	2,90,000 TPA	4,29,000 TPA (2 x 650 TPD)	4,29,000 TPA (**Change in configuration of EC permitted capacity to 1 x 1000 TPD + 1 x 300 TPD**)	7,19,000 TPA
7.	Ferro Alloy Plant (FeSi/FeMn/SiMn/FeCr)	2 x 9 MVA (FeMn 32,400 TPA / SiMn	2 x 9 MVA (FeMn 32,400 TPA /	2 x 9 MVA (FeMn 32,400 TPA / SiMn	4 x 9 MVA (FeMn64,800 TPA / SiMn64,800 TPA /

S. No.	Unit (Product)	Existing Operating plant	Capacity for which EC obtained in 24th May, 2019	Present Proposal	Final Configuration after Present Proposal
		[1]	[2]	[3]	[4] = [1] + [3]
		32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA)	SiMn 32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA)	32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA) **[Retained EC permitted capacity]**	FeCr – 54,000 TPA / FeSi – 31,200 TPA)
8.	Power Plant (WHRB)	10 MW	24 MW	Increase in WHRB Power from 24 MW **to 36 MW (4 x 9 MW)**	46 MW
9.	Power Plant (FBC)	7 MW	25 MW (1 x 25 MW)	**Reduction in Power Plant from 25 MW to 18 MW**	25 MW
10.	Oxygen Plant	Nil	4,000 TPA	4,000 TPA **[Retained EC permitted capacity]**	4,000 TPA
11.	Cement Plant	75,000 TPA	Nil	---	75,000 TPA
12.	Coal / Coke / Chrome fines Briquette	Nil	1,00,000 TPA	1,00,000 TPA **[Retained EC permitted capacity]**	1,00,000 TPA

2.6 PROPOSED SCHEDULE FOR APPROVAL AND IMPLEMENTATION [Std. TOR # 3(i)]

Table No. 2.6.1: Implementation Schedule

S.No.	Unit	Plant Configuration	Production Capacity	Duration from the date if receipt of EC & Financial Closure													
				1st Year		2nd Year		3rd Year		4th Year		5th Year		6th Year		7th Year	
1	Iron Ore beneficiation	12,00,000 TPA	12,00,000 TPA														
2	Pellet plant	8,00,000 TPA	8,00,000 TPA														
3	DRI Kilns	2 x 425 TPD	2,80,500 TPA														
4	WHRB Power Plant	2 x 40 TPH	2 x 9 MW														
5	DRI Kilns	2 x 425 TPD	2,80,500 TPA														
6	WHRB Power Plant	2 x 40 TPH	2 x 9 MW														
7	FBC Power Plant	1 x 72 TPH	18 MW														
8	Induction Furnace	3 x 15 T	1,59,750 TPA														
9	Induction Furnace	3 x 17 T	1,81,050 TPA														
10	Induction Furnace	2 x 17 T	1,20,700 TPA														
11	Rolling Mill # 1	1000 TPD	3,30,000 TPA														
12	Rolling Mill	300 TPD	99,000 TPA														

2.7 PROJECT COST [Std. TOR # 3(i)]

The estimated project cost for the proposed expansion project is **Rs. 1410.0 Crores**.

Table No. 2.7.1: BREAK-UP OF PROJECT COST

S.No.	Unit	Project cost (Rs in Crores)
1.	Iron Ore Beneficiation & Pellet Plant	300
2.	Sponge Iron Plant	300
3.	Induction Furnaces with LRF, CCM	130
4.	Electric Arc Furnace	40
5.	Rolling Mill	140
6.	Power Plant	265
7.	Ferro Alloys	45
8.	Oxygen Plant	40
9.	Land, land development, water, power evacuation & Misc.	50
10.	Interest during construction, Engineering consultancy for execution of entire plant	100
TOTAL PROJECT COST		**1410**

2.8 TECHNOLOGY AND PROCESS DESCRIPTION

2.8.1 RAW MATERIALS [Std. TOR # 3 (iv), Spec. ToR # 8 & Addl. ToR # 2]

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

TABLE NO. 2.8.1: RAW MATERIAL REQUIREMENT, SOURCE & MODE OF TRANSPORT

S.No.	Raw Material		Quantity (TPA)	Sources	Distance from site (in Kms.)	Mode of Transport
1.	**For Iron Ore Beneficiation Plant (12,00,000 TPA – throughput capacity)**					
a)	Iron ore fines		12,00,000	Rungta Mines, Essel Mines & Other mines in Barbil & Jharkand	~ 500 Kms.	By rail & road (Covered trucks)
2.	**For Pellet Plant (Pellets) - 8,00,000 TPA**					
a)	Iron Ore Concentrate		8,80,000	Own generation	---	Through covered conveyers
b)	Bentonite		6,400	West Bengal	~ 200 Kms.	By road (Covered trucks)
c)	Limestone		12,000	Madhya Pradesh	~ 500 Kms.	By road (Covered trucks)
d)	Anthracite Coal		28,000	Jharkhand	~ 200 Kms.	By road (Covered trucks)
3.	**For DRI Kilns (Sponge Iron) – 5,61,000 TPA (4 x 425 TPD)**					
a)	Pellets (100%)		8,00,000	Inhouse generation	---	---
	Or					
b)	Iron ore (100%)		9,53,700	Barbil, Orissa NMDC, Chhattisgarh	~ 500 Kms.	By Rail & Road (covered trucks)
c)	Coal	Indian (100%)	7,30,000	ECL, West Bengal / MCL Odisha	~ 600 Kms.	By rail & road (covered trucks)

S.No.	Raw Material		Quantity (TPA)	Sources	Distance from site (in Kms.)	Mode of Transport
		Imported (100%)	5,00,000	Indonesia / South Africa / Australia	~ 270 Kms. (from Haldia Port)	Through sea route,& by road (covered trucks)
d)	Dolomite		28,050	Chhattisgarh	~ 600 Kms.	By rail &road (covered trucks)
4.	**For Steel Melting Shop (MS Ingots / Billets/Hot Billets) –4,61,500 TPA (3x15T & 5x17T induction furnaces)**					
a)	Sponge Iron		4,43,040	Own generation	---	Through covered conveyers
b)	Pig Iron		55,380	West Bengal	~ 100 Kms.	By road (covered trucks)
c)	MS Scrap		41,535	West Bengal	~ 100 Kms.	By road (covered trucks)
d)	Ferro alloys		5,538	Own generation	---	By road (covered trucks)
5.	**For Rolling Mill through Hot charging & RHF (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod) – 4,29,000 TPA**					
a)	Hot Billets / Billets / Ingots		4,51,650	Own generation	---	----
b)	LDO / LSHS		2,800 Kl/annum	Nearby IOCL Depot	~ 100 Kms.	By road (in Tankers)
6.	**For FBC Boiler [Power Generation 1 x 18 MW]**					
a)	Indian Coal (100%)		1,20,960	ECL, West Bengal / MCL Odisha	~ 600 Kms.	By rail & road (covered trucks)
	OR					
b)	Imported Coal (100%)		87,971	Indonesia / South Africa / Australia	~ 270 Kms. (from Haldi Port)	Through sea route, rail route & by road (covered trucks)
	OR					
c)	Dolochar + Indian Coal	Dolochar	1,40,250	Inhouse generation	---	Through covered conveyors
		Indian Coal	43,823	ECL, West Bengal / MCL Odisha	~ 600 Kms.	By rail & road (covered trucks)
	OR					
d)	Dolochar + Imported Coal	Dolochar	1,40,250	Inhouse generation	---	Through covered conveyors
		Imported Coal	31,871	Indonesia / South Africa / Australia	~ 270 Kms. (from Haldi Port)	Through sea route, rail route & by road (covered trucks)

2.8.2 RAW MATERIAL TRANSPORT, STORAGE & HANDLING [Addl. ToR # 6]

- SSML is in the process of having it's own Railway Siding upto the plant site.
- Most of the major materials required for expansion will be transported by Rail.
- All the trucks used for the transport of raw materials, products and wastes will be completely covered with tarpaulin and ensured no spillage during transportation.

- No. of trucks required for proposed expansion project will be 431 trucks /day (***considering worst scenario i.e. whole transport by road through covered trucks***)
- Existing Road network is capable of taking additional traffic load due to expansion project & Internal roads in the proposed expansion project will be made pucca.
- All the raw material required for the proposed steel plant will be stored on pucca platform above ground level.
- All the raw material yards are equipped with water sprinkling system, so as to avoid fugitive emission during the material handling.

2.8.3 MATERIAL BALANCE [Spec. ToR # 1]

Table No.2.8.2: IRON ORE BENEFICIATION [12,00,000 TPA]

INPUTS			OUTPUTS	
S.No.	**Item**	**Quantity (TPA)**	**Item**	**Quantity (TPA)**
1	Iron Ore fines [throughput capacity (input)]	12,00,000	Beneficiated Iron ore	9,60,000
			Tailings	2,40,000
	Total	**12,00,000**	**Total**	**12,00,000**

Table No. 2.8.3: PELLET PLANT [8,00,000 TPA]

INPUTS			OUTPUTS	
S.No.	**Item**	**Quantity (TPA)**	**Item**	**Quantity (TPA)**
1	Iron Ore Concentrate	8,80,000	Pellets	8,00,000
2	Bentonite	6,400	Ash / Dust	24,000
3	Limestone	12,000	Flue Gases with dust	1,02,400
4	Anthracite Coal	28,000		
	Total	**9,26,400**	**Total**	**9,26,400**

Table No. 2.8.4: SPONGE IRON UNIT [4 x 425 TPD DRI Kilns – 5,61,000 TPA]

When Iron ore & Indian Coal is used				
INPUTS			OUTPUTS	
S.No.	**Item**	**Quantity (TPA)**	**Item**	**Quantity (TPA)**
1.	Iron Ore	9,53,700	Sponge Iron	5,61,000
2.	Coal (Indian)	7,29,300	Dolochar	1,40,250
3.	Dolomite	28,050	Ash / Dust from Bag filters	1,00,980
4.			Wet Scraper sludge	7,517
5.			Accretion slag	5,049
6.			Flue Gases	8,96,254
	Total	**17,11,050**	**Total**	**17,11,050**

When I/O Pellet & Imported is used				
INPUTS			**OUTPUTS**	
S.No.	**Item**	**Quantity (TPA)**	**Item**	**Quantity (TPA)**
1.	I/O Pellets	8,02,230	Sponge Iron	5,61,000
2.	Coal (Imported)	5,04,900	Dolochar	1,17,810
3.	Dolomite	28,050	Ash / Dust from Bag filters	51,612
4.			Wet Scraper sludge	5,049
5.			Accretion slag	3,366
6.			Flue Gases	5,96,343
	Total	**13,35,180**	**Total**	**13,35,180**

Table No. 2.8.5: INDUCTION FURNACE [(3x15 T & 5x17 T) - 4,61,500 TPA]

INPUTS			**OUTPUTS**	
S.No.	**Item**	**Quantity (TPA)**	**Item**	**Quantity (TPA)**
1.	Sponge Iron	4,43,040	Hot Billets / MS Billets / MS Ingots	4,61,500
2.	Pig iron	55,380	Slag	64,610
3.	MS Scrap	41,535	Flue Gases	19,383
4.	Ferro Alloys	5,538		
	Total	**5,45,493**	**Total**	**5,45,493**

Table No. 2.8.6: ROLLING MILL [1x1000 TPD & 1x300 TPD – 6,60,000 TPA]

With 80% Hot charging				
INPUTS			**OUTPUTS**	
S.No.	**Item**	**Quantity (TPA)**	**Item**	**Quantity (TPA)**
1	Hot Billets	3,57,270	Rolled Products / Structural Steels	3,43,200
			End cuttings	10,296
			Gases / Dust	3,774
	Total	**3,57,270**	**Total**	**3,57,270**
With 20% Re-heating				
INPUTS			**OUTPUTS**	
S.No.	**Item**	**Quantity (TPA)**	**Item**	**Quantity (TPA)**
1	MS Billets / MS Ingots	94,380	Rolled Products / Structural Steels	85,800
			Mill scales	1,716
			End cuttings	2,574
			Gases	4,290
	Total	**94,380**	**Total**	**94,380**

Table No. 2.8.7: POWER PLANT [1x72 TPH (1x18 MW)]

i. **With 100 % Indian Coal**				
INPUTS			**OUTPUTS**	
S.No.	**Item**	**Quantity**	**Item**	**Quantity**
1.	Indian Coal	1,20,960	Electricity	18 MW
2.			Ash	54,432
			Gases	66,528
	Total	**1,20,960**	**Total**	**1,20,960**
Note: Ash in Indian coal is considered max. of 45%				
ii. **With 100 % Imported Coal**				
INPUTS			**OUTPUTS**	
S.No.	**Item**	**Quantity**	**Item**	**Quantity**
1.	Imported Coal	87,971	Electricity	18 MW
2.			Ash	10,556
			Gases	77,415
	Total	**87,971**	**Total**	**87,971**
Note: Ash in Imported coal is considered Max. of 12%				
iii. **Indian Coal with combination of Dolochar**				
INPUTS			**OUTPUTS**	
S.No.	**Item**	**Quantity**	**Item**	**Quantity**
1.	Dolochar	1,40,250	Electricity	18 MW
2.	Indian Coal	43,823	Ash	1,03,870
			Gases	80,203
	Total	**1,84,073**	**Total**	**1,84,073**
Note: Percentage of Ash in Indian coal is considered as 45% & 60 % in Dolochar				
iv. Imported Coal with combination of Dolochar				
INPUTS			**OUTPUTS**	
S.No.	**Item**	**Quantity**	**Item**	**Quantity**
1.	Dolochar	1,40,250	Electricity	18 MW
2.	Indian Coal	31,871	Ash	87,974
			Gases	84,147
	Total	**1,72,121**	**Total**	**1,72,121**
Note: Ash in Imported coal is considered as 12% & 60 % in Dolochar				

2.8.4 MANUFACTURING PROCESS [Std. TOR # 3 (viii) & Spec. ToR # 1]

2.8.4.1 IRON ORE BENEFICIATION

Beneficiation is a process, which removes the gangue particle like Alumina, Silica from the Iron Ore. Basically, it separates Fe_2O_3 or Fe_3O_4 from other impurities in the iron ore. In this process the Fe content is improve to maximum possible extent. The highest can be 70% i.e. purest form.

Process Description

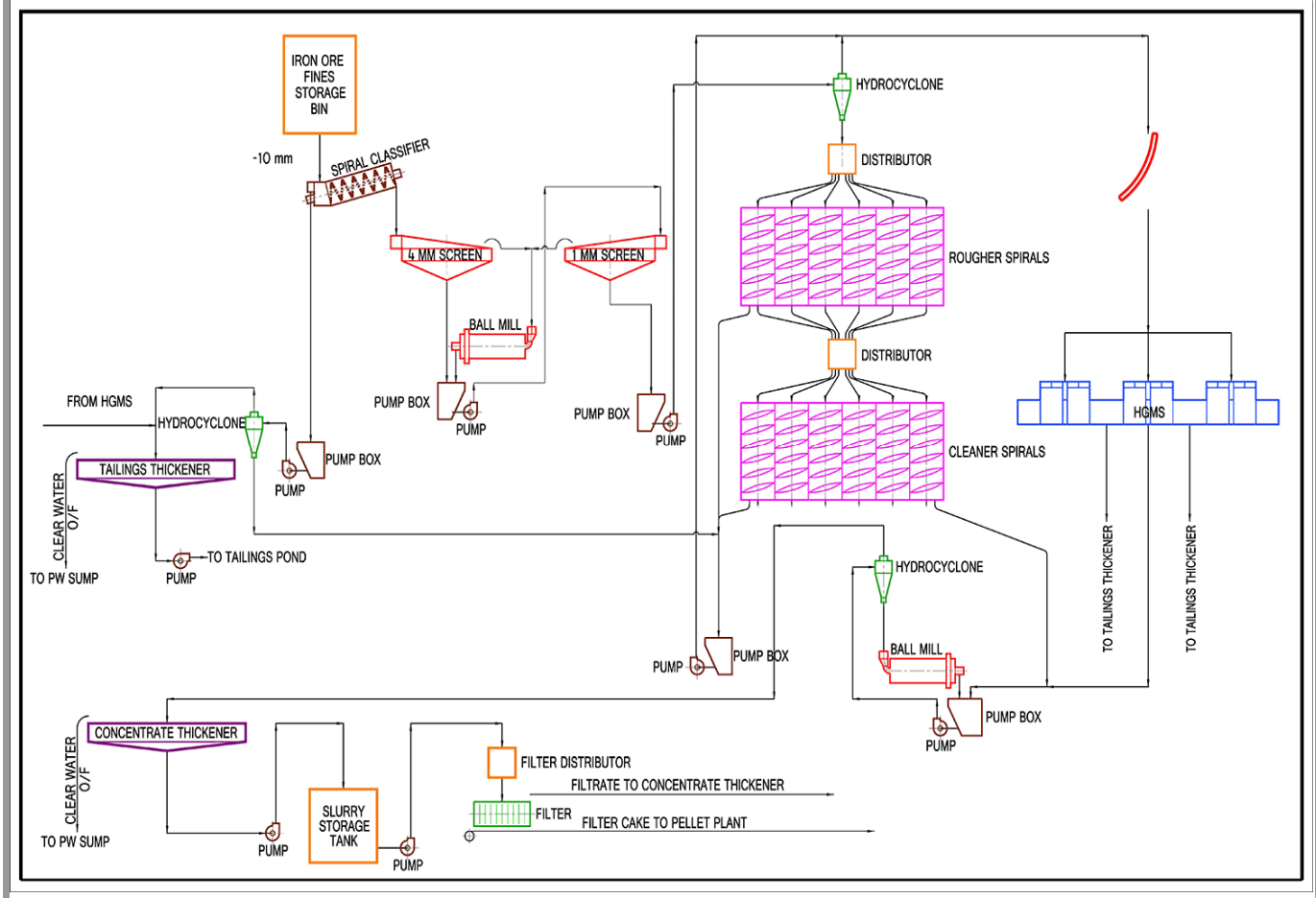
Iron ore fines reclaimed from the blending stockpile shall be conveyed into a surge bin within the beneficiation plant building. Ore drawn from the surge bin by a belt weigh feeder will be fed to a spiral screw type classifier.

Washed ore from spiral classifier will be screened for +4 mm and -4 mm fractions over a scalping screen. Undersize fraction of -4 mm will be pumped to sizing screens for screening off -1 mm fraction. Oversize fractions of +4 mm from the scalping screen and +1 mm from the sizing screens are ground in a primary ball mill in closed circuit with sizing screens to get 100% -1 mm solids suitable for gravity separation in spirals.

Washed sizing screen underflow fraction of -1 mm will be pumped to dewatering cyclones. Underflow of dewatering cyclones is beneficiated by gravity separation through two stage spirals viz., rougher and cleaner spirals. Concentrate from spirals circuit is ground to a size consistency of 100% passing 100 mesh and ~70% passing 325 mesh in secondary ball mills in closed circuit with classifying cyclones. Ground concentrate from the classifying cyclones overflow as well as the overflow from dewatering cyclones ahead of spirals will be pumped to concentrate thickener. Concentrate thickener underflow thereafter will be filtered to get a product with 8% moisture max. The filter cake will be conveyed to stockpile.

Process schematic diagram of manufacturing process of I/O Beneification is shown as Fig.2.9
Total capacity of Iron ore Beneficiation plant will be 1.2 MTPA (throughput).

Figure 2.9: Schematic Diagram showing Beneficiated I/O Manufacturing Process



Tailings from the spirals circuit will be pumped to a linear screen to ensure a 100% -1 mm size solids in the slurry will be fed to high gradient magnetic separators to recover feebly magnetic Fe units. Concentrate from high gradient magnetic separators will be diverted to secondary ball mill discharge pump box for grinding along with spiral concentrate, to desired fineness.

Tailings from high gradient magnetic separators will be fed to tailings thickener. Spiral classifier overflow will be pumped to de-sliming cyclones. Overflow from these de-sliming cyclones will be fed to the tailings thickener. Underflow from de-sliming cyclones will be diverted to spiral tailings pump box in turn to high gradient magnetic separators to recover Fe units as much as possible.

Tailing's thickener underflow will be taken to a filter press and the dewatered cake obtained will be stored in a yard. Clear water from concentrate thickener, filter press flows by gravity back into the process water sump for recirculation.

2.8.4.2 IRON ORE PELLETISATION

The process of pelletization enables converting Iron Ore Fines into Uniform sized Iron Ore Pellets, that will be charged into the DRI kiln for production of sponge iron. Pellets are uniform size, with purity of 63%- 65% contributing to faster reduction and high metallization rates. Pellets with their high, uniform mechanical strength and high abrasive strength. The iron ore pelletization unit comprises of following sections:

a) Drying & Preparation of raw materials:

Generally Iron Ore Fines, Lime Stone and Dolomite fines & Coal (Anthracite & Bituminous) available, contain more than 6-7% moisture and require drying before grinding. The drying will be carried out in separate dryers for iron ore, coal & a common dryer for lime stone & dolomite. LDO along with oil fired boilers will be used for heating the air required for drying. The moisture content in the dry material will be controlled. The low-grade Iron Ore Fines will pass through a screen for separation. Oversize/ under size moves to the primary grinding circuit.

b) Grinding

The Iron Ore Fines will be ground to the required size by dry grinding in Ball mill and sent to the proportioning room. Bentonite in ground form will be send to proportioning building. A provision for the Bentonite grinder will also be provided if necessary. Lime stone, Dolomite will be ground together by VRM grinder and sent to the proportioning building. Anthracite & bituminous coal will be ground separately with the common grinder and send to the proportioning building.

c) Mixing and Blending

In the proportioning room the iron ore powder will be blended with other raw materials i.e, Bentonite, Lime Stone, Dolomite & Bituminous Coal in desired proportion. Small quantity of water will be added during blending operation. This raw mix will be ready for Pellet making and stored in feed hopper.

d) Pelletization

Controlled quantity of raw mix will be fed on disc Pelletizers. Some amount of water will be sprinkled for producing Pellets. These Pellets will pass through oversize and undersize screens.

e) Screening

Pellets produced in Pelletization sections will pass through oversize and undersize screens. Reject Pellets will be sent back to raw mix silos and sized Pellets will be fed into Induration Furnace.

f) Travelling Grate Furnace

A Travelling Grate Furnace will be used for induration of Pellets. This will be divided into *four* sections (Up draught drying zone, Down draught drying zone, Pre-heating zone-1, Pre-heating zone-2). The green pellets travel successively in higher temperature zones to acquire strength gradually. Hot Pellets at around 850 ^{o}C to 1000^{o}C from this Travelling grate will be dropped into the Kiln for further strengthening. The heat source of draft drawing zone, down draft drawing zone is pre-heating zone to of the Traveling grate. Heat source of pre-heating zone-1 is the waste gases of cooler zone-2. The heat source of pre-heating zone-2 is the kiln waste gases. Additional heat source of kiln is cooler zone-1.

g) Rotary Kiln

Rotary Kiln receives Pellets from the Induration Furnace where Pellets have to withstand high temperatures of approx. 1250^{o}C – 1350^{o}C. Here the Pellets gain more hardness due to high temperature. Pulverized anthracite coal will be used as a fuel inside the Kiln. After passing through the Kiln, the Pellets will be hardened and acquire the desired strength. Then these pellets will pass through the Cooler.

h) Cooler

Grate Cooler receives hot Pellets with temperature up to 1250^{o}C coming from Rotary Kiln. Cooler has its own blowers to blast the air from bottom for cooling. The hot air from the first zone will be used as combustion air in the kiln. The hot blast of the second zone will be used in the pre-heating zone-1 and Pre-heating zone-2 of travel grate and the air from the 3rd zone

will be discharged to the atmosphere through chimney as its dust concentration is well within the permissible limits of pollution norms. Volume of cooling air in all the three zones is regulated automatically through the temperature control loops as per the requirement. Cold Pellets at about 100ºC will be discharged on to the conveyors and then conveyed to the stock pile/ loading hoppers.

i) Stacking

The screened Pellets of required size duly cooled at air cooler and subsequently by natural cooling will be transported to Bunkers.

j) Recovery of Dust and Spillage

Dust from drying zones and preheating zones of traveling grate, dust from the wind boxes of traveling grate and dust collected through de-duster of technological process will be sent to dust bins via belt conveyors. From the dust bins they will be sent to the proportioning rooms for reuse. Bulk spillage (dry Pellets) produced at the discharge end of Traveling Grate and will be fed into the kiln from the feed chute of the kiln feed end by bucket elevation along with spillage from Kiln feed end. Almost all the dust and bulks pillage are re-circulated and recovered.

***k)* Pulverized Coal Preparation & Injection System:**

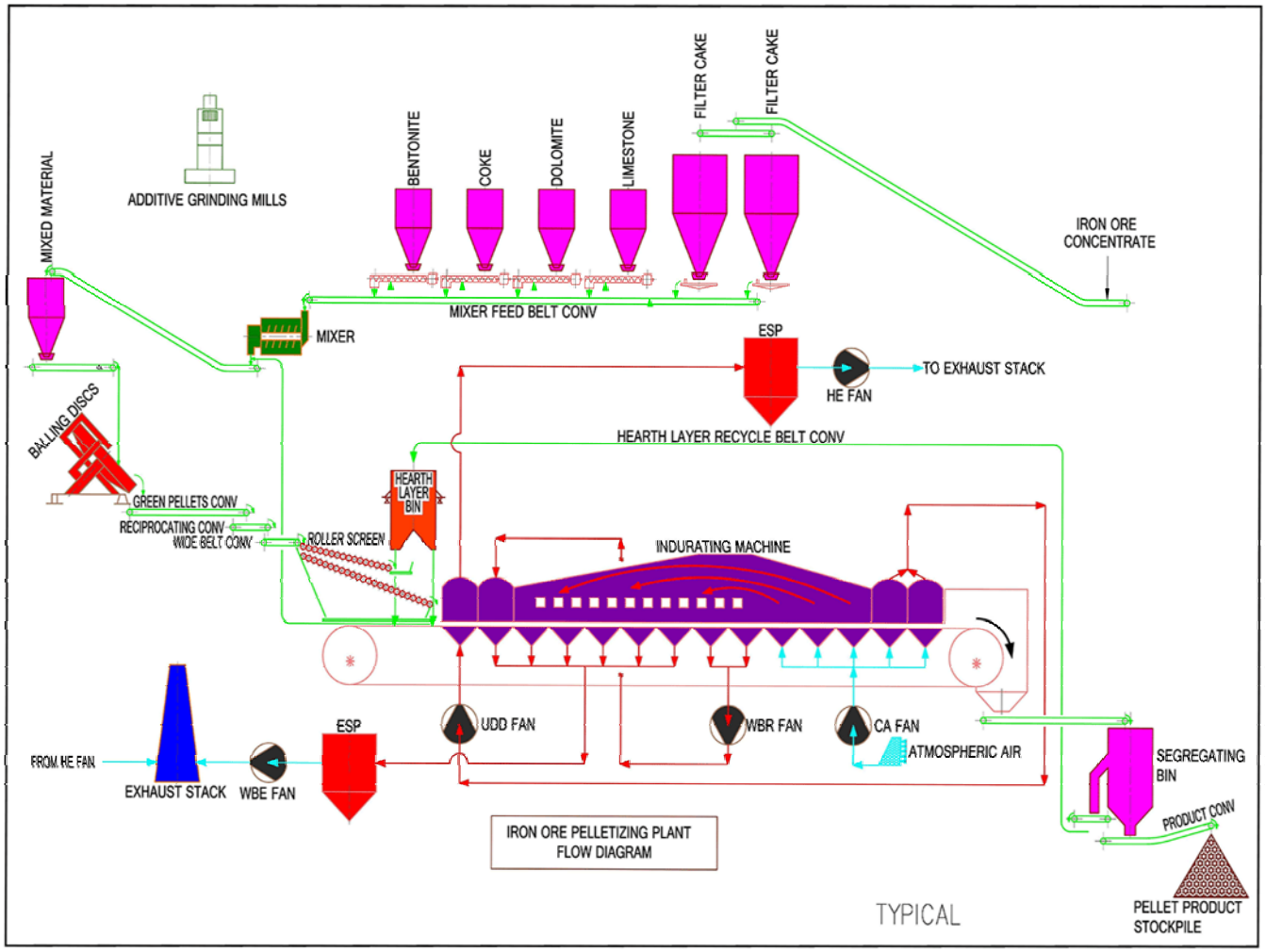
A Pulverized Coal Preparation & Injection System (PCPIS) will be provided to prepare the fuel for the pelletization process. The fuel used will be anthracite coal. The PCPIS consists of coal crushing, drying, grinding and pulverizing system. For the purpose of drying, LDO will be used in burners to feed the hot air needed. The PCIPIS will inject the pulverized coal from the discharge end of the Kiln.

l) Waste Gas System:

To achieve the fuel economy, an efficient and environment friendly technology will be adopted wherein the waste heat of the pelletization process will be used for successive drying of the green balls and also as heat source required in the kiln & different stages of Travelling Grate furnace. The waste gases from Pre-heating zone-1, Up draught & Down draught drying zone will be cleaned in ESP and released to the atmosphere through a stack. The same ESP will be used for pre-heating zone-2 waste gases before cleaning the gases in cyclones. The

outlet particulate emission will not exceed 30 mg/Nm^3. Process schematic diagram of manufacturing process of Pellets is shown as Fig.2.10 below. Capacity of Pellet plant will be 0.80 MTPA.

Figure 2.10: Schematic Diagram showing Pellet Manufacturing Process



2.8.4.3 DRI KILN BASED SPONGE IRON PLANT

4x425 TPD to be established instead of 3x 350 TPD as per EC permission dt. May 2019

(SPONGE IRON – 5,61,000 TPA WITH WHRB FACILITY)

It is a coal-based plant for converting Iron Ore to Iron through direct reduction. The Oxide Ore Fe_2O_3 (Hematite) is reduced to 'Fe' by using Carbon as reductant. The process can take place at 900-1000°C. Coal provides the heat as well as reducing gases. Dolomite chips of size (-3 mm) are used as flux to Scavenge Sulphur content from coal and preventing the combining of this impurity with iron. The process is carried out in a Rotary Kiln.

The Direct Reduced Iron (DRI) plant will comprise of 4 x 425 TPD kilns and related accessories including Waste Heat Recovery power generating unit.

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

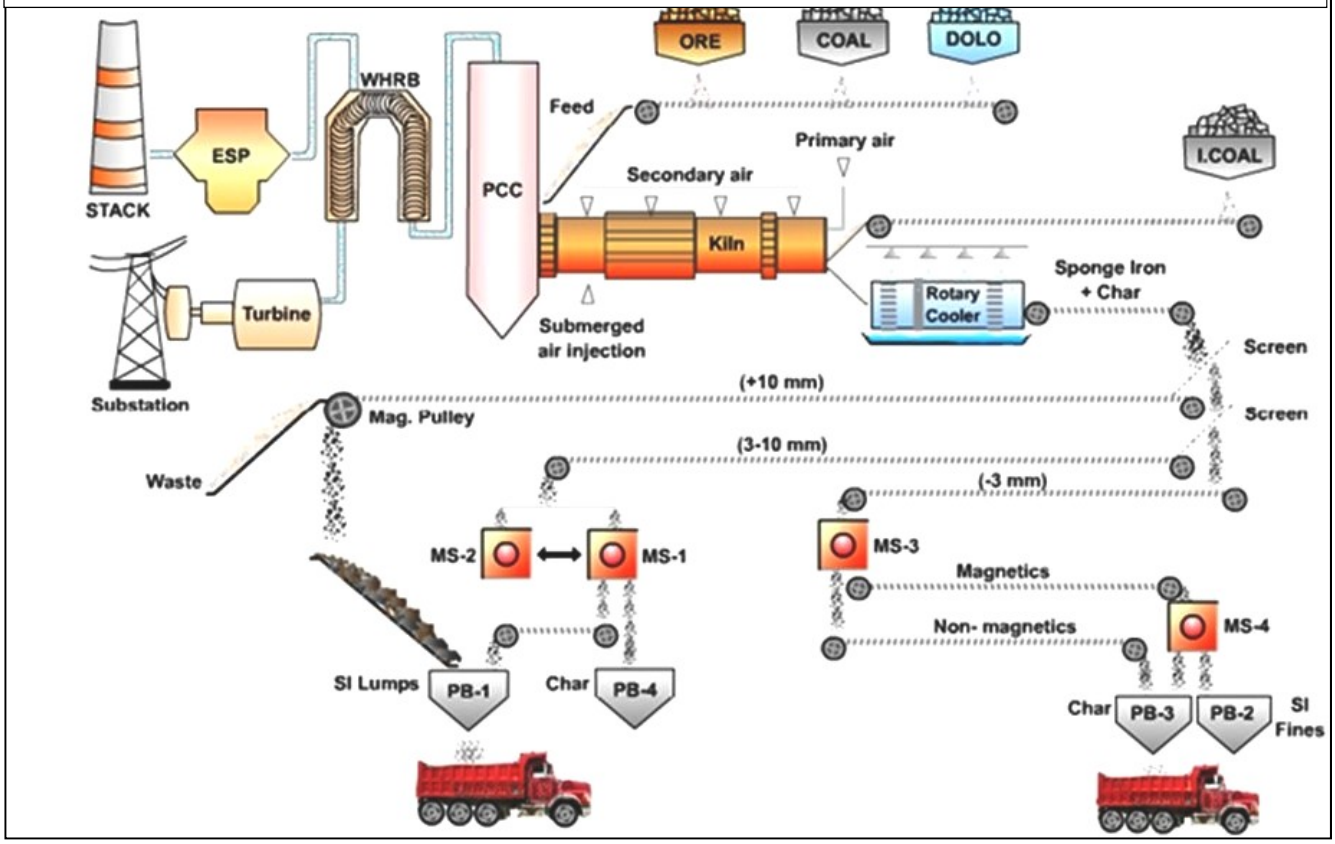
- Day bins
- Rotary Kiln & Cooler
- Central Control Room
- Product processing and product storage
- Off gas system including waste heat recovery power generation

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

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

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

Figure 2.11 : Schematic Diagram showing Sponge Iron Manufacturing Process and WHRB Power Generation



2.8.4.4 STEEL MELTING SHOP (INDUCTION FURNACE – HOT BILLETS / MS BILLETS / MS INGOTS) [Spec. ToR # 2]

Production of Hot Metal

Sponge Iron will be melted along with melting scrap and fluxes to make pure liquid steel / Hot Billets. The Hot metal produced will be directly sent to Rolling Mill through Hot Charging method.

It is proposed to install 3 x 15 MT & 5 x 17 MT Induction Furnaces instead of permitted 8 x 15 MT Induction Furnaces, along with CCM & 5 x 15 MT LRFs to produce Steel Billets of 4,61,500 TPA.

In this method of Steel Melting Shop consists of following units

1. Induction Furnace
2. Ladles

3. Ladle Refining Furnace

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

***Ladles*:** Ladles are pots with refractory lining inside to withstand 1600^0C temperature. It has side arms so that can be lifted with the help of crane. Ladles are used to stores the liquid steel / Hot Metal from Induction Furnace. Ladles are with bottom nozzle and pneumatically operated gate for discharge of liquid. The **Liquid Steel / Hot Billets** will be sent directly to Rolling Mill for manufacturing Rolled Products.

Figure 2.12 : Schematic Diagram showing Hot Billets Manufacturing Process

Production of Billets / Ingots

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

In this method of Steel Melting Shop consists of following units

1. Induction Furnace
2. Ladles
3. Cranes
4. Continuous Casting Machine (CCM)

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

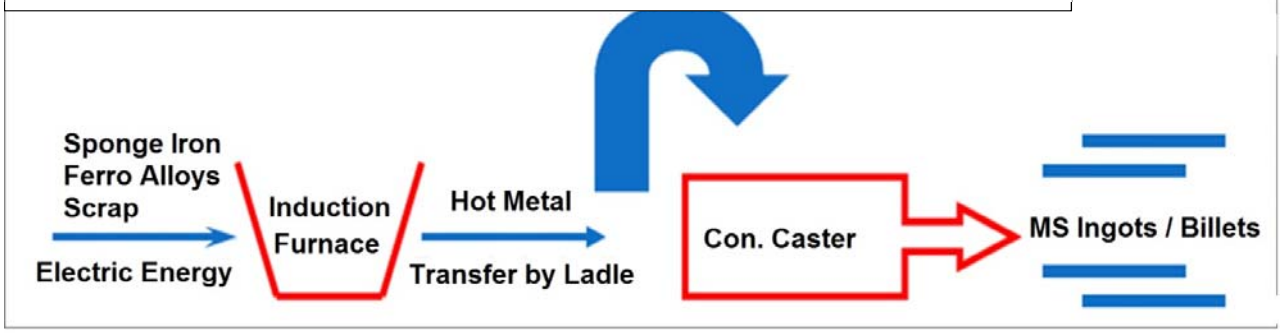
Ladles: Ladles are pots with refractory lining inside to withstand 1600^{0}C temperature. It has side arms so that can be lifted with the help of crane. Ladles are used to stores the liquid steel from Induction Furnace and take it for further processing. Ladles are with bottom nozzle and pneumatically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

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

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

There will be 3 x 15 T and 5 x 17 T Induction Furnaces. Ingot/Billet/Hot Billets will be produced in Continuous Casting Machine.

Figure 2.13: Schematic Diagram showing MS Ingots / Billets Manufacturing



2.8.4.5 ROLLING MILL

As per EC obtained in 2019, 2 x 650 TPD Rolling Mills are permitted. Now it has been proposed to change configuration of Rolling Mills to 1x1000 TPD & 1x300 TPD and the production will remain same i.e. 4,29,000 TPA along with 2 x 20 T RHF.

The Rolled products will be manufactured using the following methods:

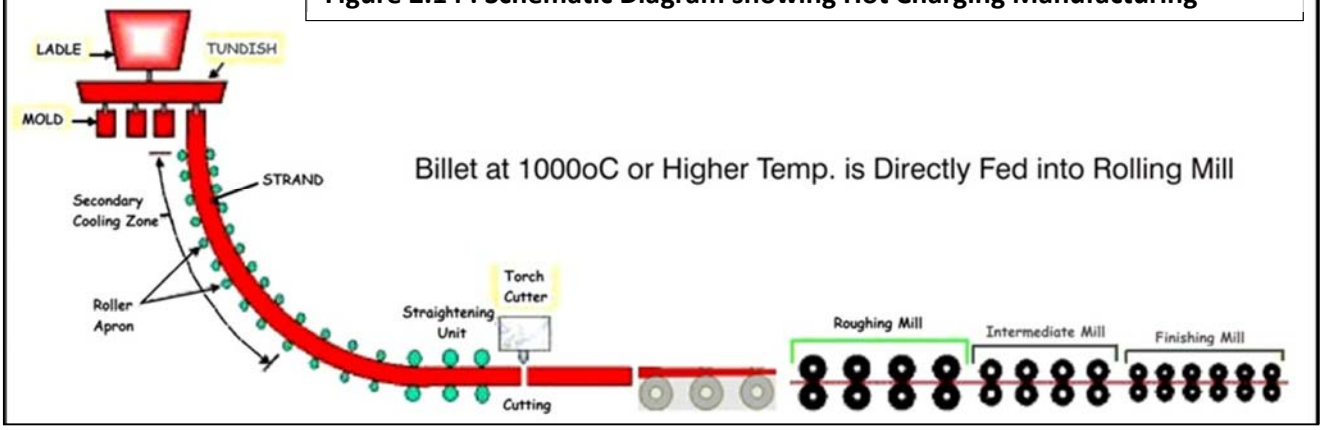
i. Direct Hot Rolling / Hot Charging
ii. Rolling Mill with Re-Heating Furnace / Conventional Rolling Mill

(i) Direct Hot Rolling / Hot Charging

Raw Material i.e. Hot Billets from Ladle in red hot condition is cut by automatic hot metal Shearing Machine. In the proposed plant automatic hot metal shear machines are going to be installed with each strand. The gas cutting facility will be maintained as a backup to the hot metal shearing machine.

After the Hot Metal is cut into required length, then pushed out to rolling stands for re-rolling. Steel Pieces are rolled through all stands in order to get required shape of finished goods i.e.Rolled products. Process flow chart of Direct Rolling is shown below:

Figure 2.14 : Schematic Diagram showing Hot Charging Manufacturing



(ii) Rolling Mill with Re-Heating Furnace / Conventional Rolling Mill

A pusher type furnace has been envisaged for the heating of Ingots / Billets. The furnace will be end charging and side discharging. It will have single row as well as double row charging facility. The furnace will be heated with LDO. The furnace combustion system will comprise of air blowers, LDO storage, supply and preheating system and other associated facilities. The product of combustion will leave the furnace at charging end and exhausted through underground flue tunnel and passed through a metallic tubular recuperator before finally let

off to a self-supporting steel chimney of sufficient height. A set of instrument will be used for smooth operation of the furnace.

Bar and Round mill

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

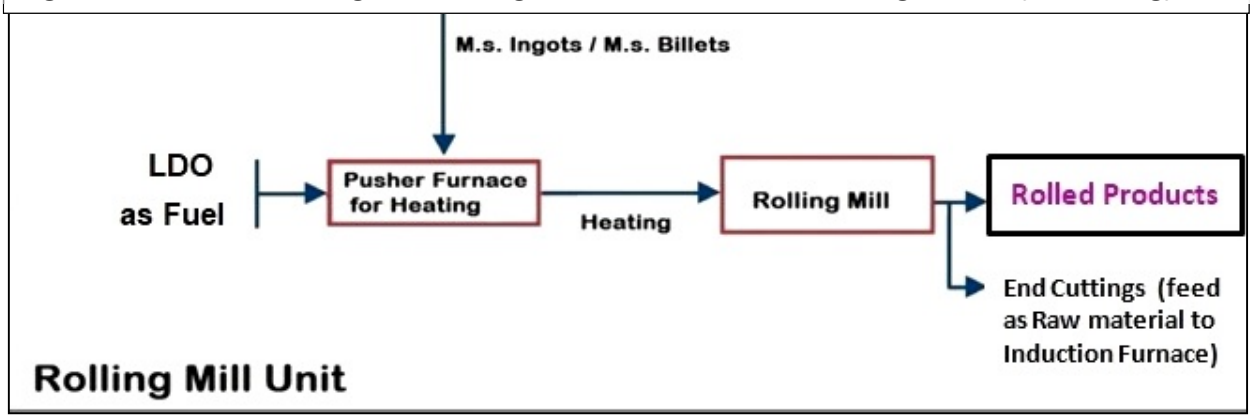
One wire rod outlet has been provided in the mill. The wire rod line will have 4 stand blocks driven by a single motor through gear box. Coil forming and handling of coil is provided. Automated tilting, drop type tilter and feeding arrangement will be provided in roughing group of stands. Repeaters have been provided in roughing / intermediate stands as necessary.

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

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

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

Figure 2.15: Schematic Diagram showing Rolled Product Manufacturing Process (Re-heating)



2.8.4.6 POWER PLANT

It is proposed to install 4 x 9 MW WHRB & 1 x 18 MW FBC based power plant in the proposed project to meet the power requirement for various processes of integrated plant including auxiliaries of power plant.

WHRB Power Plant

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

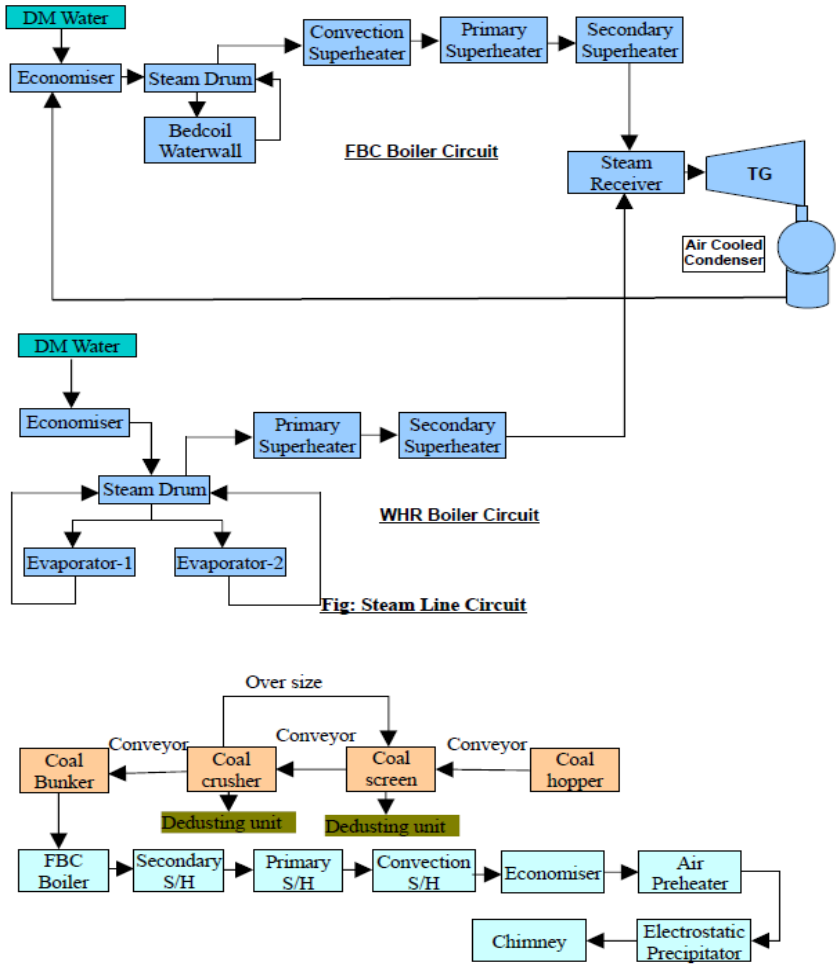
Steam Turbo-generators (STGs) envisaged for the Power plant will be single cylinder, multistage, extraction – cum – condensing type complete with condenser, air evacuation system, 2 x100% condensate extraction pumps, electronic governing system, lubricating oil system, regenerative feed heating system etc. The turbine will be fed with steam generated from HRSG in DR kiln. The STGs will be located in the machine hall of the power plant.

4 x 36 TPH Boilers will be installed to 4 x 425 TPD DRI Kilns to generate 4 x 9 MW Power.

FBC Power Plant

The unit will have One FBC Boiler of 72 TPH to generate 18 MW Power. The boiler shall be designed for continuous operation at Turbine Maximum Continuous Rating (TMCR). A margin of 10% over TMCR shall be taken into account to arrive at Boiler rated capacity. The boiler will be natural circulation, circulating fluidized bed combustion, two pass, non-reheat, single drum, balanced draft, semi-outdoor type. The boiler will have continuous evaporation rating of approx. 360 tonnes/hr. (BMCR shall not be less than 110% of TMCR) with steam parameters at super heater outlet as 66 kg/cm^2 and 490^{0}C . The feed water temperature at MCR at inlet to economizer is expected to be around 120^{0}C. Steam parameter are to be fine tuned at Boiler outlet based on actual plant layout and piping arrangement. The boiler will be complete with ash /solid separator, economizer, air heater, ducting, FD fans, ID fans and PA fans. Air cooled condensers envisaged for Power plant to conserve water.

Figure 2.16: Schematic Diagram showing Power generation



2.8.5 POWER REQUIREMENT [Std. TOR # 3 (vii) & Spec. ToR # 1]

Power requirement for the existing plant is 41.70 MW and same is being met from Captive Power plant and Damodar Valley Corporation (DVC). Power required for proposed expansion will be 105.5 MW and will be met partly from proposed 54.0 MW captive power plant and remaining 51.5 MW from Damodar Valley Corporation (DVC). Following is Power consumption break up for each unit in the in the existing and proposed expansion:

Table No. 2.8.8: POWER REQUIREMENT AND ITS BREAKUP

S.No.	Unit	Power Consumption	Power Requirement (in MW)		
			Existing / Permitted	Proposed	After proposed expansion
1.	I/O Benefication & Pellet Plant	60 Kwh/ton	---	10.0	10.0
2.	DRI	75 Kwh/ton	1.75	5.3	7.05
3.	SMS	750 Kwh/ton	19.50	43.7	63.20
4.	EAF	---	---	20.50	20.50
5.	Rolling Mill	95 Kwh/ton	3.50	5.1	8.60
6.	Cement Plant	---	0.75	---	0.75
7.	Ferro Alloys	9000 Kwh/ton	14.50	14.50	29.00
8.	Oxygen Plant	---	---	1.00	1.00
9.	Power Plant – WHRB	Aux. Consumption @ 10%	1.00	3.6	4.60
10.	Power plant – FBC	Aux. Consumption @ 10%	0.70	1.8	2.5
Total			**41.70**	**105.5**	**147.2**

Total Captive Power Generation from expansion : 54MW (36 MW WHRB + 18 MW CFBC)

Total Power Consumption in proposed expansion : 105.5 MW

Remaining power of 51.5 MW for proposed expansion will be sourced from Damodar Valley Corporation (DVC).

2.8.6 WATER REQUIREMENT

- Water required in the existing plant is 1050 KLD and same being sourced from Damodar river.
- Water required for the proposed expansion project will be 3420 KLD and same will be sourced from Damodar river.

- Air cooled condensers have been provided in existing power plant. In expansion also Air-Cooled condensers will be provided.
- Total water requirement after the proposed expansion will be 4470 KLD.
- Water permission from Damodar Valley Corporation has already been obtained for 1.3 MGD (i.e. 5909.75 KLD).
- Hence separate water drawl permission will not be required even after the present expansion also.

2.8.7 EMPLOYMENT POTENTIAL [Std. TOR # 3 (vii)]

The expansion project creates direct employment to about 1,800 persons (skilled, semiskilled & unskilled) once the expansion comes to the operational stage and indirect employment of about 700 persons. Top priority will be given to locals for Semi-Skilled and Unskilled jobs. With the development of this Plant there will be lot of scope for more ancillary development, which in turn will benefit the nation.

2.8.8 ENERGY CONSERVATION MEASURES

[Std.TOR # 3 (vii) & Addl. ToR # 9]

- In the proposed expansion project, flue gases generated from DRI kilns will be taken to WHRB and after heat recovery it will be used for Power Generation. A total of 46 MW will be generated through flue gases from the existing & proposed DRI units.
- Unburnt Coal (DoloChar) generated from the DRI Plant will be used as fuel in the FBC Boiler.
- Instead of making billets separately and cooling then and again reheating in RHF followed by rolling, we are proposing to adopt Direct Hot Charging route in which hot billets are directly taken to Rolling Mill without reheating Furnace.
- Air cooled condensers will be provided to Power Plant which reduces the water consumption significantly.
- Rooftop Solar Panel, Solar Powered Street Lights etc. will be installed wherever possible.
- In the proposed project regenerative type burners will be installed in reheating furnaces.
- It is proposed to provide LED lights in the offices and common areas.
- Energy Efficient Motors as per NEMA Premium® Efficiency Electric Motor specification or equivalent classifications will be provided.

- All Electrical Motor of 3.0 KW or above will be provided with Variable Frequency Drive (VFD).

2.9 ENVIRONMENTAL MITIGATION MEASURES

2.9.1 AIR EMISSION CONTROL [Std.TOR # 3 (vi) & 7 (v)]

i. Pellet Plant

Air emissions from the Iron Ore Beneficiation, Pelletization manufacturing process & from Producer Gas plant are particulate matter, oxides of nitrogen (NOx) and Sulphur dioxide (SO_2).

- Air emission control equipment such as ESP, Bag filters will be provided to Pellet Plant to maintain the dust concentration in the exhaust gases below **30 mg/Nm^3.**
- Air emission control equipment such as De-dusting System such as Bag filters will be provided to I/O beneficiation plant to maintain the dust concentration in the exhaust gases below **30 mg/Nm^3**.
- All conveyers will be covered with GI sheets.
- Dust suppression system will be provided at raw material unloading areas.
- Dust extraction system with bagfilters will be provided at material transfer points and other dust emanating areas.
- All internal roads will be pucca.

ii. Sponge Iron (DRI)

- Covered trucks will be used for transport of Raw materials.
- Stock piles will be provided with Dust Suppression system.
- Coal screen House, Crusher House, Junction houses and surge hopper, Iron ore screen house and bins, Product discharge, Junction House & SMS bins will be provided with dust extraction system with bagfilters.
- Dust extraction system with Bagfilters will be provided at material transfer points, crusher area, cooler discharge, product separation area, etc. to control dust emission. All the material handling systems will be connected with de dusting system. All the discharge points and feed points wherever the possibility of dust generation is there a de dusting suction point will be provided to collect the dust.
- Water sprinklers will be provided for dust suppression during unloading of raw materials.

- All conveyors will be covered with GI sheets to prevent the fugitive dust.
- Post Combustion Chamber (PCC) will be provided to eliminate the CO emissions.
- Covered shed for storage of Raw materials.
- In the proposed plant the exhaust gases from the rotary kilns will pass through a Waste Heat Recovery Boiler (WHRB) and after heat recovery the gases will pass through high efficiency Electro Static Precipitator to bring down the particulate matter in the exhaust gases to less than **30 mg/Nm^3**. Then the treated gases will be let out through stack 76 m height provided to **each 425 TPD** DRI Kiln for effective dispersion of emissions into the atmosphere.
- All internal roads will be asphalted to prevent the fugitive dust due to vehicular transport.

iii. Steel Melting Shop

- The Fugitive emissions from the Induction furnaces will be sucked through hoods and will pass through a fume extraction system with bag filters and then the treated gases will be discharged into the atmosphere through 4 no. of combined stacks each of 30 m height to 3 x 15 T, 3 x 17 T, 2 x 17 T Induction Furnaces for effective dispersion of emissions into the atmosphere. The outlet dust emission in the exhaust gases will be less than **30 mg/Nm^3**. The dust will be pneumatically carried to covered bins.

iv. Rolling Mill

- The Rolling mill will be operated with 80% Hot charging & 20 % with Reheating.
- Stack of **adequate** height will be provided for effective dispersion of emissions from Rolling Mill.

v. FBC Power Plant

- Covered trucks will be used for transport of fuel.
- Water sprinklers will be provided at the unloading areas of the fuel for dust suppression. Dust suppression system with plain water - comprising piping network, valves pumps, instrumentation & control, water tank etc. will be provided.
- Coal handling plant & Coal transfer points will be provided with dust extraction system with bagfilters.
- Covered conveyers will be provided with GI sheets to prevent fugitive dust emission.

- The flue gases from the FBC boiler will be treated in a high efficiency Electro Static Precipitator to bring down the particulate emission to less than **30 mg/Nm^3**.
- The flue gases will be discharged through a combined stack (with twin flues) of 71m height for effective dispersion of SO_2.
- Internal roads will be asphalted to prevent the fugitive dust emission due to vehicular movement.
- Fly ash will be stored in Silos to prevent fugitive dust emissions.

vi. Internal Roads

All internal roads will be asphalted to prevent fugitive emissions due to vehicular movement.

Table No. 2.9.1: AIR EMISSION CONTROL SYSTEMS PROPOSED

S.No.	Source	Control Equipment	Emission at the outlet
1.	Pellet Plant	Electro Static Precipitators (ESP) (High performance rigid electrodes with transformer)	PM <30 mg/Nm^3
2.	DRI kilns with WHRB's	Electro Static Precipitators (ESP) (High performance rigid electrodes with transformer)	PM <30 mg/Nm^3
3.	Induction Furnaces with CCM& LRFs	Fume Extraction system with PTFE membrane bag filters	PM < 30 mg/Nm^3
4.	CFBC Boiler	Electro Static Precipitators (ESP) (High performance rigid electrodes with transformer)	PM < 30 mg/Nm^3
		Automatic lime dosing control system	SOx <100 mg/Nm^3
		Combustion temperature will be around 800-850^{0}C, which is not conducive for thermal NOx formation. Low NOx burners with 3-stage combustion, flue gas recirculation and auto combustion control system will be provided.	NOx <100 mg/Nm^3
Note : Apart from the above sprinkler system with dust suppression at transfer points, crushing plant, dust extraction system with bagfilters at other dust emanating areas , covered conveyers, mechanical dust sweepers, etc. will also be provided.			

2.9.1.1 DUST EXTRACTION AND DUST SUPPRESSION SYSTEM

The following are the details of dust extraction system & dust suppression system proposed in the plant.

Table No. 2.9.2: Dust Extraction & Dust Suppression System

S.No.	Location	Pollution control system proposed
1.	➢ Coal screen House ➢ Crusher House ➢ Junction houses and surge hopper ➢ Iron ore screen house and bins ➢ Product discharge ➢ Junction House & SMS bins	These areas will be provided with Dust extraction systems & will be injected into DSC of DRI Kilns.
2.	Junction houses and truck hoppers	Dust suppression system with plain water - comprising of spray nozzles, piping network, valves, pumps, instrumentation & controls, water tank etc.
3.	Stock piles in DR route	Dust suppression system with plain water - comprising piping network, valves, pumps, instrumentation & control, water tank etc.

2.9.1.2 SOURCES OF AIR POLLUTION (DRI Kilns)

Table No. 2.9.3: Sources of Air Pollution (DRI Kilns)

S.No.	AREA OF AIR POLLUTION	MEASURES ADOPTED FOR CONTROL
1.	Raw Material Handling	1. All vibrating screens will be totally covered, to prevent the leakages of dust. 2. Throughout the length, the conveyor is covered with G.I. Sheets to prevent the dust pollution 3. All the material handling systems will be connected with de dusting system. All the discharge points and feed points wherever the possibility of dust generation is there, a de dusting suction point will be provided to collect the dust. 4. <u>DUST SUPPRESSION SYSTEM</u> It is the most effective and successful system to prevent the fly-off of dust. Dust suppression system will be adopted to control the fugitive dust emanated during raw material unloading operations.
2.	Raw Material Storage System	1. All conveyors will be covered with G.I. Sheets to control the dust. 2. All bins will be totally packed and covered, so that there will not be any chance of dust leakage. i. Weigh feeders will be kept below the hopper and used to feed the known quantity of raw material per hour; it also seals the discharge area. ii. All discharge and feed points wherever the possibility of dust generation is there, will be provided with dust suppression system. iii. All material transfer points will be connected with dust suppression water nozzles to avoid the fugitive dust emission.

S.No.	AREA OF AIR POLLUTION	MEASURES ADOPTED FOR CONTROL
3.	Kiln Feed System	The raw material will be fed into the kiln through a double pendulum valve, which seals the false air entry into the rotary kiln and gas leakage from the kiln. The chute will be sealed with a double pendulum flap.
4.	Main Processing System Kiln	Sealed system to avoid false air entry as well as exit. So that the desired quality can be produced. Hence no dust escapes outside.
5.	Kiln Cooler Transfer Building	The transfer point between kiln to coolers is completely sealed to avoid the false air entry and gas leakages.
6.	Rotary Cooler	1. The water will be circulated again and again. Hence there will not be any water pollution problem 2. There will be slip seals at cooler inlet & cooler outlet. The seals are also being lubricated to avoid false air entry and gas leakages. 3. Cooler discharge and feed points wherever the possibility of dust generation is there, will be provided with de dusting system.
7.	Waste Gas Cleaning System	**AFTER BURNING CHAMBER (POST COMBUSTION CHAMBER)** The waste gas passes through the after burning chamber where the combustion of carbon monoxide and un burnt carbon takes place in presence of air supplied. The basic purpose of after burning chamber is to reduce the carbon monoxide content in waste flue gases. **ELECTRO STATIC PRECIPITATOR** The flue gas from DRI kilns, after heat recovery, will pass through an electro static precipitator where it is cleaned to contain <30 mg/Nm^3 particulate matter. The clean gas will be emitted into the atmosphere through the chimney whose height is calculated on the basis of CPCB guidelines. The total conveying of gas from kiln to chimney is done by the induced draft fan located between ESP and chimney.
8.	Product Separation System	1. All conveyors will be covered with G.I. Sheets, to control the dust emission. 2. All bins will be totally packed and covered, so that there will not be any chance for dust leakage. 3. Telescopic chutes will be provided below the hopper to discharge the product directly into the truck for dispatch to avoid the pollution. 4. All the above material handling system will be connected with de-dusting system 5. All discharge points and feed points wherever the possibility of dust generation is there, a de-dusting suction point will be provided to collect the dust. 6. The collected dust will be taken by pneumatic conveying system and stored in a dust storage bin.

S.No.	AREA OF AIR POLLUTION	MEASURES ADOPTED FOR CONTROL
		7. Bag housing system In the bag house, the dry dust will be collected in an enclosed housing containing fabric filter bags which are suspended inside the unit. The dust laden air will pass through bag filters forming a dust cake to separate the particulate from the clean air. The collected dust will be taken by a pneumatic conveying system and stored in a dust storage bin.

2.9.1.3 ACTION PLAN FOR CONTROL AND MONITORING OF FUGITIVE EMISSIONS

[Std. TOR # 7 (vi)]

Control of Fugitive Emissions from Sponge Iron Plant

Fugitive dust emissions are likely in the unloading areas, material transfer point, cooler discharge area, product separation area, etc. Fugitive emission in the material unloading area can be avoided by providing dust suppression system. Fugitive emission from material unloading operations, material transfer points will be controlled fully with total enclosure and all the transfer emission will be connected with extractor inlet point and will pass through a high efficiency Bag Filter before discharging into the atmosphere. All internal roads will be asphalted.

Control of Secondary Fugitive Emissions from Induction Furnace (IF)

- The secondary emissions from the Induction furnaces will be extracted and treated in a fume extraction & cleaning system.
- Fumes will be evacuated directly from induction furnaces through hoods with swiveling mechanism and ducting.
- Clean gases having less than **30 mg/Nm^3** of dust content will be exhausted through a Stack of adequate height.

Monitoring Of Secondary Fugitive Emissions

Sponge Iron plant

As per MoEF notification vide no. G.S.R. 414 (E) dated 30th May 2008, fugitive emissions will be monitored at a distance 10 m from their source as per following:

Table No. 2.9.4: Monitoring location for Secondary Fugitive Emissions

S.No	Area	Monitoring Location
1.	Raw material handling area	Screen area, Transfer Points, Stock Bin area
2.	Crusher area	Crushing plant, vibrating screen, transfer points
3.	Raw material feed area	Feeder area, Mixing area, transfer points
4.	Cooler discharge area	Over size discharge area, Transfer Points
5.	Product processing area	Intermediate stock bin area. Screening plant, Magnetic Separation unit, Transfer Points, Over size discharge area, Product separation area, Bagging area
6.	Other areas	Areas as specified by State Pollution Control Board
The fugitive emissions will be maintained below the MoEF&CC norm of 2000 µg/m^3.		

Induction Furnace

Fugitive emission will be monitored at specified intervals within a distance of 10 m away from the source of emission or from suction hood connected to control system. The reports will be submitted to MoEF&CC & SPCB regularly.

2.9.2 WASTEWATER MANAGEMENT [Std. ToR # 3 (vi) & 7 (iv)]

Existing

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

Proposed

- There will be no effluent discharge in the I/O Beneficiation, Pellet Plant, DRI Unit, Induction Furnace Unit, Electric Arc Furnace, Ferro Alloys as closed-circuit cooling system will be adopted.

- Effluent from Rolling mill will be sent to settling tank and will be recycled through closed circuit cooling system.
- Effluent from power plant will be treated in ETP and after ensuring compliance with WBPCB norms, it will be utilized for dust suppression, ash conditioning and for greenbelt development.
- Air cooled condenser will be provided in the power plant, which will reduce the water consumption significantly. Hence wastewater generation will be also be minimized.
- Sanitary waste water will be treated in STP and after treatment it will be utilized for greenbelt development.
- Zero liquid effluent discharge practice will be continued in the proposed expansion also.
- During monsoon the treated effluent will be utilized as makeup water in Rolling Mill. Accordingly, the makeup water for Rolling mill also reduces during the rainy period.

EFFLUENT TREATMENT PLANT

pH of the boiler blowdown will be between 9.5 to 10.5. Hence a neutralization tank will be constructed for neutralizing the boiler blow down. DM plant regeneration water will be neutralized in a neutralization tank. After neutralization, these two effluent streams will be mixed with Cooling Tower blowdown in a Central Monitoring Basin (CMB). The treated effluent will be utilized for dust suppression, ash conditioning and for Green belt development. No effluent will be let out of the plant premises. Hence Zero discharge concept will be implemented.

TREATED EFFLUENT DISPOSAL

Effluent quantity to be used for ash conditioning	:	91 m^3/day
Effluent to be used for dust suppression in CHP	:	300 m^3/day
Effluent to be used for Greenbelt development	:	200 m^3/day

81 Acres of greenbelt **(inclusive of existing)** will be developed by using the treated effluent. Treated effluent which is proposed to be utilized for greenbelt, will be used as make up water for Rolling Mill, during monsoon.

2.9.3 NOISE LEVEL MANAGEMENT

- The major noise generating sources in the plant will be STG, boiler, feed pumps, steam blowing from boiler, D.G. Sets.

- Acoustic enclosures will be provided to STG & D.G. set.
- Quench water Silencer will be provided to prevent the noise during steam blowing.
- All machinery will be manufactured as per MoEF&CC/OSHA & other international standards on noise levels.
- The noise levels will be confined to the working zones of the plant.
- Ear plugs will be provided to all employees who will enter into the noise prone areas.
- Community noise levels are not likely to be affected due to the proposed thick green belt and attenuation due to the physical barriers.
- The ambient noise levels will be in accordance with MoEF&CC norms i.e. ambient noise levels will be < 75 dBA during daytime and < 70 dBA during night time.

2.9.4 SOLID WASTE MANAGEMENT [Std. TOR # 7 (vii) & Spec. ToR # 13 & 14]

The following will be the solid waste generation & proposed method of disposal.

Table No. 2.9.5: SOLID WASTE GENERATION & PROPOSED METHOD OF DISPOSAL

S.No	Waste	Quantity (TPA)			Method of disposal
		Existing	Proposed	After expansion	
1.	Tailing from Beneficiation plant	--	2,40,000	2,40,000	Tailings from thickener will be taken to filter press and the dewatered tailings cake be stored in the yard with 30 days capacity. This will be given to Ceramic industries / cement plants.
2.	Pellet Plant (ESP & Bagfilter dust from dedusting system)	--	2,200	2,200	Will utilised in own Brick manufacturing units.
3.	Ash from DRI	32,400	1,00,980	133,380	Is being utilized in the owned existing Brick Plants (Partly) & surplus given to Brick manufacturers (partly). In expansion same practice will be continued.
4.	Dolochar	54,000	1,40,250	194,250	Is being utilized in the existing AFBC boiler-based power plant. The same practice will be continued after expansion also.
5.	Kiln Accretion Slag	1,620	5,049	6,669	Is being given to road contractors for road construction & will be utilized in own brick manufacturer and same practice will be continued after the proposed expansion also.

6.	Wet Scraper Sludge	2400	7,517	9,917	Is being given to road contractors for road construction & will be utilized in own brick manufacturing unit and same practice will be continued after the proposed expansion also.
7.	SMS Slag	32,800	64,610	97,410	Presently it is being used in the slag crusher unit for metal recovery and the remaining after recovery process is further used as a Raw Material for owned brick manufacturing unit. After expansion same practice will be continued.
8.	End cuttings from rolling Mill	8,700	12,780	21,480	Reused in SMS
9.	Mills Scales from Rolling Mill	5,800	1,716	7,516	Will be used in existing and proposed SMS & Ferro Alloys plant captively
10.	Ash from Power Plant (With Indian Coal + Dolochar)	40,920	1,03,870	1,44,790	Is being given to M/s. BMR Enterprises, who is a supplier of ash to M/s. Ultratech Cement Ltd., Durgapur. In the proposed expansion project also ash will be given to M/s. BMR Enterprises for utilization of ash in cement manufacturing.

[Addl. TOR # 6]

NOTE: Solid wastes such as dolochar, accretion slag, wet scrapper sludge will be stored in designated storage yard. Ash generated will be stored in silos only. There will not be any open storage of fly ash. All other storage yards will be on top of stable liner to avoid leaching of material to ground water.

However, upon commencement of production, TCLP will be conducted and disposal of slag will be in accordance with the MoEF&CC/CPCB/SPCB norms.

Hazardous waste generation, storage &disposal [Std. TOR # 3 (vi)]

1. **Waste oil: 5.0 KL / Annum**

   This will be stored in covered HDPE drums in a designated area and will be given to SPCB approved vendors.

2. **Used Batteries**

   Used batteries will be given back to the supplier under buy back agreement with supplier.

Table No. 2.9.6: MUNICIPAL SOLID WASTE GENERATION & ITS DISPOSAL

Type of Municipal solid waste	Proposed method of disposal
Construction debris (Generated during construction phase)	Used for landfill within the plant site to the extent possible and recyclables will be given to authorised recyclers.
Canteen waste	Used in composting / Vermiculture Used as manure for greenbelt development within the premises.
Recyclables	Given to SPCB authorised dealers

2.9.5 GREEN BELT

- 32.79 Ha. (81 acres) of Greenbelt (inclusive of existing) will be developed within the plant premises.
- 35,000 nos. of plants are existing till date (survival rate 85%).
- 7 m to 14 m wide greenbelt is being developed all around the plant.
- Another 46,000 nos. of saplings will be planted as part of expansion.
- Local DFO will be consulted in developing the green belt.
- The tree species to be selected for the plantation are pollutant tolerant, fast growing, wind firm, deep rooted. A three-tier plantation is proposed comprising of an outer most belt of taller trees which will act as barrier, middle core acting as air cleaner and the innermost core which may be termed as absorptive layer consisting of trees which are known to be particularly tolerant to pollutants.
- 1000 plants will be planted per acre as per CPCB norms.

2.10 ASSESSMENT OF NEW & UNTESTED TECHNOLOGY FOR THE RISK OF TECHNOLOGICAL FAILURE

Manufacturing technologies for all the units proposed in the project are well proven technologies all over the world. Hence, there will not be any risk of technological failures in the proposed expansion proposal.

CHAPTER – 3
DESCRIPTION OF ENVIRONMENT
(BASELINE ENVIRONMENTAL STATUS)

3.1 BASELINE ENVIRONMENTAL STATUS

This chapter gives an idea and description of environmental status of the study area with reference to the prominent environmental attributes. The main objective of describing the environment is to assess present environmental quality & the environmental impacts. The study area 10 Km. radius of the Project site is covered in Survey of India Toposheet Nos. 73 I/14, 73 M/2, M/3.

The impact identification always commences with the collection of baseline data such as ambient air quality, ground water quality, surface water quality, noise levels, land environment, land use pattern, flora & fauna and socio economic aspects with in the study zone of 10 Km. radius during **1st March 2021 to 31st May 2021.**

Baseline data has been collected pertaining to Ambient Air, Noise, Water & Soil by an external laboratory M/s.Global Enviro Labs, Hyderabad, which is a MoEFCC recognized laboratory. Due care has been taken by Pioneer Enviro to ensure that calibrated samplers / equipments/ instruments have been utilized for sampling & analysis. Adequate care has also been taken to ensure proper Preservation & Transportation methods in accordance with the standard procedures. It is ensured by Pioneer Enviro that Standard Operating Procedures have been followed by M/s. Global Enviro Labs, Hyderabad.

3.2 AIR ENVIRONMENT

3.2.1 METEOROLOGY

Meteorology of the study area plays an important role in the air pollution studies. The prevailing micro meteorological conditions at the site will regulate the dispersion and dilution of air pollutants in the atmosphere. The predominant wind directions and the wind speed will decide the direction and distance of the most affected zone from the proposed activity. The meteorological data collected during the monitoring period is very useful in interpretation of baseline as input for dispersion models for predicting the Ground Level Concentrations (GLC).

3.2.2 METEOROLOGICAL DATA RECORDED AT PROJECT SITE [Std. TOR # 6 (i)]

A Temporary Weather Monitoring Station was installed at the project site and temperature, relative humidity, wind direction, wind speed, rainfall, etc. were recorded for one season **1st March 2021 to 31st May 2021.**

Cloud cover

During the study period, it was observed that no clouds have seen & sky is very clear. During the monsoon season both in the mornings & evenings the skies were found to be cloudy.

Rainfall

There is no rainfall recorded during the study period. However, Average Annual Rainfall of the Bankura district is 1236 mm.

Temperature

The maximum temperature recorded was 42.1^{0}C and the minimum temperature was 17.4 ^{0}C at the Plant site.

Relative Humidity

The relative humidity's at the site are ranging from 51% to 68%.

Wind Pattern at Project Site during the study period

Wind rose from IMD has been collected for Jamshedpur (Nearest IMD station) is shown in Figure No. 3.1.

Weather monitoring station has been established at site to collect Meteorological data.

Wind speed and direction are recorded at site every hour.

The wind rose shows that winds are predominantly blowing from **West (W)** to **East (E)** direction.

The wind rose diagram of summer season is shown in Figure No. 3.2.

Figure No. 3.1 : IMD Wind Rose at Jamshedpur Station (March to May)

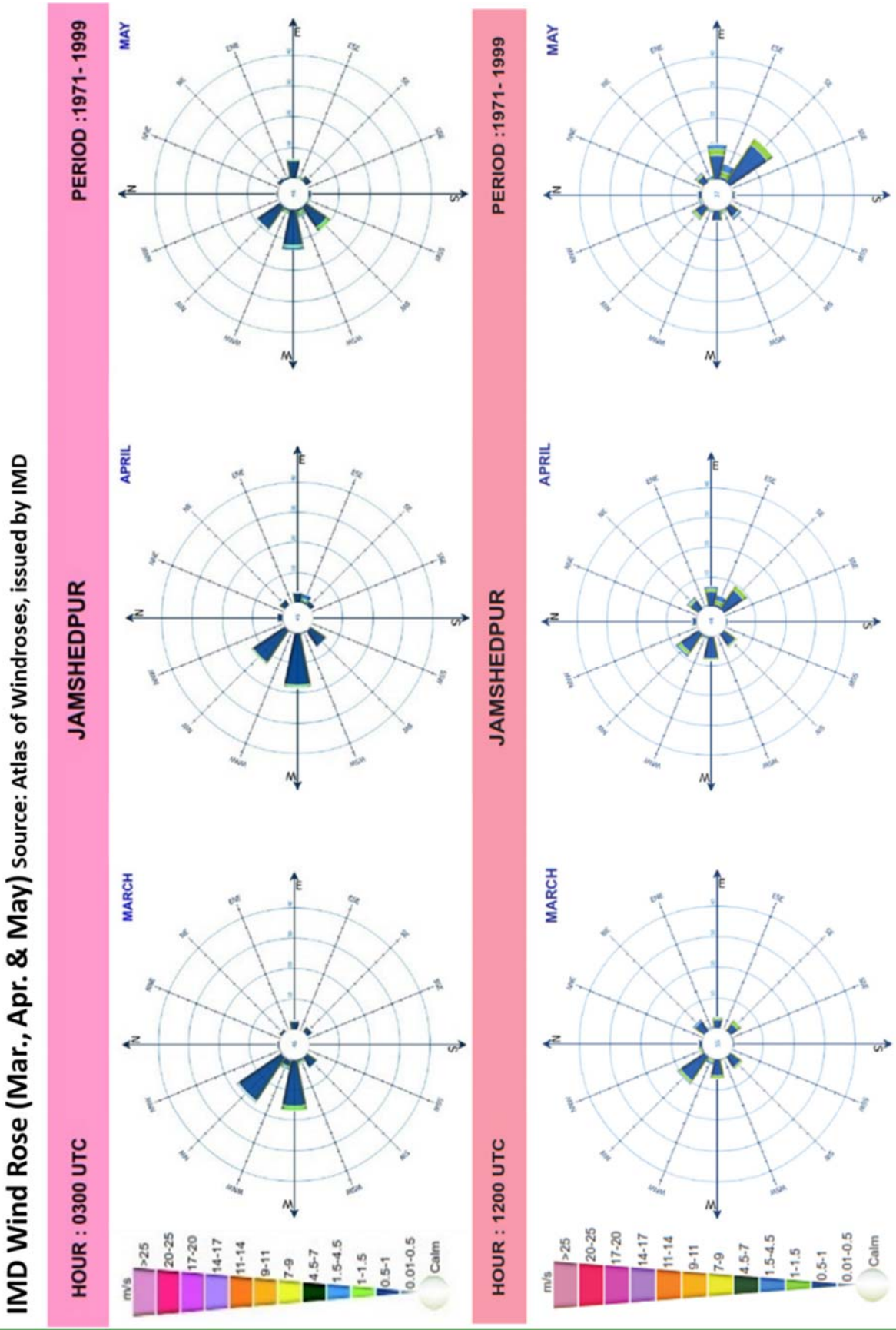


Figure No.3.2: Wind Rose at the Project Site (March 2021 to May 2021)

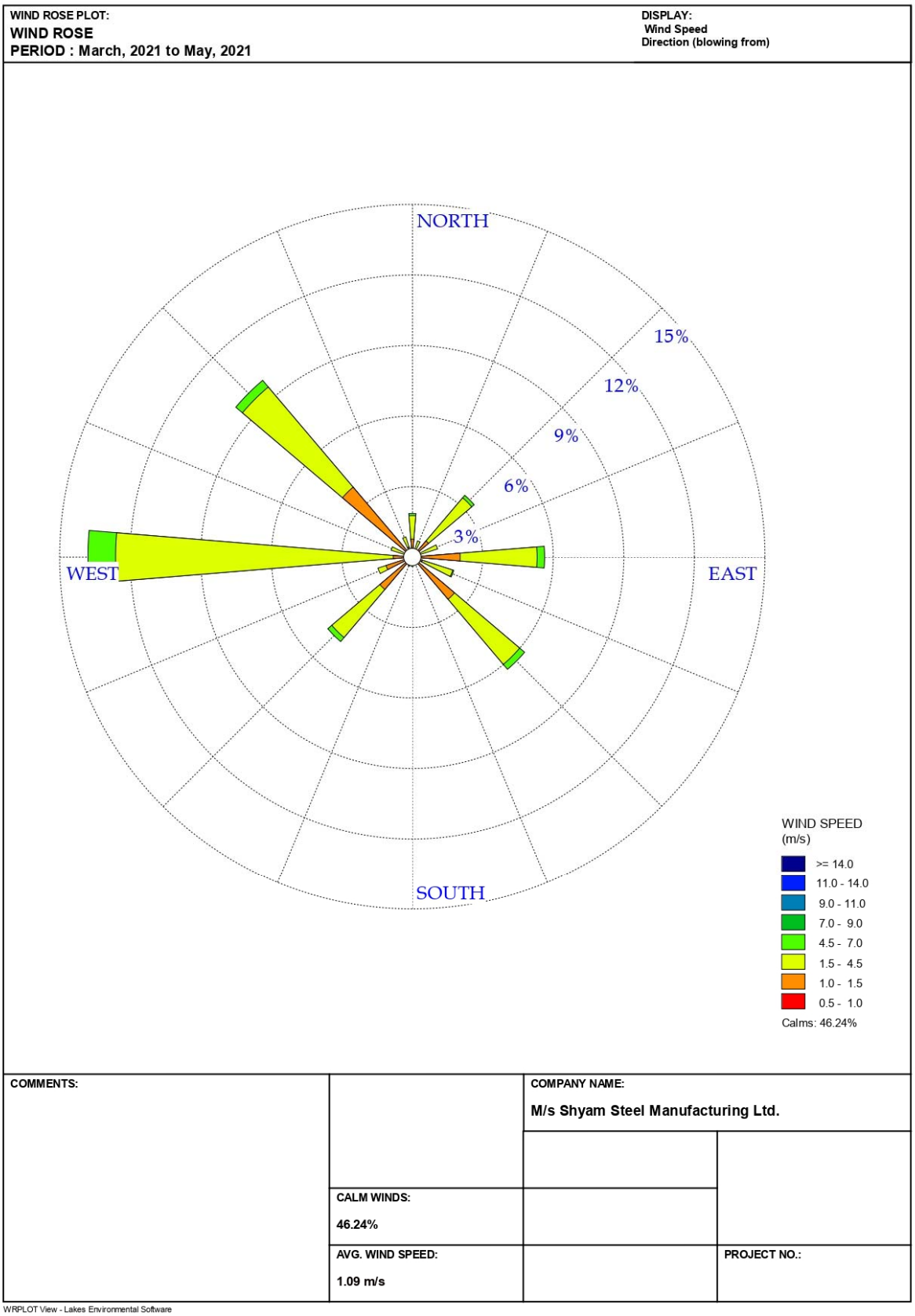


TABLE No. 3.2.1: 24 Hourly Site Specific Micro-Meteorological Data

S.No.	Time	Wind Direction	Wind Speed (m/s)	Ambient Temp. (Kelvin)	Stability Class	Mixing Height (m)
1	1:00:00	CALM	0.0	290.4	6	100
2	2:00:00	CALM	0.0	292.1	6	200
3	3:00:00	CALM	0.0	294.5	6	300
4	4:00:00	CALM	0.0	295.2	6	200
5	5:00:00	CALM	0.0	297.5	6	300
6	6:00:00	CALM	0.0	300.4	6	200
7	7:00:00	W	3.8	301.8	2	1000
8	8:00:00	NW	2.2	302.6	3	1100
9	9:00:00	SE	1.0	305.9	2	1200
10	10:00:00	E	5.6	307.4	2	1300
11	11:00:00	W	2.5	309.7	2	1200
12	12:00:00	NW	6.6	311.5	2	1000
13	13:00:00	W	5.4	313.2	1	1200
14	14:00:00	SW	2.3	315.1	1	1400
15	15:00:00	W	6.1	314.7	1	1200
16	16:00:00	NW	4.8	312.3	2	1400
17	17:00:00	W	7.0	310.5	2	900
18	18:00:00	SE	4.5	309.7	3	800
19	19:00:00	NE	2.6	307.1	4	600
20	20:00:00	W	1.8	306.6	4	500
21	21:00:00	CALM	0.0	301.2	6	250
22	22:00:00	CALM	0.0	299.3	6	300
23	23:00:00	CALM	0.0	297.2	6	400
24	0:00:00	CALM	0.0	295.2	6	200

3.2.3 AIR QUALITY [Std. TOR # 6 (ii) & Addl. TOR 5]

The ambient air quality with respect to the study zone of 10 km. radius around the project site forms the baseline information. The study area represents mostly rural environment. The various sources of air pollution in the region are vehicular traffic, dust arising from unpaved village roads & domestic fuel burning. The Prime objective of baseline air quality survey is to assess the existing air quality of the area. This will also be useful is assessing the conformity to standards of the ambient air quality during the operation of the proposed project.

3.2.3.1 SELECTION OF SAMPLING STATIONS

The base line status of the ambient air quality can be accessed through scientifically designed Ambient Air Quality Monitoring Network.

The selection of sampling locations in the air quality surveillance programme is based on the following:

(a) Representation of the Existing Plant.
(b) Representation of down wind direction.
(c) Representation of upwind direction.
(d) Representation of cross wind direction.
(e) Representation of residential areas.
(f) Representation of sensitive receptors.

8 nos. of Ambient Air Quality Monitoring Stations were established with in the study zone of the plant area in accordance with SPCB guidelines & based on nearest IMD windrose.

The sampling locations and their distances are shown in Table No. 3.2.3 and in **Figure No. 3.3**. The Max., Min., and 98th percentile values for all the sampling locations for $PM_{2.5}$, PM_{10}, SO_2 , NO_X and CO are shown in Table No. 3.2.4 to 3.2.5.

3.2.3.2 PARAMETERS MONITORED

Ambient air quality was monitored for 2 days in a week for three months (March 2021 to May 2021) to assess the existing status of air pollution and pollution dispersion pattern over the whole air basin of plant as per the National Ambient Air Quality Standards vide No. S. No. 826 (E) dated 16th November, 2009. At each Monitoring Particulate Matter ($PM_{2.5}$), Particulate Matter (PM_{10}), SO_2 NO_X and CO are monitored.

3.2.3.3 SAMPLING & ANALYTICAL TECHNIQUES INSTRUMENTS USED FOR SAMPLING

Envirotech RDS, APM 550 dust samplers pertaining to M/s.Global Enviro Labs, Hyderabad have been used for monitoring $PM_{2.5}$, PM_{10}, SO_2, NO_X & CO. $PM_{2.5}$ & PM_{10} are estimated by Gravimetric method West & Gaeke method (IS –5182, part III 1969) has been adopted for estimation of SO_2, Jacob – Hochheiser method (IS –5182, part IV, 1975) has been adopted for estimation of NOx. CO was analyzed on Gas Chromatograph. The standard operating Procedures of M/s. Global Enviro Labs, Hyderabad have been used for sampling and analysis.

Calibration

Calibration charts have been prepared for all gaseous pollutants. The Calibration is carried out when new absorbing solutions are prepared.

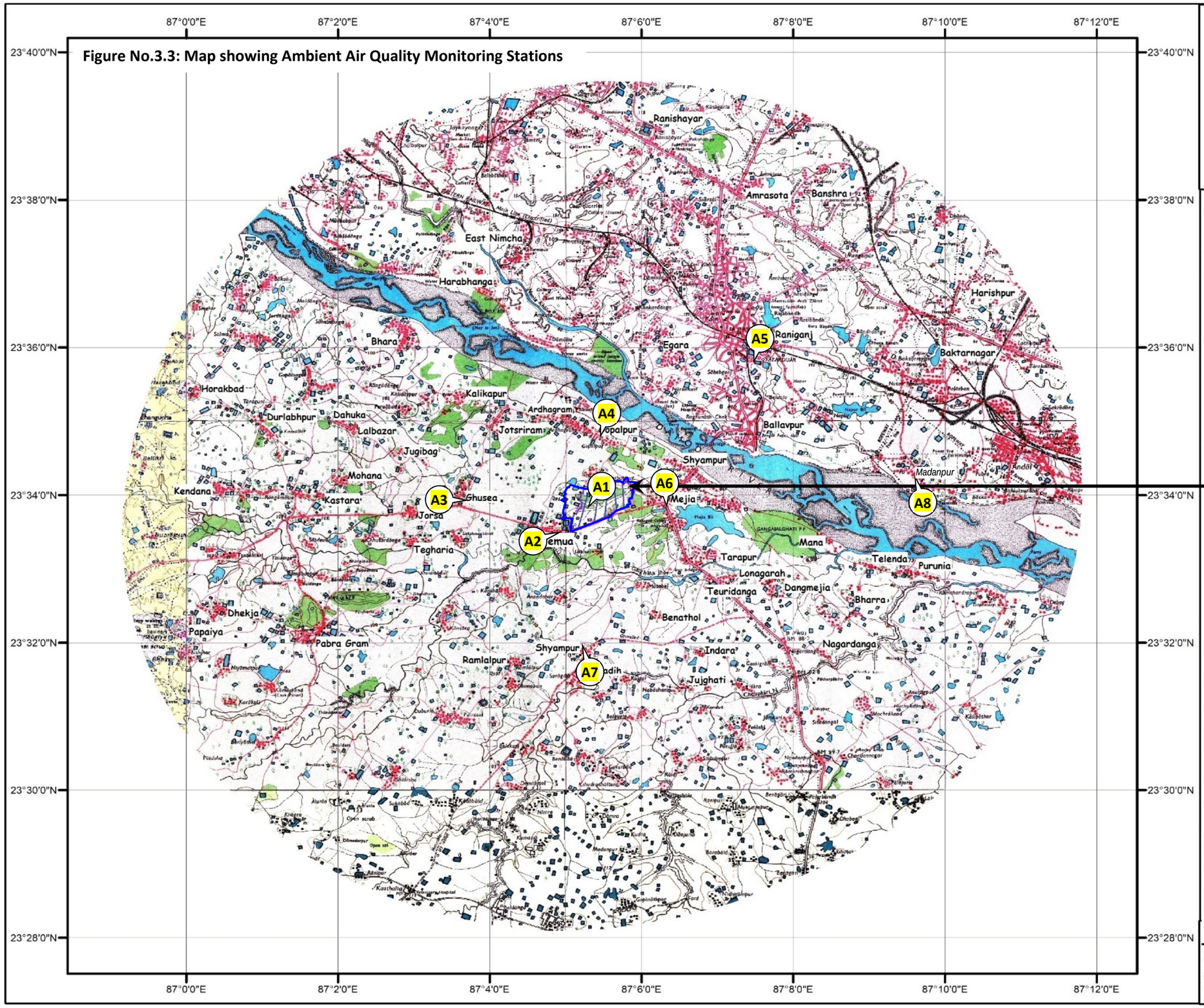
TABLE No. 3.2.2 : TECHNIQUES USED FOR AMBIENT AIR QUALITY MONITORING

S.No.	Parameter	Technique	Minimum Detectable Limit (μg /m³)
1.	Particulate Matter ($PM_{2.5}$)	APM 550 dust sampler (Gravimetric Method)	5.0
2.	Particulate Matter (PM_{10})	Respirable Dust Sampler (Gravimetric Method)	5.0
3.	SO_2	EPA Modified West & Gaeke method	4.0
4.	NOx	Arsenite modified Jacob & Hochheiser	4.5
5.	CO	Adsorption and Desorption followed by GC analysis	12.5

TABLE No. 3.2.3 : AMBIENT AIR QUALITY MONITORING STATIONS

S.No.	STATION	DIRECTION (w.r.t SIte)	DISTANCE (in Kms.)	CRITERIA FOR SELECTION
1	Plant Site	---	---	Represents Plant site (Core area)
2	Jemua	SW	0.1	Represents nearest habitation in crosswind direction
3	Ghusea	W	2.5	Represents habitaton in upwind direction
4	Gopalpur	NW	2.5	Represents habitation in crosswind direction
5	Raniganj	NNE	5.2	Represents habitation in densely populated area
6	Mejia	E	0.5	Represents habitation in downwind direction
7	Shyampur	S	3.5	Represents habitation in crosswind direction
8	Madanpur	E	7.0	Represents habitation in downwind direction

Figure No.3.3: Map showing Ambient Air Quality Monitoring Stations



10 Km RADIUS TOPO MAP SHOWING SITE SURROUNDINGS

N

1 0.5 0 1 2 3 4 Kilometers

1 centimeter = 1,208 meters

Coordinates of the project site

Point	Coordinates
Point # 1	23°34'5.43"N 87° 5'42.40"E
Point # 2	23°33'50.57"N 87° 5'35.69"E
Point # 3	23°33'42.29"N 87° 5'20.44"E
Point # 4	23°33'33.53"N 87° 4'51.96"E
Point # 5	23°33'42.34"N 87° 4'53.35"E
Point # 6	23°33'42.98"N 87° 4'45.38"E
Point # 7	23°33'56.37"N 87° 4'45.60"E
Point # 8	23°34'7.38"N 87° 4'52.87"E
Point # 9	23°34'3.60"N 87° 5'6.58"E
Point # 10	23°34'7.01"N 87° 5'22.52"E

Project site

A Monitoring Station

CONVENTIONAL SYMBOLS

Source
Survey of India Topographical Maps, No.s. 73 I/14, 73 M/2 and 3.

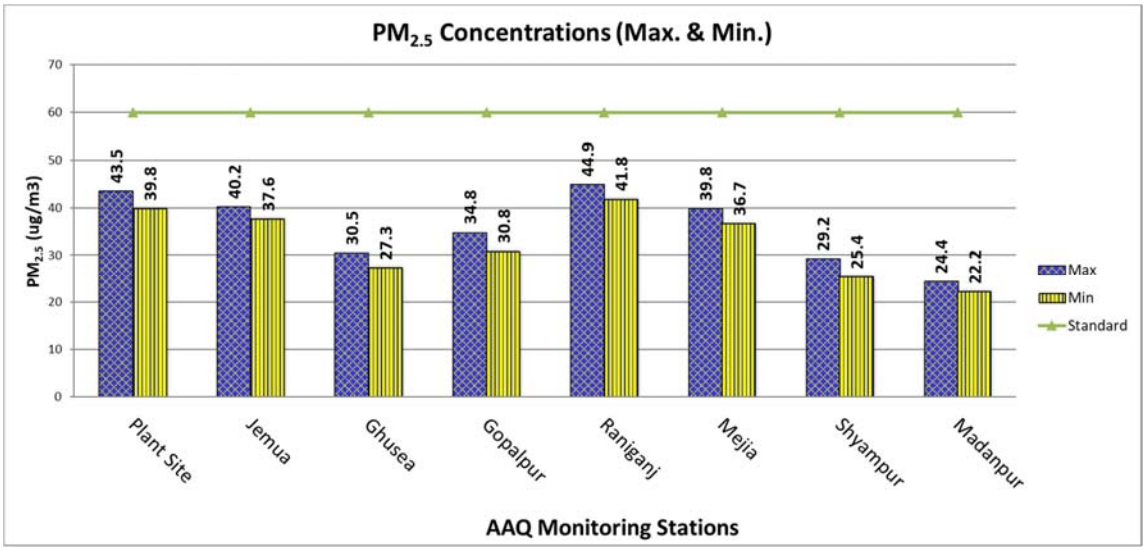
Table No.3.2.4 : Ambient Air Quality Monitoring Data

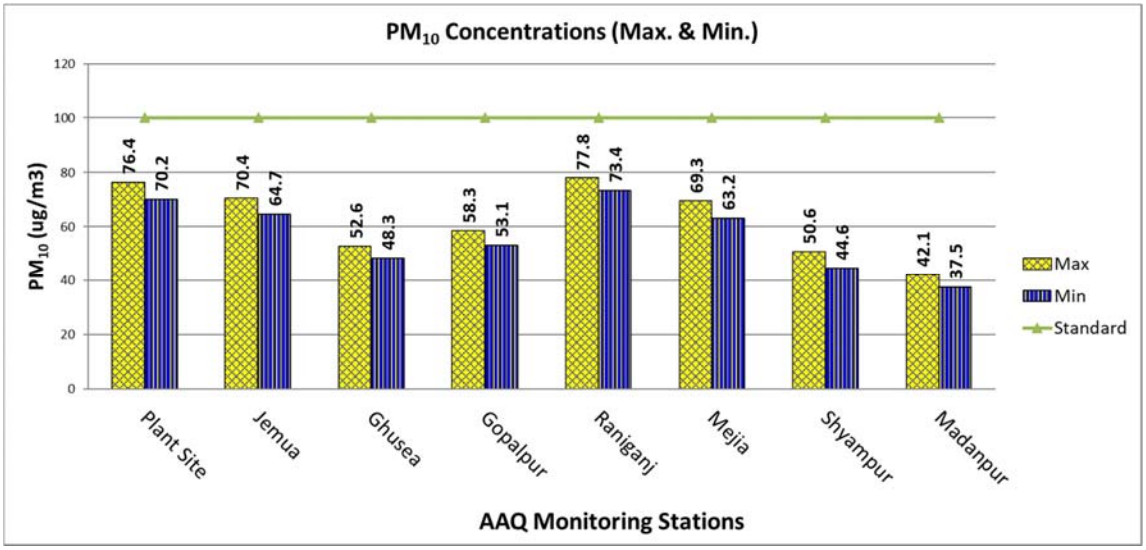
1.	**Sampling Location:** Plant Site **Unit** : µg /m^3			**Sampling Period:** March 2021 to May 2021	
	Parameter	**Maximum**	**Minimum**	**98th percentile**	**Standard as per NAAQS**
	$PM_{2.5}$	43.5	39.8	43.5	60
	PM_{10}	76.4	70.2	76.4	100
	SO_2	14.2	12.7	14.2	80
	NO_X	26.8	22.4	26.8	80
	CO	1044	876	1044	2000
2.	**Sampling Location:** Jemua **Unit** : µg /m^3			**Sampling Period:** March 2021 to May 2021	
	Parameter	**Maximum**	**Minimum**	**98th percentile**	**Standard as per NAAQS**
	$PM_{2.5}$	40.2	37.6	40.2	60
	PM_{10}	70.4	64.7	70.4	100
	SO_2	13.6	12.2	13.6	80
	NO_X	25.4	20.3	25.4	80
	CO	952	802	952	2000
3.	**Sampling Location:** Ghusea **Unit:**µg /m^3			**Sampling Period:** March 2021 to May 2021	
	Parameter	**Maximum**	**Minimum**	**98th percentile**	**Standard as per NAAQS**
	$PM_{2.5}$	30.5	27.3	30.5	60
	PM_{10}	52.6	48.3	52.6	100
	SO_2	10.8	9.4	10.8	80
	NO_X	15.2	13.5	15.2	80
	CO	822	614	822	2000
4.	**Sampling Location:** Gopalpur **Unit** : µg /m^3			**Sampling Period:** March 2021 to May 2021	
	Parameter	**Maximum**	**Minimum**	**98th percentile**	**Standard as per NAAQS**
	$PM_{2.5}$	34.8	30.8	34.8	60
	PM_{10}	58.3	53.1	58.3	100
	SO_2	12.0	10.8	12.0	80
	NO_X	16.6	14.1	16.6	80
	CO	865	658	865	2000

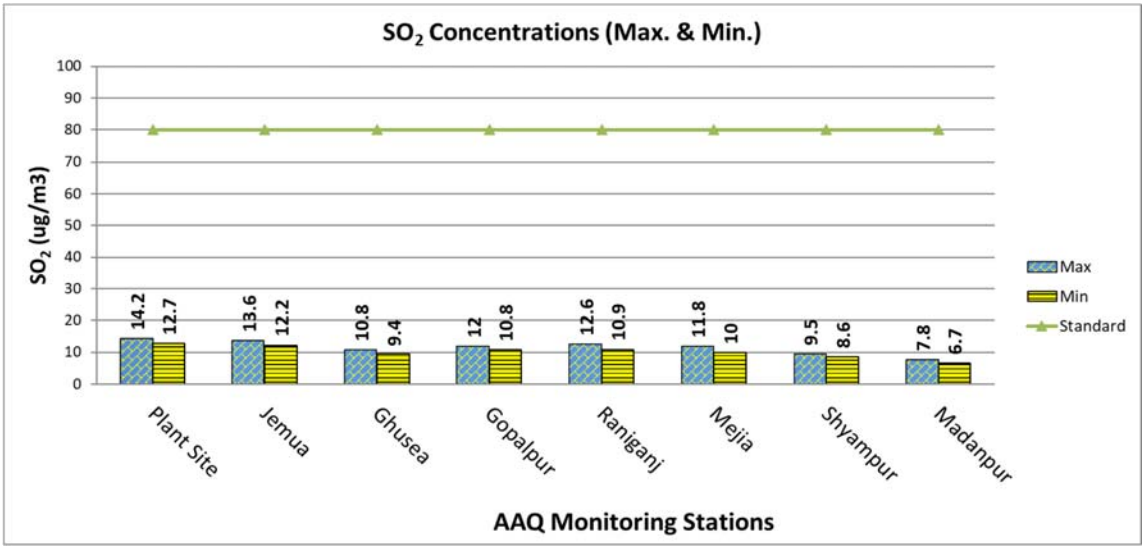
Table No.3.2.5 : Ambient Air Quality Monitoring Data

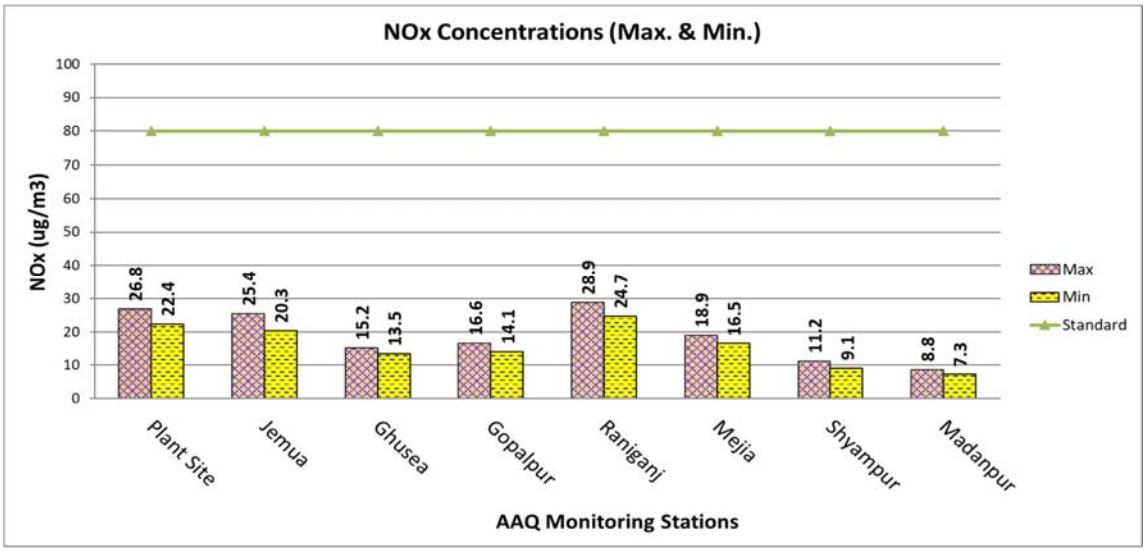
5.	**Sampling Location:** Raniganj **Unit** : µg /m^3			**Sampling Period:** March 2021 to May 2021	
	Parameter	**Maximum**	**Minimum**	**98th percentile**	**Standard as per NAAQS**
	$PM_{2.5}$	44.9	41.8	44.9	60
	PM_{10}	77.8	73.4	77.8	100
	SO_2	12.6	10.9	12.6	80
	NO_X	28.9	24.7	28.9	80
	CO	1445	1278	1445	2000
6.	**Sampling Location:** Mejia **Unit** : µg /m^3			**Sampling Period:** March 2021 to May 2021	
	Parameter	**Maximum**	**Minimum**	**98th percentile**	**Standard as per NAAQS**
	$PM_{2.5}$	39.8	36.7	39.8	60
	PM_{10}	69.3	63.2	66.5	100
	SO_2	11.8	10.0	11.2	80
	NO_X	18.9	16.5	18.9	80
	CO	1012	826	1012	2000
7.	**Sampling Location:** Shyampur **Unit:**µg /m^3			**Sampling Period:** March 2021 to May 2021	
	Parameter	**Maximum**	**Minimum**	**98th percentile**	**Standard as per NAAQS**
	$PM_{2.5}$	29.2	25.4	29.2	60
	PM_{10}	50.6	44.6	50.6	100
	SO_2	9.5	8.6	9.5	80
	NO_X	11.2	9.1	11.2	80
	CO	694	577	694	2000
8.	**Sampling Location:** Madanpur **Unit** : µg /m^3			**Sampling Period:** March 2021 to May 2021	
	Parameter	**Maximum**	**Minimum**	**98th percentile**	**Standard as per NAAQS**
	$PM_{2.5}$	24.4	22.2	24.4	60
	PM_{10}	42.1	37.5	42.1	100
	SO_2	7.8	6.7	7.8	80
	NO_X	8.8	7.3	8.8	80
	CO	403	312	403	2000

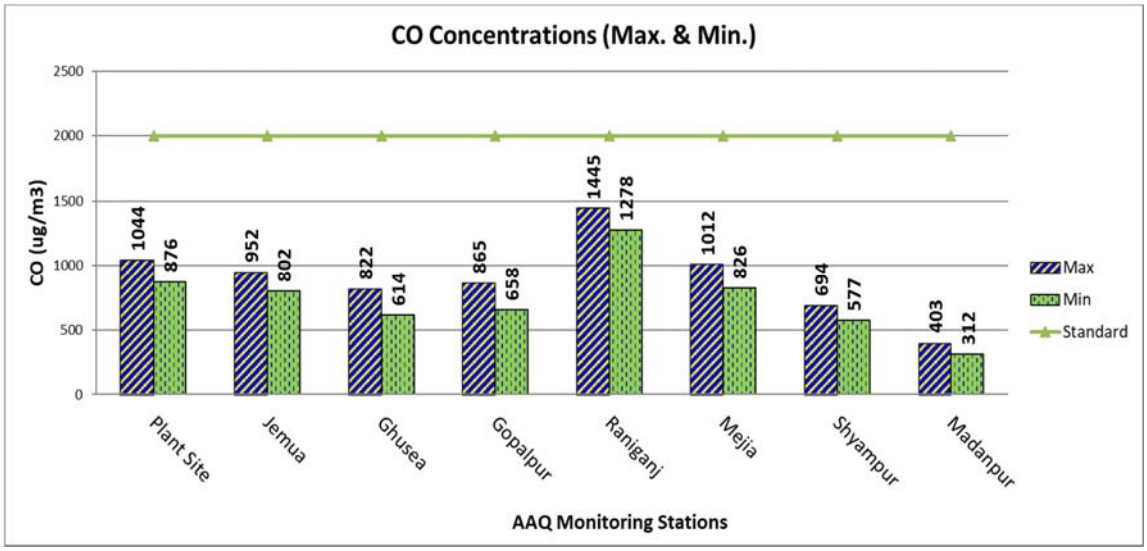
3.2.4 BAR DIAGRAMS SHOWING THE SUMMARY OF AMBIENT AIR QUALITY DATA








NOx Concentrations (Max. & Min.)
NOx (ug/m3)
100
90
80
70
60
50
40
30
20
10
0
26.8
22.4
25.4
20.3
15.2
13.5
16.6
14.1
28.9
24.7
18.9
16.5
11.2
9.1
8.8
7.3
Plant Site
Jemua
Ghusea
Gopalpur
Raniganj
Mejia
Shyampur
Madanpur
AAQ Monitoring Stations
Max
Min
Standard


CO Concentrations (Max. & Min.)
CO (ug/m3)
2500
2000
1500
1000
500
0
1044
876
952
802
822
614
865
658
1445
1278
1012
826
694
577
403
312
Plant Site
Jemua
Ghusea
Gopalpur
Raniganj
Mejia
Shyampur
Madanpur
AAQ Monitoring Stations
Max
Min
Standard

3.2.5 INTERPRETATION OF AMBIENT AIR QUALITY MONITORING

The 98th percentile $PM_{2.5}$ concentration recorded at the Plant Site is 43.5 µg /m^3.

The 98th percentile PM_{10} concentration recorded at the Plant Site is 76.4 µg /m^3.

The 98th percentile SO_2 concentration recorded at the Plant Site is 14.2 µg/m^3.

The 98th percentile NOx concentration recorded at the Plant Site is 26.8 µg/m^3.

The 98th percentile CO concentration recorded at the Plant Site is 1044 µg /m^3.

The highest 98th percentile $PM_{2.5}$ concentration was recorded at Raniganj Town with a value of 44.9 µg/m^3.

The highest 98th percentile PM_{10} concentration was recorded at Raniganj Town with a value of 77.8 µg/m^3.

The highest 98th percentile SO_2 concentration was recorded at Plant site with a value of 14.2 µg/m^3.

The highest 98th percentile NOx concentration was recorded at Raniganj Town with a value of 28.9 µg/m^3.

The 98th percentile CO concentration recorded at the Raniganj Town is 1445 µg /m^3.

The highest concentrations are recorded at Raniganj Town due to Densely populated area, Commercial, Residential & Industrial activity and the town is abutting to National Highway.

Ambient air quality was monitored for $PM_{2.5}$, PM_{10}, SO_2, NOx & CO at 8 stations including project site during March 2021 to May 2021. The following are the concentrations of various parameters at the monitoring stations:

Table 3.2.6 : AAQ data summary

S.No.	Parameter		Concentration
1.	$PM_{2.5}$	:	22.2 to 44.9 µg/m^3
2.	PM_{10}	:	37.5 to 77.8 µg/m^3
3.	SO_2	:	6.7 to 14.2 µg/m^3
4.	NO_X	:	7.3 to 28.9 µg/m^3
5.	CO	:	312 to 1445 µg/m^3

The concentrations of various parameters are within the NAAQS Standards. There is marginal increase in emissions due to the proposed expansion project due to the emissions from Stack, Fugitive emissions, Vehicular Emissions the over baseline concentrations. The net resultant incremental GLCs are calculated and furnished in page no. 4.10 of Chapter # 4.

3.3 NOISE ENVIRONMENT

The physical description of sound concerns its loudness as a function of frequency. Noise in general is sound, which is composed of many frequency components of various loudness distributed over the audible frequency range. Various noise scales have been introduced to describe, in a single number, the response of an average human being to a complex sound made up various frequencies at different loudness levels. The most common and heavily favoured of those scales is the A weighted decibel (dBA). This is more suitable for audible range of 20 to 20,000 Hertz. The scale has been designed to weigh various components of noise according to the response of a human ear.

The impact of noise sources on surrounding community depends on

- Characteristics of noise sources (instantaneous, intermittent or continuous in nature). It is well known that steady noise not as annoying as one that is continuously varying in loudness.
- The time, at which noise occurs, for example loud noise levels at night in residential areas are not acceptable because of sleep disturbance.
- The location of the noise source, with respect to noise sensitive area, which determines the loudness and period of noise exposure.

The environmental impact of noise can have several effects varying from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of Noise levels.

The environmental impact assessment of noise from the proposed project can be carried out by taking into consideration of various factors: potential damage to hearing, potential physiological responses, and annoyance and general community responses.

The main objective of noise level monitoring is to assess the background noise levels in different zones viz., industrial, commercial, residential and silence zones within the study area.

The basic studies conducted were

a. Assessment of background noise levels.
b. Identification and monitoring the major noise generating sources in the study area.
c. Impact of noise on general population in the study zone of 10 Km. radius.

3.3.1 RECONNAISSANCE

Noise levels were measured at different locations within 10 Km. radius of the plant such as villages, bus stands etc.

3.3.1.1 BACKGROUND NOISE

Baseline noise data has been measured at different locations using A-weighted sound pressure level meter. The equivalent day-night noise levels in the study zone are ranging from **47.18 dBA to 70.06 dBA**.

3.3.1.2 SOURCES OF NOISE

Typical considerations in environmental noise assessment can be divided into two categories; one is related to noise sources and the other related to potential receiver. Two quantities are needed to describe completely the strength of the source.

They are sound Power level and directivity. Sound Power levels measures the total sound Power radiated by the source in all directions where as directivity is a measure of difference in radiation with direction. This concept of sound Power level and directivity index makes it possible to calculate the sound pressure level created by the source.

3.3.2 COMMUNITY NOISE

The ambient noise level is characterized by significant variations above a base or a residual noise level. The residual noise level is that level below which the ambient noise does not seem to drop during a given time interval and is generally caused by the unidentified distant sources. It differs in rural and urban areas. At night, its level is low due to lesser elements of noise. The annoyance that people experience depends upon the number of noise elements that produce noise concurrently at a given time that occur during a time interval.

The noise rating developed by EPA for specification of community noise from all sources is the day night sound level, Ldn. It is similar to a 24 hour equivalent sound level except that during the night period, which extends from 10.00 p.m. to 6.00 a.m. A 10 dBA weighing penalty is added to the account for the fact that noise at night when people are trying to sleep is judged more annoying than the same noise during the day time.

The Ldn for a given location in a community is calculated from an hourly equivalent sound level given by the following equation.

Ldn =10 log (1/24 [15 ($10^{(Ld/10)}$ + 9 ($10^{(Ln+10)/10}$)])

Where Ld is the equivalent noise level during day time (6 A .M. to 10 P.M.)

Ln is the equivalent noise level during night time (10 P.M. to 6 A.M.)

3.3.2.1 OCCUPATIONAL EXPOSURE

To assess the magnitude of impact due to noise sources, it is essential to know the following:

a. The duration of sound.
b. Distribution through the working day.
c. Overall noise levels.
d. It's composition including frequency and intensity at various intervals of time.

Other factors regarding receiver include

a. The age of the individual.
b. The sensitivity of the individual.
c. The efficiency of the protective devices used.

After characterizing the noise sources noise at receiver's location, the impact must be assessed. The environmental impact of noise can lead to the following effects.

a. Damages the hearing capacity.
b. Interference in communication.
c. Interference with work.
d. Interference with sleep.
e. Causes annoyance.

3.3.3 METHODOLOGY ADOPTED FOR NOISE LEVEL OBSERVATION

For measurement of Ambient Noise level in the Study area, a Digital Sound Level Meter *(Make & Model: Lutron SL-4001)* was used. The instrument was calibrated with a Standard Acoustic calibrator before using in the field. The measurements were carried out continuously for the 24-hour period to obtain hourly equivalent sound pressure level, 1 hour Leq. From these values, day and night time as well as 24-hour Leq values were also calculated. The Leq is the equivalent continuous sound level, which is equivalent to the same sound energy as the fluctuating sound measured in the same period.

Table No. 3.3.1: GUIDANCE FOR ASSESSMENT OF REPRESENTATIVENESS AND RELIABILITY OF BASELINE ENVIRONMENTAL ATTRIBUTES

Attributes	Sampling		Measurement Method	Remarks
Noise	Network	Frequency		
Hourly equivalent noise levels	Identified study area	Once in each season	Instrument: Noise level meter	IS:4954-1968 as adopted by SPCB
Hourly equivalent noise levels	In plant (1.5 m from machinery)	Once	Instrument: Noise level meter	SPCB/OSHA
Hourly equivalent noise levels	Highways	Once in each season	Instrument: Noise level meter	SPCB/IS:4954-1968

3.3.4 NOISE LEVEL OBSERVATIONS IN THE STUDY AREA [Std. TOR # 6 (vii)]

Baseline noise levels have been monitored at different locations within the study zone of the plant during March 2021. The impact of Noise levels will be confined to max. of 2 Kms. Hence, we have chosen monitoring stations close to the plant site. 8 nos. of stations have been selected for measurement of noise levels and their distances with respect to site are shown in Table No. 3.3.2.

TABLE No. 3.3.2 : NOISE LEVEL MONITORING STATIONS

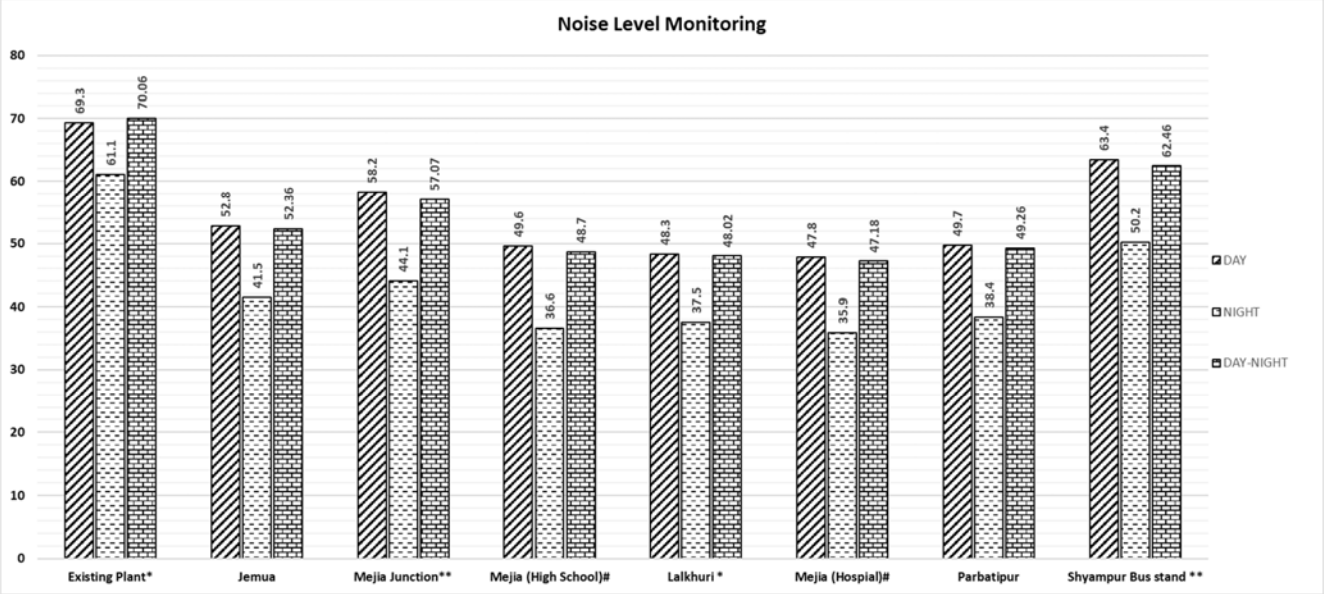
S.No.	MONITORING STATION	DIRECTION w.r.t site	DISTANCE (in Kms.)	CRITERIA FOR SELECTION
1.	Existing Plant*	--	--	Represents Project site
2.	Jemua	SW	0.3	Represents nearest habitation
3.	Mejia Junction**	SEE	0.9	Represents Junction /connecting NH # 60
4.	Mejia (High School)#	NEE	0.5	Represents Silence zone
5.	Lalkhuri *	S	0.6	Represents Habitation & near to Industrial Activity
6.	Mejia (Hospial)#	SE	1.2	Represents Silence zone
7.	Parbatipur	N	0.3	Represents habitation
8.	Shyampur Bus stand **	NE	1.0	Represents Commercial Area

TABLE No. 3.3.3 : EQUIVALENT DAY NIGHT NOISE LEVELS

S.No.	MONITORING STATION	EQUIVALENT NOISE LEVELS (dBA)			Standard
		DAY	NIGHT	DAY-NIGHT	
1.	Existing Plant*	69.3	61.1	70.06	**Residential** Daytime – 55 dBA Night time – 45 dBA
2.	Jemua	52.8	41.5	52.36	

3.	Mejia Junction**	58.2	44.1	57.07	**Industrial*** Daytime – 75 dBA Night time – 70 dBA
4.	Mejia (High School)#	49.6	36.6	48.70	
5.	Lalkhuri	48.3	37.5	48.02	**Commercial **** Daytime – 65 dBA Night time – 55 dBA
6.	Mejia (Hospital)#	47.8	35.9	47.18	
7.	Parbatipur	49.7	38.4	49.26	**Silence zone #** Daytime – 50 dBA Night time – 40 dBA
8.	Shyampur Bus stand **	63.4	50.2	62.46	

3.3.5 BAR DIAGRAM SHOWING THE SUMMARY OF NOISE LEVEL MONITORING DATA



3.3.6 INTERPRETATION OF NOISE LEVEL MONITORING

- *The noise levels monitored at **Existing Plant** are within the norms prescribed for Industrial Zone.
- **The noise levels monitored at **Mejia Junction & Shyampur Bus stand** are within the norms prescribed for Commercial Zone.
- # The noise levels monitored at Silence zone **(i.e. Mejia Junction, Mejia High School, Mejia Hospital)** are within the norms prescribed for Silence Zone.
- The noise levels monitored at all residential areas are within the norms prescribed for Residential Zone.

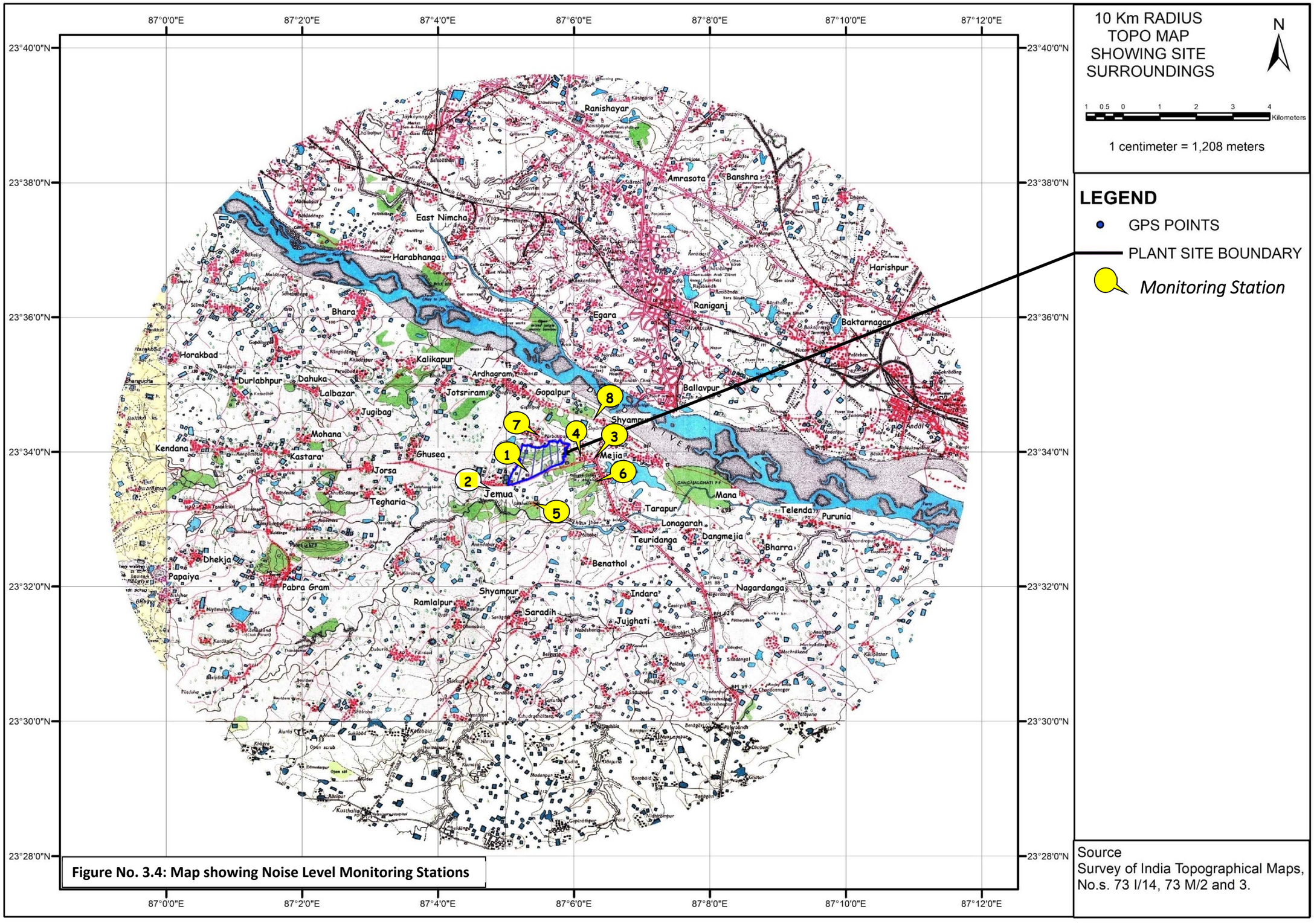


Figure No. 3.4: Map showing Noise Level Monitoring Stations

3.4 WATER QUALITY IMPACTS

3.4.1 SURFACE WATER QUALITY [Std.ToR # 6 (iv)]

Damodar River (1.5 Kms.), Gaighata Jhor Nallah (0.5 KMs.), Chouphari Nallah (3.7 Kms.) & Mejia Bil Reservoir (1.3 Kms.) are flowing within 10 km. radius of the plant. 2 no. of Samples are collected from Damodar River, 1 no. of sample collected from Gaighata Jhor Nallah, Chouphari Nallah & Mejia Bil Reservoir. No other water sample is collected as water is not available during the study period and analyzed for various parameters. The analysis is furnished in Table No. 3.4.1, 3.4.2, & 3.4.3.

TABLE No. 3.4.1 : SURFACE WATER QUALITY ANALYSIS (Damodar River)

S.No.	PARAMETER	Standard as per BIS: 2296	UNIT	Damodar River - 60 m Upstream (SW1)	Damodar River – 60 m Downstream (SW2)
PHYSICAL CHARACTERISTICS					
1.	Colour	-----	-----	-----	-----
2.	pH	6.5-8.5	-----	7.6	7.9
3.	Turbidity	-----	NTU	1.3	1.2
4.	Electrical Conductivity	-----	ms/cm	485	448
5.	Total Dissolved Solids	1500	mg/l	291	268
6.	Dissolved Oxygen	4 (Min.)	mg/l	5.7	5.9
CHEMICAL CHARACTERISTICS					
7.	Total Hardness	1500	mg/l	188	202
8.	Calcium Hardness (as Ca)	200	mg/l	117	125
9.	Magnesium Hardness (as Mg)	100	mg/l	71	77
10.	Alkalinity	-----	mg/l	194	182
11.	Sulphates	400	mg/l	103	92
12.	Chlorides	600	mg/l	144	136
13.	Nitrates as NO_3	20	mg/l	3.7	4.4
14.	Fluoride as F	1.5	mg/l	0.55	0.52
15.	Sodium as Na	-----	mg/l	44	51
16.	BOD (5 days at 20 °C)	3	mg/l	2.4	2.2
17.	COD	-----	mg/l	11.3	10.5
18.	Residual chlorine	-----	mg/l	<0.01	<0.01
19.	Cyanides as CN^-	0.05	mg/l	<0.01	<0.01
20.	Phenols as C_6H_5OH	0.005	mg/l	Absent	Absent
21.	Hexavalent chromium as Cr	0.05	mg/l	<0.01	<0.01
22.	Iron as Fe	50	mg/l	0.18	0.16
23.	Copper as Cu	1.5	mg/l	<0.01	<0.01
24.	Arsenic as As	0.2	mg/l	<0.01	<0.01
25.	Selenium	<0.01	mg/l	<0.01	<0.01
26.	Cadmium as cd	<0.01	mg/l	<0.01	<0.01
27.	Boron as B	<0.01	mg/l	<0.01	<0.01

28.	Mercury as Mg	<0.01	mg/l	<0.001	<0.001
29.	Lead as Pb	0.1	mg/l	<0.01	<0.01
30.	Silica as SiO_2	----	mg/l	3.5	3.8
31.	Mineral oil	<0.01	mg/l	<0.01	<0.01
32.	Total coliforms	500	(MPN/100 ml)	114	133

TABLE No. 3.4.2 : SURFACE WATER QUALITY ANALYSIS

(Gaighata Jhor Nallah & Chouphari Nallah)

S.No.	PARAMETER	Standard as per BIS: 2296	UNIT	Gaighata Jhor Nallah (SW3)	Chouphari Nallah (SW4)
PHYSICAL CHARACTERISTICS					
1.	Colour	-----	-----	-----	-----
2.	pH	6.5-8.5	-----	7.4	8.1
3.	Turbidity	-----	NTU	2.4	3.1
4.	Electrical Conductivity	-----	ms/cm	639	564
5.	Total Dissolved Solids	1500	mg/l	382	338
6.	Dissolved Oxygen	4 (Min.)	mg/l	4.6	4.9
CHEMICAL CHARACTERISTICS					
7.	Total Hardness	1500	mg/l	277	224
8.	Calcium Hardness (as Ca)	200	mg/l	172	139
9.	Magnesium Hardness (as Mg)	100	mg/l	105	85
10.	Alkalinity	-----	mg/l	158	176
11.	Sulphates	400	mg/l	134	121
12.	Chlorides	600	mg/l	191	166
13.	Nitrates as NO_3	20	mg/l	6.2	8.6
14.	Fluoride as F	1.5	mg/l	0.67	0.71
15.	Sodium as Na	-----	mg/l	33	61
16.	BOD (5 days at 20 °C)	3	mg/l	2.9	2.8
17.	COD	-----	mg/l	13.1	12.6
18.	Residual chlorine	-----	mg/l	<0.01	<0.01
19.	Cyanides as CN^-	0.05	mg/l	<0.01	<0.01
20.	Phenols as C_6H_5OH	0.005	mg/l	Absent	Absent
21.	Hexavalent chromium as Cr	0.05	mg/l	<0.01	<0.01
22.	Iron as Fe	50	mg/l	0.27	0.22
23.	Copper as Cu	1.5	mg/l	<0.01	<0.01
24.	Arsenic as As	0.2	mg/l	<0.01	<0.01
25.	Selenium	<0.01	mg/l	<0.01	<0.01
26.	Cadmium as cd	<0.01	mg/l	<0.01	<0.01
27.	Boron as B	<0.01	mg/l	<0.01	<0.01
28.	Mercury as Mg	<0.01	mg/l	<0.001	<0.001
29.	Lead as Pb	0.1	mg/l	<0.01	<0.01
30.	Silica as SiO_2	----	mg/l	4.4	4.1
31.	Mineral oil	<0.01	mg/l	<0.01	<0.01
32.	Total coliforms	500	(MPN/100 ml)	276	214

TABLE No. 3.4.3 : SURFACE WATER QUALITY ANALYSIS (Mejia Bil Reservoir)

S.No.	PARAMETER	Standard as per BIS : 2296	UNIT	Mejia Bil Reservoir (SW5)
PHYSICAL CHARACTERISTICS				
1.	Colour	-----	-----	-----
2.	pH	6.5-8.5	-----	8
3.	Turbidity	-----	NTU	4.6
4.	Electrical Conductivity	-----	ms/cm	690
5.	Total Dissolved Solids	1500	mg/l	413
6.	Dissolved Oxygen	4 (Min.)	mg/l	4.4
CHEMICAL CHARACTERISTICS				
7.	Total Hardness	1500	mg/l	284
8.	Calcium Hardness (as Ca)	200	mg/l	176
9.	Magnesium Hardness (as Mg)	100	mg/l	108
10.	Alkalinity	-----	mg/l	279
11.	Sulphates	400	mg/l	155
12.	Chlorides	600	mg/l	196
13.	Nitrates as NO_3	20	mg/l	13.4
14.	Fluoride as F	1.5	mg/l	0.82
15.	Sodium as Na	-----	mg/l	74
16.	BOD (5 days at 20 °C)	3	mg/l	3.6
17.	COD	-----	mg/l	15.4
18.	Residual chlorine	-----	mg/l	<0.01
19.	Cyanides as CN^-	0.05	mg/l	<0.01
20.	Phenols as C_6H_5OH	0.005	mg/l	Absent
21.	Hexavalent chromium as Cr	0.05	mg/l	<0.01
22.	Iron as Fe	50	mg/l	0.41
23.	Copper as Cu	1.5	mg/l	<0.01
24.	Arsenic as As	0.2	mg/l	<0.01
25.	Selenium	<0.01	mg/l	<0.01
26.	Cadmium as cd	<0.01	mg/l	<0.01
27.	Boron as B	<0.01	mg/l	<0.01
28.	Mercury as Mg	<0.01	mg/l	<0.001
29.	Lead as Pb	0.1	mg/l	<0.01
30.	Silica as SiO_2	----	mg/l	3.6
31.	Mineral oil	<0.01	mg/l	<0.01
32.	Total coliforms	500	(MPN/100 ml)	343

3.4.2 INTERPRETATION OF SURFACE WATER ANALYSIS

The following are the analytical values (Minimum & Maximum values among all the stations) of the surface water samples collected for the following parameters:

Table No. 3.4.4: Range of concentration values for Surface Water Analysis

S.No.	Parameter	:	Range of Concentration
1.	pH	:	7.4 to 8.1
2.	DO (in mg/l)	:	4.4 to 5.9
3.	BOD (in mg/l)	:	2.2 to 3.6
4.	COD (in mg/l)	:	10.5 to 15.4
5.	TDS (in mg/l)	:	268 to 413
6.	Sulphates (in mg/l)	:	92 to 155
7.	Chlorides (in mg/l)	:	136 to 196

All the parameters in the water samples collected are in confirmity with BIS: 2296

3.4.3 GROUND WATER QUALITY ANALYSIS [Std. TOR # 6 (vi) & Spec. ToR # 18]

The ground water samples have been collected and analyzed for various parameters like pH, Suspended Solids, Total Dissolved Solids, Temperature, Total Hardness, Calcium Hardness, Magnesium hardness, Alkalinity, Fluoride, Chloride, Sulphates, Nitrates, Phenolic compounds, Heavy metals etc. and is compared with the standards to know the water quality. Selection of sampling locations will be generally done based on the following factors:

- Representation of project site.
- Topography
- Industrial Areas
- Residential areas
- Agricultural Activity

Eight (8) numbers of ground water samples from were collected from the near by villages to assess ground water quality impacts. The ground water sampling locations and their distances from the existing plant are shown in Table No. 3.4.5. These water samples are analyzed for various parameters as per IS: 10500. The ground water characteristics were shown in Table Nos. 3.4.6 to 3.4.13. The Ground water sampling stations are shown in Figure No. 3.4.

TABLE No. 3.4.5 : GROUND WATER QUALITY SAMPLING STATIONS

S.No.	STATION	DIRECTION w.r.t site	DISTANCE w.r.t site (in Kms.)	CRITERIA FOR SELECTION
1.	Existing Plant	--	--	Borewell sample representing the project site & Industrial Activity.
2.	Jemua	SWW	0.3	Sample representing nearby Habitation / Residential area.
3.	Mejia	E	1.0	Borewell sample representing Residential area.
4.	Ardhagram	N	1.6	Borewell sample representing Mining activity
5.	Ballavpur	NE	3.3	Borewell sample representing Industrial Activity.
6.	Lalkhuri	S	0.6	Borewell sample Residential area & also based on Topography (downstream)
7.	Raniganj	N	3.6	Borewell sample representing, densely populated Residential area, commercial area & near to industrial activity.
8.	Pebra Gram	SW	7.1	Borewell sample collected from Habitation based on Topography (Upstream)

The Groundwater sample analysis indicates that all physical, Chemical & Bacteriological parameters of all the samples collected are within the Potable water standards as per BIS-10500 standards.

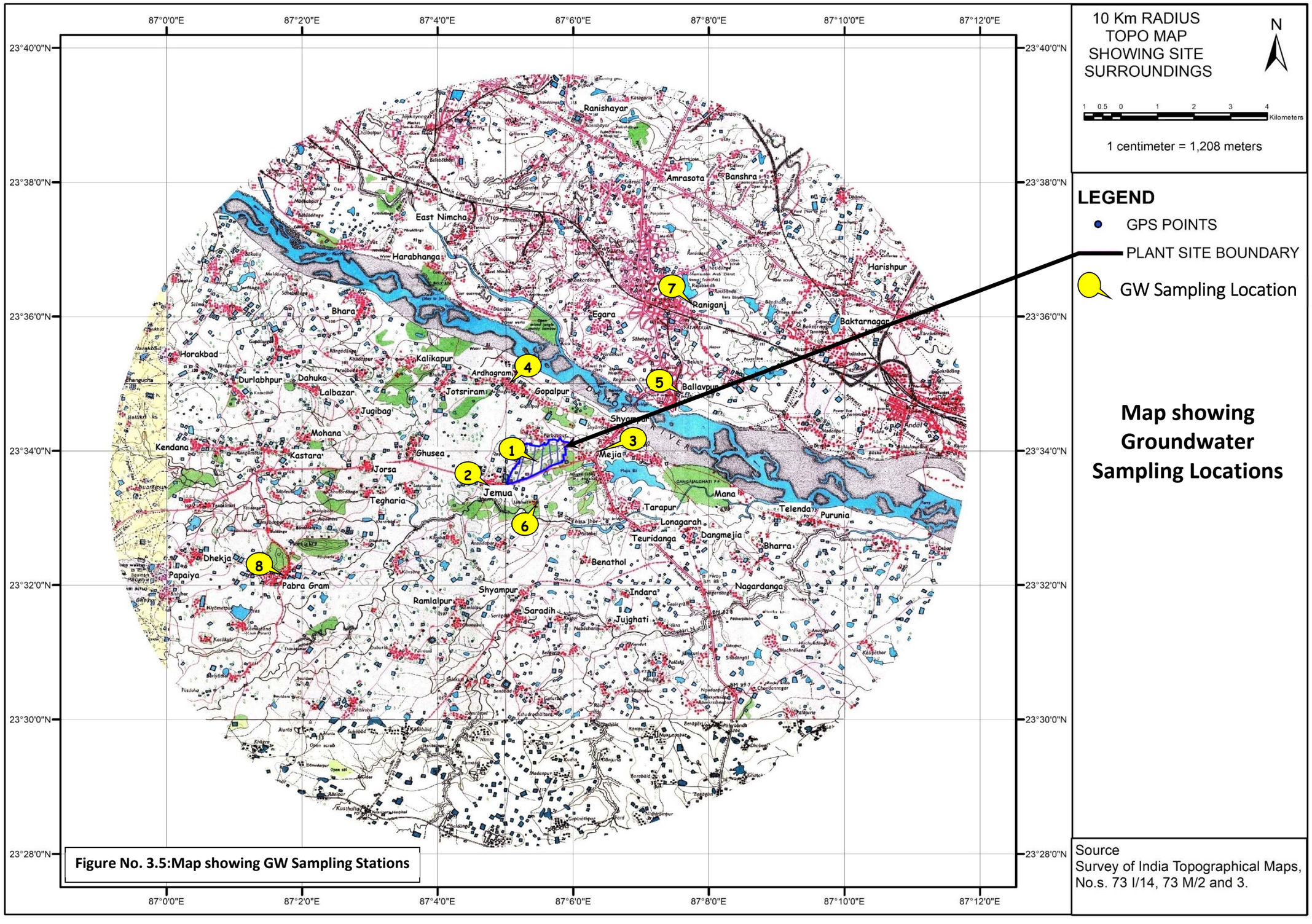


Figure No. 3.5:Map showing GW Sampling Stations

TABLE No. 3.4.6 : GROUND WATER QUALITY ANALYSIS (Plant Site)

Sampling Location: Existing Plant				**Month:** March 2021
S.No.	**PARAMETER**	**Standard as per IS: 10500 Desirable limit (Permissible limit)**	**UNIT**	**SAMPLE**
	PHYSICAL CHARACTERISTICS			
1	Colour	5 (25)	Hazen	< 5
2	Odour	U/O	---	U/O
3	pH	6.5 – 8.5	---	7.6
4	Turbidity	5 (10)	NTU	0.9
5	Total Suspended solids	---	---	0.36
6	Electrical Conductivity	Limit not specified	ms/cm	723
7	Total Dissolved Solids	500 (2000)	mg/l	433
	CHEMICAL CHARACTERISTICS			
8	Total Hardness	300 (600)	mg/l	157
9	Calcium Hardness	75 (200 as Ca)	mg/l	97
10	Magnesium Hardness	30 (100 as Mg)	mg/l	60
11	Alkalinity	200 (600)	mg/l	189
12	Sulphates	200 (400)	mg/l	158
13	Chlorides	250 (1000)	mg/l	210
14	Nitrates as NO_3	45 (45)	mg/l	2.3
15	Fluoride as F	1.0/1.5	mg/l	0.73
16	Sodium as Na	Limit not specified	mg/l	31
17	Residual chlorine	0.2	mg/l	<0.01
18	Cyanides as CN^-	0.05 (0.05)	mg/l	<0.01
19	Phenols as C_6H_5OH	0.001 (0.002)	mg/l	Absent
20	Total chromium as Cr	0.05 (0.05)	mg/l	<0.01
21	Iron as Fe	0.3 (1.0)	mg/l	0.33
22	Copper as Cu	0.05 (1.5)	mg/l	<0.01
23	Arsenic as As	0.01 (0.01)	mg/l	<0.01
24	Selenium as Se	0.01 (0.01)	mg/l	<0.01
25	Cadmium as cd	0.01 (0.01)	mg/l	<0.01
26	Boron as B	1.0 (5.0)	mg/l	<0.01
27	Mercury as Hg	0.001 (0.001)	mg/l	<0.001
28	Lead as Pb	0.05 (0.05)	mg/l	<0.01
29	Silica as SiO_2	---	mg/l	0.6
30	Manganese as Mn	0.1 (0.3)	mg/l	<0.01
31	Anionic detergents as MBAS	0.2 (1.0)	mg/l	<0.01
32	Total coliforms	10 (-)	(MPN/100 ml)	Absent

U/O – Unobjectionable

TABLE No. 3.4.7 : GROUND WATER QUALITY ANALYSIS (Jemua)

Sampling Location: Jemua				**Month:** March 2021
S.NO.	**PARAMETER**	**Standard as per IS: 10500 Desirable limit (Permissible limit)**	**UNIT**	**SAMPLE**
	PHYSICAL CHARACTERISTICS			
1	Colour	5 (25)	Hazen	< 5
2	Odour	U/O	---	U/O
3	pH	6.5 – 8.5	---	7.7
4	Turbidity	5 (10)	NTU	1
5	Total Suspended solids	---	---	0.40
6	Electrical Conductivity	Limit not specified	ms/cm	823
7	Total Dissolved Solids	500 (2000)	mg/l	493
	CHEMICAL CHARACTERISTICS			
8	Total Hardness	300 (600)	mg/l	177
9	Calcium Hardness	75 (200 as Ca)	mg/l	110
10	Magnesium Hardness	30 (100 as Mg)	mg/l	67
11	Alkalinity	200 (600)	mg/l	158
12	Sulphates	200 (400)	mg/l	178
13	Chlorides	250 (1000)	mg/l	241
14	Nitrates as NO_3	45 (45)	mg/l	3.5
15	Fluoride as F	1.0/1.5	mg/l	0.69
16	Sodium as Na	Limit not specified	mg/l	58
17	Residual chlorine	0.2	mg/l	<0.01
18	Cyanides as CN^-	0.05 (0.05)	mg/l	<0.01
19	Phenols as C_6H_5OH	0.001 (0.002)	mg/l	Absent
20	Total chromium as Cr	0.05 (0.05)	mg/l	<0.01
21	Iron as Fe	0.3 (1.0)	mg/l	0.32
22	Copper as Cu	0.05 (1.5)	mg/l	<0.01
23	Arsenic as As	0.01 (0.01)	mg/l	<0.01
24	Selenium as Se	0.01 (0.01)	mg/l	<0.01
25	Cadmium as cd	0.01 (0.01)	mg/l	<0.01
26	Boron as B	1.0 (5.0)	mg/l	<0.01
27	Mercury as Hg	0.001 (0.001)	mg/l	<0.001
28	Lead as Pb	0.05 (0.05)	mg/l	<0.01
29	Silica as SiO_2	---	mg/l	1.2
30	Manganese as Mn	0.1 (0.3)	mg/l	<0.01
31	Anionic detergents as MBAS	0.2 (1.0)	mg/l	<0.01
32	Total coliforms	10 (-)	(MPN/100 ml)	Absent

U/O – Unobjectionable

TABLE No. 3.4.8 : GROUND WATER QUALITY ANALYSIS (Mejia)

Sampling Location: Mejia				**Month:** March 2021
S.NO.	**PARAMETER**	**Standard as per IS: 10500 Desirable limit (Permissible limit)**	**UNIT**	**SAMPLE**
	PHYSICAL CHARACTERISTICS			
1	Colour	5 (25)	Hazen	< 5
2	Odour	U/O	---	U/O
3	pH	6.5 – 8.5	---	7.3
4	Turbidity	5 (10)	NTU	1.2
5	Total Suspended solids	---	---	0.48
6	Electrical Conductivity	Limit not specified	ms/cm	845
7	Total Dissolved Solids	500 (2000)	mg/l	506
	CHEMICAL CHARACTERISTICS			
8	Total Hardness	300 (600)	mg/l	146
9	Calcium Hardness	75 (200 as Ca)	mg/l	91
10	Magnesium Hardness	30 (100 as Mg)	mg/l	55
11	Alkalinity	200 (600)	mg/l	167
12	Sulphates	200 (400)	mg/l	194
13	Chlorides	250 (1000)	mg/l	236
14	Nitrates as NO_3	45 (45)	mg/l	2.4
15	Fluoride as F	1.0/1.5	mg/l	0.55
16	Sodium as Na	Limit not specified	mg/l	46
17	Residual chlorine	0.2	mg/l	<0.01
18	Cyanides as CN^-	0.05 (0.05)	mg/l	<0.01
19	Phenols as C_6H_5OH	0.001 (0.002)	mg/l	Absent
20	Total chromium as Cr	0.05 (0.05)	mg/l	<0.01
21	Iron as Fe	0.3 (1.0)	mg/l	0.27
22	Copper as Cu	0.05 (1.5)	mg/l	<0.01
23	Arsenic as As	0.01 (0.01)	mg/l	<0.01
24	Selenium as Se	0.01 (0.01)	mg/l	<0.01
25	Cadmium as cd	0.01 (0.01)	mg/l	<0.01
26	Boron as B	1.0 (5.0)	mg/l	<0.01
27	Mercury as Hg	0.001 (0.001)	mg/l	<0.001
28	Lead as Pb	0.05 (0.05)	mg/l	<0.01
29	Silica as SiO_2	---	mg/l	0.8
30	Manganese as Mn	0.1 (0.3)	mg/l	<0.01
31	Anionic detergents as MBAS	0.2 (1.0)	mg/l	<0.01
32	Total coliforms	10 (-)	(MPN/100 ml)	Absent

U/O – Unobjectionable

TABLE No. 3.4.9 : GROUND WATER QUALITY ANALYSIS (Ardhagram)

Sampling Location: Ardhagram				**Month:** March 2021
S.NO.	**PARAMETER**	**Standard as per IS: 10500 Desirable limit (Permissible limit)**	**UNIT**	**SAMPLE**
	PHYSICAL CHARACTERISTICS			
1	Colour	5 (25)	Hazen	< 5
2	Odour	U/O	---	U/O
3	pH	6.5 – 8.5	---	7.2
4	Turbidity	5 (10)	NTU	0.8
5	Total Suspended solids	---	---	0.32
6	Electrical Conductivity	Limit not specified	ms/cm	923
7	Total Dissolved Solids	500 (2000)	mg/l	553
	CHEMICAL CHARACTERISTICS			
8	Total Hardness	300 (600)	mg/l	224
9	Calcium Hardness	75 (200 as Ca)	mg/l	139
10	Magnesium Hardness	30 (100 as Mg)	mg/l	85
11	Alkalinity	200 (600)	mg/l	171
12	Sulphates	200 (400)	mg/l	212
13	Chlorides	250 (1000)	mg/l	258
14	Nitrates as NO_3	45 (45)	mg/l	3.1
15	Fluoride as F	1.0/1.5	mg/l	0.78
16	Sodium as Na	Limit not specified	mg/l	56
17	Residual chlorine	0.2	mg/l	<0.01
18	Cyanides as CN^-	0.05 (0.05)	mg/l	<0.01
19	Phenols as C_6H_5OH	0.001 (0.002)	mg/l	Absent
20	Total chromium as Cr	0.05 (0.05)	mg/l	<0.001
21	Iron as Fe	0.3 (1.0)	mg/l	0.19
22	Copper as Cu	0.05 (1.5)	mg/l	<0.01
23	Arsenic as As	0.01 (0.01)	mg/l	<0.01
24	Selenium as Se	0.01 (0.01)	mg/l	<0.01
25	Cadmium as cd	0.01 (0.01)	mg/l	<0.01
26	Boron as B	1.0 (5.0)	mg/l	<0.01
27	Mercury as Hg	0.001 (0.001)	mg/l	<0.001
28	Lead as Pb	0.05 (0.05)	mg/l	<0.01
29	Silica as SiO_2	---	mg/l	0.7
30	Manganese as Mn	0.1 (0.3)	mg/l	<0.01
31	Anionic detergents as MBAS	0.2 (1.0)	mg/l	<0.01
32	Total coliforms	10 (-)	(MPN/100 ml)	Absent

U/O – Unobjectionable

TABLE No. 3.4.10: GROUND WATER QUALITY ANALYSIS (Ballavpur)

Sampling Location: Ballavpur				**Month:** March 2021
S.NO.	**PARAMETER**	**Standard as per IS: 10500 Desirable limit (Permissible limit)**	**UNIT**	**SAMPLE**
	PHYSICAL CHARACTERISTICS			
1	Colour	5 (25)	Hazen	< 5
2	Odour	U/O	---	U/O
3	pH	6.5 – 8.5	---	7
4	Turbidity	5 (10)	NTU	1.1
5	Total Suspended solids	---	---	0.44
6	Electrical Conductivity	Limit not specified	ms/cm	819
7	Total Dissolved Solids	500 (2000)	mg/l	491
	CHEMICAL CHARACTERISTICS			
8	Total Hardness	300 (600)	mg/l	255
9	Calcium Hardness	75 (200 as Ca)	mg/l	158
10	Magnesium Hardness	30 (100 as Mg)	mg/l	97
11	Alkalinity	200 (600)	mg/l	133
12	Sulphates	200 (400)	mg/l	188
13	Chlorides	250 (1000)	mg/l	229
14	Nitrates as NO_3	45 (45)	mg/l	4.9
15	Fluoride as F	1.0/1.5	mg/l	0.65
16	Sodium as Na	Limit not specified	mg/l	62
17	Residual chlorine	0.2	mg/l	<0.01
18	Cyanides as CN^-	0.05 (0.05)	mg/l	<0.01
19	Phenols as C_6H_5OH	0.001 (0.002)	mg/l	Absent
20	Total chromium as Cr	0.05 (0.05)	mg/l	<0.001
21	Iron as Fe	0.3 (1.0)	mg/l	0.22
22	Copper as Cu	0.05 (1.5)	mg/l	<0.01
23	Arsenic as As	0.01 (0.01)	mg/l	<0.01
24	Selenium as Se	0.01 (0.01)	mg/l	<0.01
25	Cadmium as cd	0.01 (0.01)	mg/l	<0.01
26	Boron as B	1.0 (5.0)	mg/l	<0.01
27	Mercury as Hg	0.001 (0.001)	mg/l	<0.001
28	Lead as Pb	0.05 (0.05)	mg/l	<0.01
29	Silica as SiO_2	---	mg/l	1.5
30	Manganese as Mn	0.1 (0.3)	mg/l	<0.01
31	Anionic detergents as MBAS	0.2 (1.0)	mg/l	<0.01
32	Total coliforms	10 (-)	(MPN/100 ml)	Absent

U/O – Unobjectionable

TABLE No. 3.4.11 : GROUND WATER QUALITY ANALYSIS (Lalkhuri)

Sampling Location: Lalkhuri				**Month:** March 2021
S.NO.	**PARAMETER**	**Standard as per IS: 10500 Desirable limit (Permissible limit)**	**UNIT**	**SAMPLE**
	PHYSICAL CHARACTERISTICS			
1	Colour	5 (25)	Hazen	< 5
2	Odour	U/O	---	U/O
3	pH	6.5 – 8.5	---	7.4
4	Turbidity	5 (10)	NTU	0.9
5	Total Suspended solids	---	---	0.36
6	Electrical Conductivity	Limit not specified	ms/cm	951
7	Total Dissolved Solids	500 (2000)	mg/l	569
	CHEMICAL CHARACTERISTICS			
8	Total Hardness	300 (600)	mg/l	192
9	Calcium Hardness	75 (200 as Ca)	mg/l	119
10	Magnesium Hardness	30 (100 as Mg)	mg/l	73
11	Alkalinity	200 (600)	mg/l	182
12	Sulphates	200 (400)	mg/l	196
13	Chlorides	250 (1000)	mg/l	288
14	Nitrates as NO_3	45 (45)	mg/l	2.2
15	Fluoride as F	1.0/1.5	mg/l	0.51
16	Sodium as Na	Limit not specified	mg/l	48
17	Residual chlorine	0.2	mg/l	<0.01
18	Cyanides as CN^-	0.05 (0.05)	mg/l	<0.01
19	Phenols as C_6H_5OH	0.001 (0.002)	mg/l	Absent
20	Total chromium as Cr	0.05 (0.05)	mg/l	<0.001
21	Iron as Fe	0.3 (1.0)	mg/l	0.3
22	Copper as Cu	0.05 (1.5)	mg/l	<0.01
23	Arsenic as As	0.01 (0.01)	mg/l	<0.01
24	Selenium as Se	0.01 (0.01)	mg/l	<0.01
25	Cadmium as cd	0.01 (0.01)	mg/l	<0.01
26	Boron as B	1.0 (5.0)	mg/l	<0.01
27	Mercury as Hg	0.001 (0.001)	mg/l	<0.001
28	Lead as Pb	0.05 (0.05)	mg/l	<0.01
29	Silica as SiO_2	---	mg/l	0.9
30	Manganese as Mn	0.1 (0.3)	mg/l	<0.01
31	Anionic detergents as MBAS	0.2 (1.0)	mg/l	<0.01
32	Total coliforms	10 (-)	(MPN/100 ml)	Absent

U/O – Unobjectionable

TABLE No. 3.4.12: GROUND WATER QUALITY ANALYSIS (Raniganj)

Sampling Location: Raniganj				**Month:** March 2021
S.NO.	**PARAMETER**	**Standard as per IS: 10500 Desirable limit (Permissible limit)**	**UNIT**	**SAMPLE**
	PHYSICAL CHARACTERISTICS			
1	Colour	5 (25)	Hazen	< 5
2	Odour	U/O	---	U/O
3	pH	6.5 – 8.5	---	7.8
4	Turbidity	5 (10)	NTU	1.6
5	Total Suspended solids	---	---	0.64
6	Electrical Conductivity	Limit not specified	ms/cm	886
7	Total Dissolved Solids	500 (2000)	mg/l	531
	CHEMICAL CHARACTERISTICS			
8	Total Hardness	300 (600)	mg/l	218
9	Calcium Hardness	75 (200 as Ca)	mg/l	135
10	Magnesium Hardness	30 (100 as Mg)	mg/l	83
11	Alkalinity	200 (600)	mg/l	193
12	Sulphates	200 (400)	mg/l	174
13	Chlorides	250 (1000)	mg/l	277
14	Nitrates as NO_3	45 (45)	mg/l	1.9
15	Fluoride as F	1.0/1.5	mg/l	0.7
16	Sodium as Na	Limit not specified	mg/l	59
17	Residual chlorine	0.2	mg/l	<0.01
18	Cyanides as CN^-	0.05 (0.05)	mg/l	<0.01
19	Phenols as C_6H_5OH	0.001 (0.002)	mg/l	Absent
20	Total chromium as Cr	0.05 (0.05)	mg/l	<0.01
21	Iron as Fe	0.3 (1.0)	mg/l	0.18
22	Copper as Cu	0.05 (1.5)	mg/l	<0.01
23	Arsenic as As	0.01 (0.01)	mg/l	<0.01
24	Selenium as Se	0.01 (0.01)	mg/l	<0.01
25	Cadmium as cd	0.01 (0.01)	mg/l	<0.01
26	Boron as B	1.0 (5.0)	mg/l	<0.01
27	Mercury as Hg	0.001 (0.001)	mg/l	<0.001
28	Lead as Pb	0.05 (0.05)	mg/l	<0.01
29	Silica as SiO_2	---	mg/l	1.2
30	Manganese as Mn	0.1 (0.3)	mg/l	<0.01
31	Anionic detergents as MBAS	0.2 (1.0)	mg/l	<0.01
32	Total coliforms	10 (-)	(MPN/100 ml)	Absent

U/O – Unobjectionable

TABLE No. 3.4.13 : GROUND WATER QUALITY ANALYSIS (Pebra Gram)

Sampling Location: Pebra Gram				**Month:** March 2021
S.NO.	**PARAMETER**	**Standard as per IS: 10500 Desirable limit (Permissible limit)**	**UNIT**	**SAMPLE**
	PHYSICAL CHARACTERISTICS			
1	Colour	5 (25)	Hazen	< 5
2	Odour	U/O	---	U/O
3	pH	6.5 – 8.5	---	7.4
4	Turbidity	5 (10)	NTU	1
5	Total Suspended solids	---	---	0.40
6	Electrical Conductivity	Limit not specified	ms/cm	1008
7	Total Dissolved Solids	500 (2000)	mg/l	604
	CHEMICAL CHARACTERISTICS			
8	Total Hardness	300 (600)	mg/l	177
9	Calcium Hardness	75 (200 as Ca)	mg/l	110
10	Magnesium Hardness	30 (100 as Mg)	mg/l	67
11	Alkalinity	200 (600)	mg/l	178
12	Sulphates	200 (400)	mg/l	225
13	Chlorides	250 (1000)	mg/l	288
14	Nitrates as NO_3	45 (45)	mg/l	5.2
15	Fluoride as F	1.0/1.5	mg/l	0.77
16	Sodium as Na	Limit not specified	mg/l	34
17	Residual chlorine	0.2	mg/l	<0.01
18	Cyanides as CN^-	0.05 (0.05)	mg/l	<0.01
19	Phenols as C_6H_5OH	0.001 (0.002)	mg/l	Absent
20	Total chromium as Cr	0.05 (0.05)	mg/l	<0.01
21	Iron as Fe	0.3 (1.0)	mg/l	0.21
22	Copper as Cu	0.05 (1.5)	mg/l	<0.01
23	Arsenic as As	0.01 (0.01)	mg/l	<0.01
24	Selenium as Se	0.01 (0.01)	mg/l	<0.01
25	Cadmium as cd	0.01 (0.01)	mg/l	<0.01
26	Boron as B	1.0 (5.0)	mg/l	<0.01
27	Mercury as Hg	0.001 (0.001)	mg/l	<0.001
28	Lead as Pb	0.05 (0.05)	mg/l	<0.01
29	Silica as SiO_2	---	mg/l	0.8
30	Manganese as Mn	0.1 (0.3)	mg/l	<0.01
31	Anionic detergents as MBAS	0.2 (1.0)	mg/l	<0.01
32	Total coliforms	10 (-)	(MPN/100 ml)	Absent

U/O – Unobjectionable

3.4.4 INTREPRETATION OF GROUND WATER QUALITY ANALYSIS

The following table depicts the analytical values of the Ground water samples collected for the following parameters:

Table No. 3.4.14: Interpretation of Ground Water Quality analysis

S.No.	Parameters	:	Concentration range
1.	pH	:	7.0 to 7.9
2.	TDS (in mg/l)	:	0.32 to 0.6
3.	TSS (in mg/l)	:	433 to 604
4.	Total Hardness (in mg/l)	:	146 to 255
5.	Chlorides (in mg/l)	:	210 to 288
6.	Fluoride (in mg/l)	:	0.51 to 0.78
7.	Iron (in mg/l)	:	0.18 to 0.33

The Groundwater sample analysis indicates that all physical, Chemical & Bacteriological parameters of all the samples collected are within the Potable water standards as per BIS-10500 standards.

3.5 LAND ENVIRONMENT

3.5.1 GEOLOGICAL & HYDROGEOLOGICAL STATUS OF THE AREA [Std.ToR # 4 (ix)]

The area has a gently undulating topography with elevation ranging from about 75m. to 90m. above the Mean Sea Level.

The Damodar River flowing easterly is the main drainage channel of the area. A small nala drains the whole area to the Damodar River. A part of the block in the South-east is covered by a marshy land (bill). A number of ponds and wells are scattered over the area. Abandoned inclines, pit and quarries also form other water sources. The High Flood Level in the area along the southern bank of the Damodar was recorded in 1978 as 78m above Mean Sea Level.

Bankura - the western-most district of West Bengal may be described having the most varied physiographic features. The district can be geologically divided in three categories according to the height of a total land area of 384496 hectors.

1. High hilly region / Hard rock area: The region consists of the areas like Saltora, Mejia, Khatra, Ranibandh, Gangajalghati etc. covering 176915 Ha. Most of this area does not have irrigation facility.
2. Uneven lands / Hard rock ring area: This consists of the areas like Bankura, Barjora,

Chatna, Onda, Simlapal, Taldangra, Raipur, Sarenga etc. It covers 150611 Ha.

3. Even alluvial lands / alluvial area: This type of land includes the areas like Bishnupur, Sonamukhi, Patrasayer, Indus, Joypur, Kotulpur etc. covering 56970 Ha.

The district of Bankura is included in the Bardhaman division of West Bengal. It is bounded on the north and a part of north-east by the district of Bardhaman from which it is separated by the natural barrier of the Damodar river.

High Hilly Region / Hard rock area: - The region consists of the areas like Saltora, Mejia, Khatra, Ranibandh, Gangajalghati etc. covering 176915 hec. Most of these parts don't have the irrigation facility and full of grits.

Ground water condition:

Ground-water in the district occurs both under water-table condition and confined condition. Ground-water in the near surface aquifers occur under water-table condition and in deep aquifers, under confined or sub-artesian condition in favorable terrain. The primary source of ground-water is rainfall, a part of which is lost as evaporation and transpiration and another part moves as surface run-off and remaining part percolates into the ground from direct rainfall or by lateral infiltration from surface water-bodies to form saturated ground-water zone.

In the western sector comprising mainly crystalline rock ground-water occurs in the weathered mantle of varying thickness from 6m to 15 m under water-table condition. As the water-bearing formations are discontinuous and at places ground-water is held under pressure in the fractured conduits, some water is also retained in the thin cover of soil and alluvium mantling the stream channel. The blocks of Bankura-I, Chhatna, Saltora, Gangajalghati, Ranibandh, Khatra, Hirbandh and Indpur fall under this sector.

In the middle sector covered by laterite and older alluvium, ground-water occurs in the moderately thick to thin acquifer under unconfined to semi-confined condition. In this region, the ground-water is mainly abstracted through open dugwell with limited number of low-duty tubewells. The yield of such low-duty tubewells (75 mts. to 100 mts. depth) varies from 20 to 25 cubic metre / hour. One-cusec medium-duty production tubewells are also feasible in specific location within the depth of 150 mts. BGL. The complete or part

of the blocks of Bankura-ll, Mejia, Taldangra, Simlapal, Raipur & Sarenga fall under this sector.

In the eastern alluvial area as in Indus, Kotalpur and Joypur Blocks ground-water occurs under confined condition below a blanket of clay whose thickness varies around 10 mts. Medium-duty tubewells are also feasible at Bishnupur, Joypur, Kotalpur, Sonamukhi,

Patrasayar, Indus and part of Barjora and Onda blocks where several saturated granular zones are likely to occur in the depth span of 40 mts. to 200 mts. BGL discharging 90 to 180 cubic metre / hour.

Formation	District	Findings	Remarks/ Recommendations
Consolidated / Semi-consolidated / Hard Crystalline rocks	Bankura, Barddhaman	Ground water occurs in : i) Weathered residuum within 10mbgl. ii) Fractures within 65mbgl having discharge within 20 m^3/hr.	In this water scarce area, topographic lows, zone of intersection of regionally extended joints & fractures (to be identified by resistivity survey) are the suitable locales for ground water development through dug and dug-cum-bore wells.

Source: Central ground water board

Change of Water Level:

In Bankura-I block, the water-level declines during pre-monsoon from 1 m. to 2 m. and, to some extents, maintains the post-monsoon level. The average water-level during pre-monsoon is 6.20 mts. and post-monsoon is 4.50 m. In Bankura-ll, the water-level also declined during pre-monsoon from 1.5 m. to 2.5 m. and rises to some extent during post-monsoon period. The average water level during pre-monsoon is 6 m. and post-monsoon 4.65 m. At Chhatna block, the water level decreases from 2 m. to 3 m. during peak summer and rises to some extent during post monsoon period from 1 m. to 1.5 m. The average water-level is 7.26 m. during peak summer and 5.15 m. during post-monsoon. At Saltora block, the condition remains the same as above. Water-level declines upto 2.5 m. to 3 m. during peak summer and rises upto 1 m. during post monsoon. The average water-level is 6.65 m. in peak summer and 4.80 m. during post-monsoon. At Barjora block, the water-level condition is somewhat good. The average water level from the last five years is 5.95 m. during summer and during post-monsoon the water level is 2.15 m. The infiltration rate is good nearly from 10 to 15 percent. Pre-monsoon average 7.40 m, post monsoon being 4.25 m. In Sonamukhi

block, the water-level during pre-monsoon is 1.82 m (average) and 1.48 m during post-monsoon period. Water-level condition has not changed much. At proposed project area i.e., Mejia and Gangajalghati, Indpur, Khatra, Ranibandh, it is seen that water level decreases upto 2 m in peak summer and rises upto 1 m. during rainy season. The reason is due to less infiltration by virtue of being hard rock disposition. Average pre-monsoon water level is 8.20 m, post-monsoon water-level is 5.50 mts.

Source: CGWB

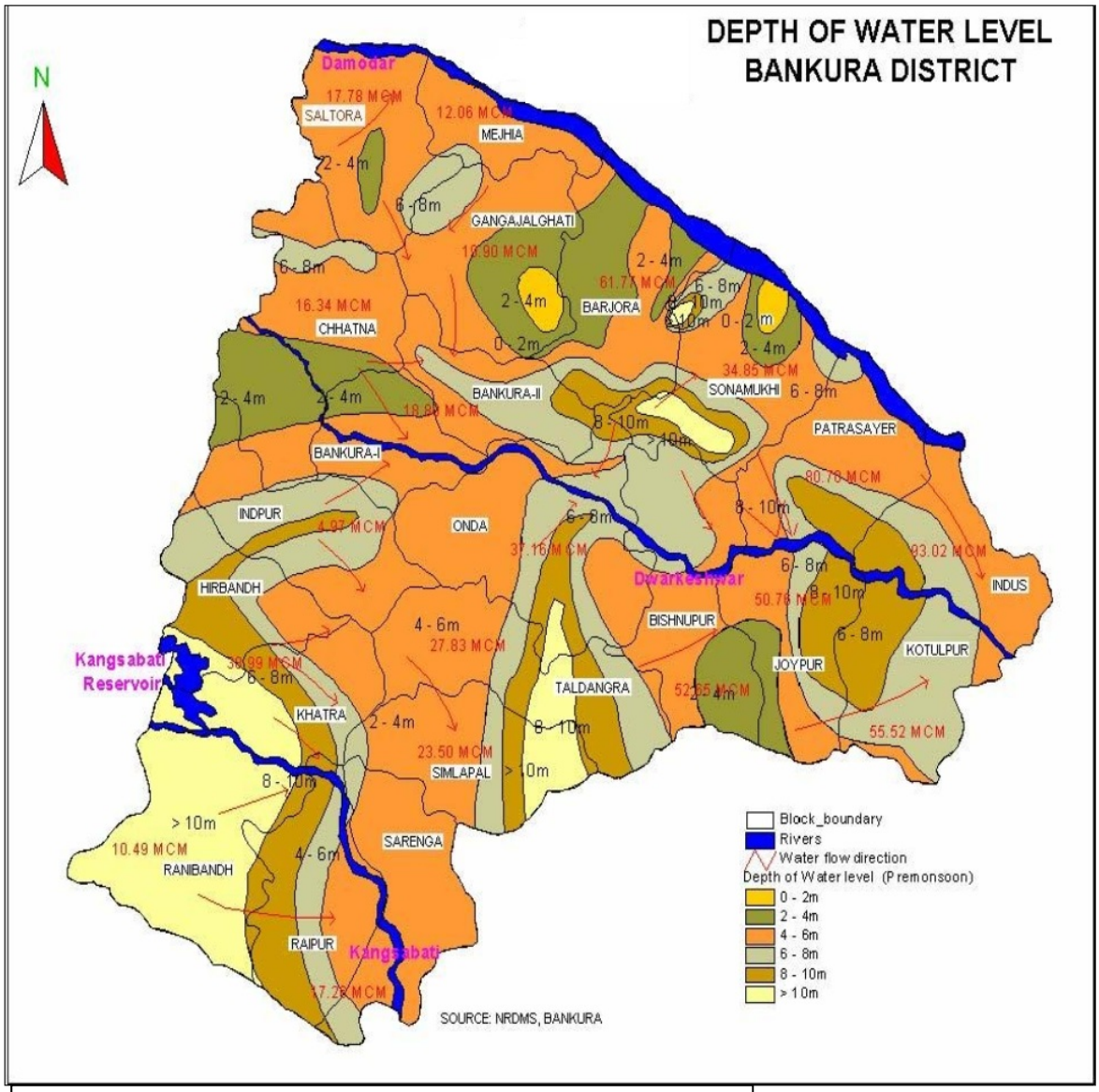


Figure No. 3.6: Depth of Water level in Bankura District

DRAINAGE PATTERN:

The Damodar River flowing easterly is the main drainage channel of the area. A small nala drains the whole area to the Damodar River. Map showing Drainage pattern of the Study area in 5 Km. radius is shown as **Figure No.: 3.7.**

3.5.2 MINERAL RESERVES

There few Coal mineral reserves are present near Damalia, Harabhanga, Amritnagar in the study area.

3.5.3 SEISMIC EFFECT

The plant site falls in zone- III of Seismic Zone classification of India.

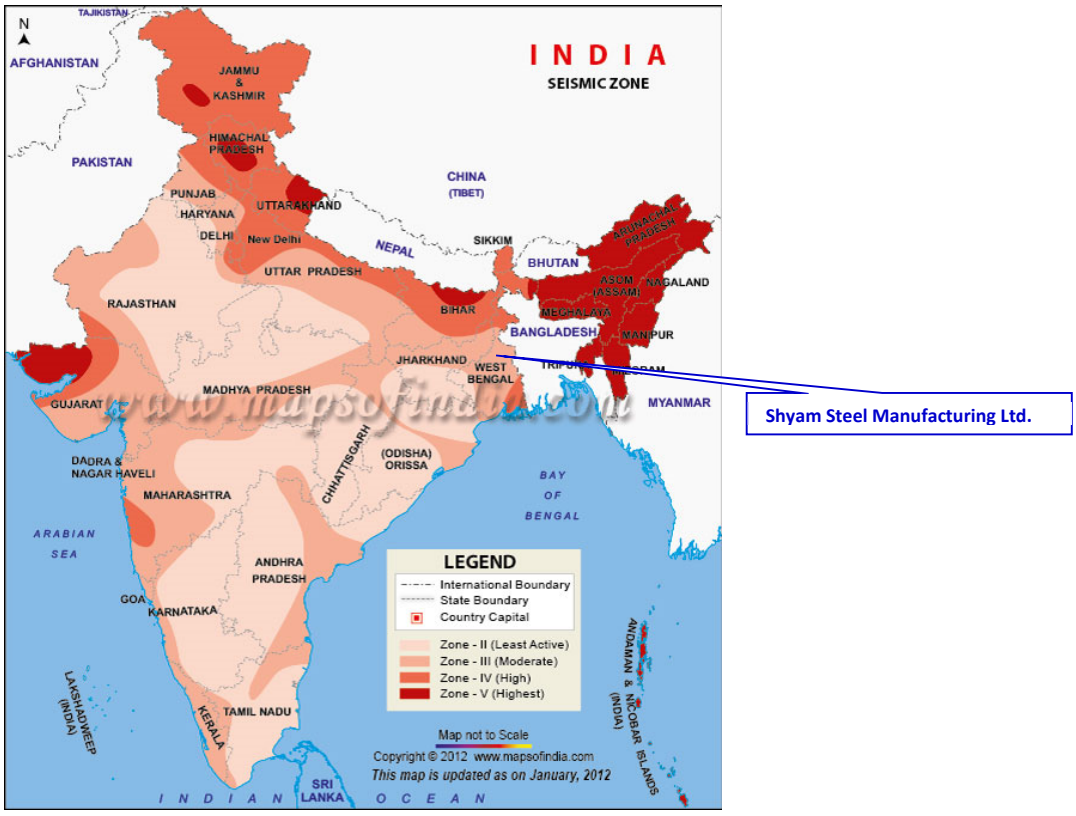


Figure No. 3.7 Seismic Zone classification of India

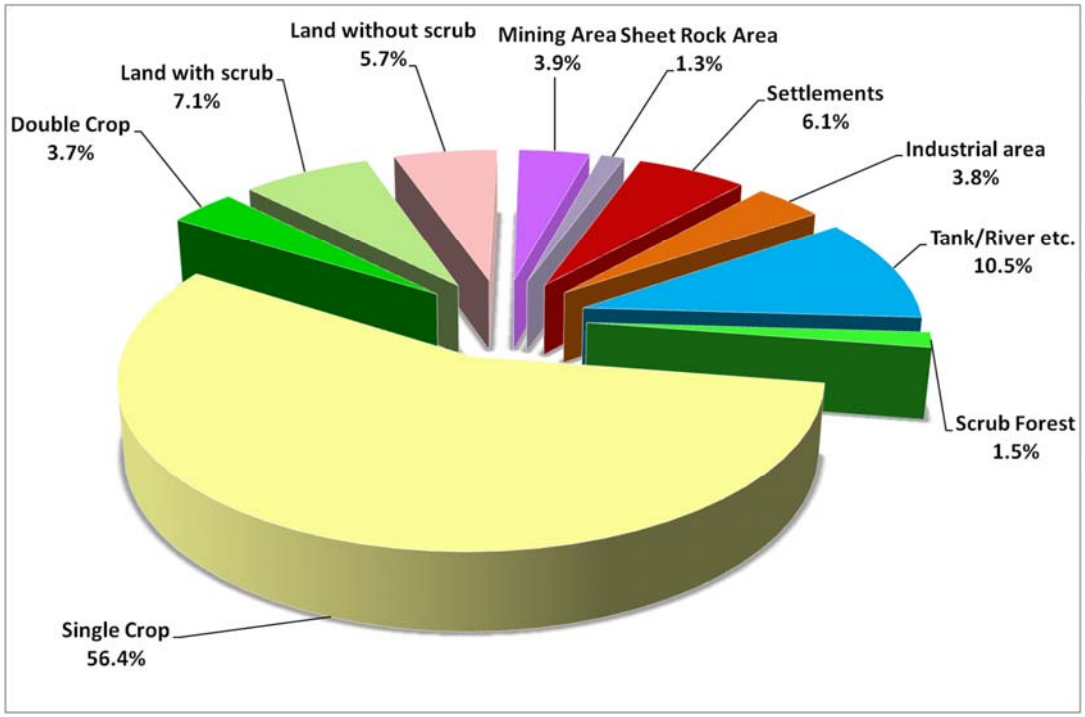
3.5.4 LAND USE PATTERN [Std. ToR # 4 (viii)]

The following is the land use pattern within 10 Km radius of the project site. LULC map & Satellite Imagery are shown as Figure No. 3.8 & 3.9.

Table No. 3.5.1 : Land Use and Land Cover of the Study area

S.No.	LAND USE	Area in (Sq. km)	Area in %
1.	**BUILT-UP LAND**		
	A. Settlements	21.777	6.1
	B. Industrial area	13.566	3.8
2.	**WATERBODIES**		
	A. Tank/River etc.	37.485	10.5
2.	**FOREST**		
	A. Scrub forest	5.355	1.5
3.	**CROP LAND**		
	A. Single crop	201.348	56.4
	B. Double crop	13.209	3.7
4.	**WASTELANDS**		
	A. Land with scrub	25.347	7.1
	B. Land without scrub	20.349	5.7
	C. Mining area	13.923	3.9
	D. Sheet rock area	4.641	1.3
	TOTAL	**357**	**100**

Figure No. 3.8: BAR DIAGRAM SHOWING LAND USE & LAND COVER OF THE STUDY AREA



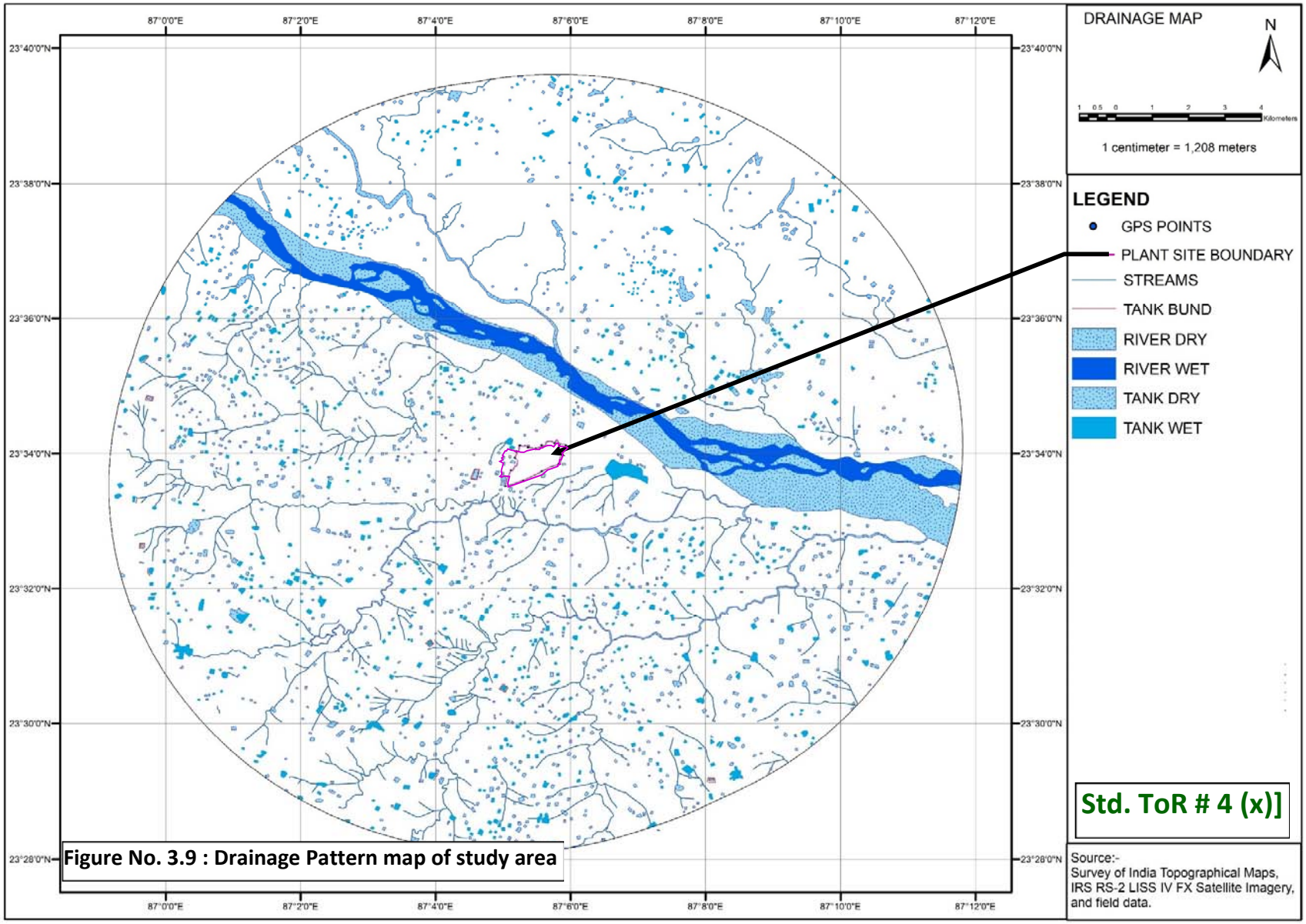


Figure No. 3.9 : Drainage Pattern map of study area

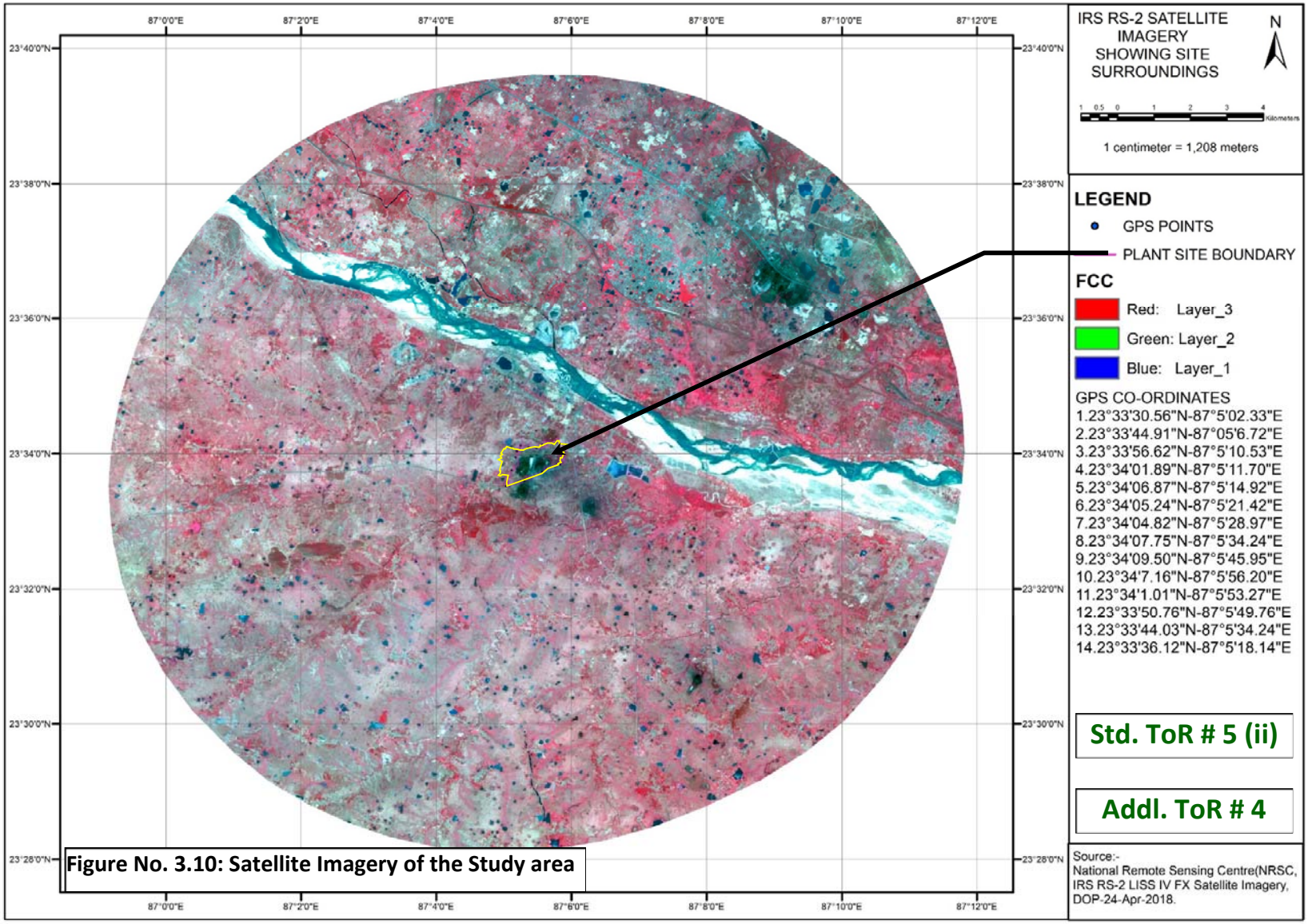


Figure No. 3.10: Satellite Imagery of the Study area

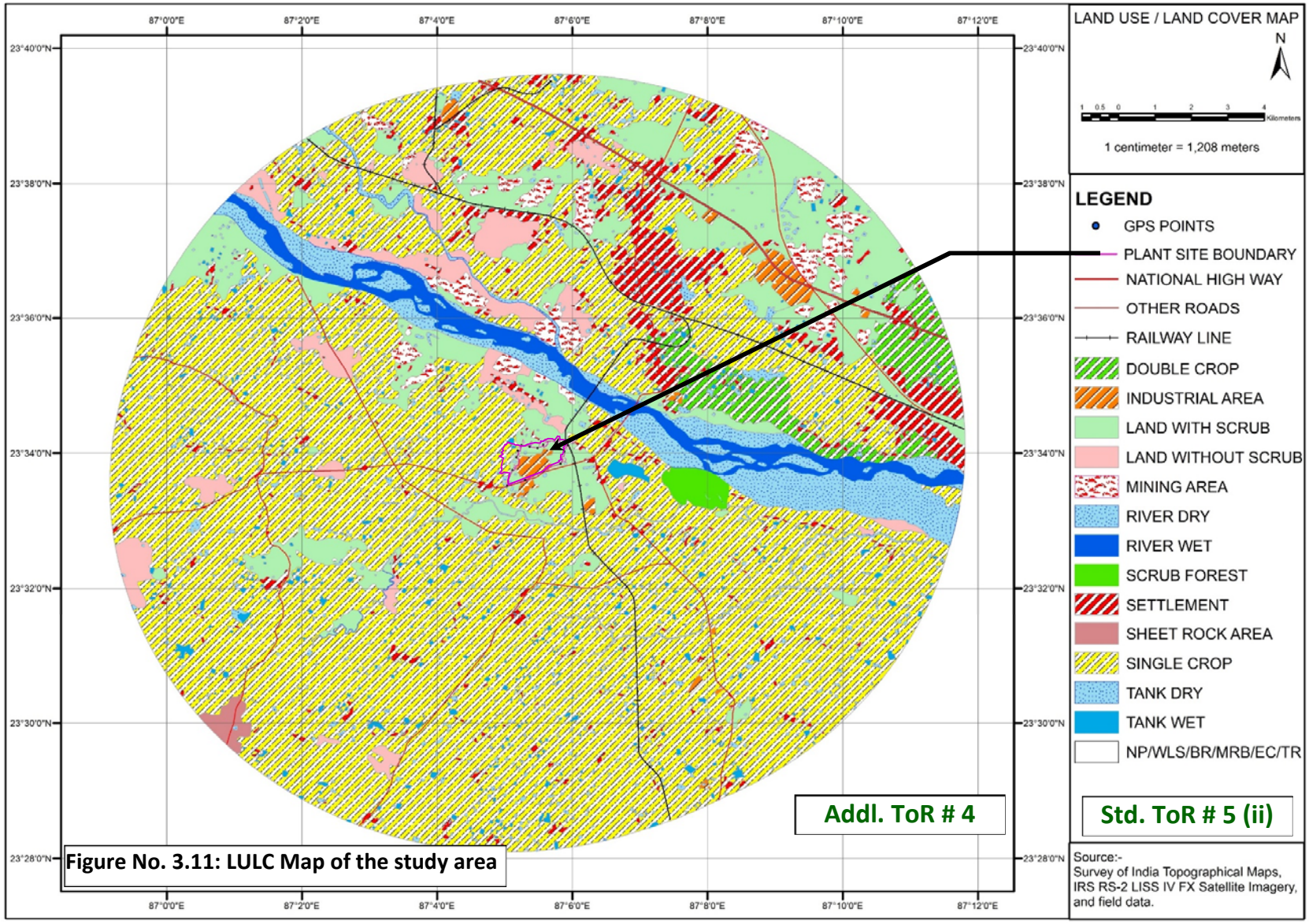


Figure No. 3.11: LULC Map of the study area

3.5.5 SOIL ENVIRONMENT [Std. TOR # 6 (viii)]

Eight (8) no. of soil samples were collected and for analyzed for various parameters like texture, infiltration rate, bulk density, pH, Ca, Nitrogen, Potash, Available Phosphorous as P_2O_5, Mn, Zn, Pb etc. The Soil samples are taken from depth of 15 to 90 cm will be collected. The Physio-chemical characteristics of soil were analyzed using standard methods.

Selection of sampling locations will be generally done based on the following factors:

- Representation of project site.
- Industrial Areas
- Residential areas
- Agricultural Activity
- Proximity to the Forest
- Proximity to Water body

The soil quality sampling locations and their distances from the project site are shown in Table No. 3.5.2. The soil characteristics are shown in Table No. 3.5.3. The soil quality sampling stations are shown in Figure No. 3.9.

TABLE No. 3.5.2 : SOIL QUALITY SAMPLING STATIONS

S.No.	SAMPLING STATION	DIRECTION w.r.t site	DISTANCE w.r.t site (in Kms.)	CRITERIA FOR SELECTION
1.	Existing Plant	--	--	Sample collected from the existing plant representing Industrial Activity.
2.	Jemua	SWW	0.3	Sample collected nearest Village representing Residential activity.
3.	Mejia	E	0.6	Sample collected from village representing Residential Activity.
4.	Ardhagram	N	1.6	Sample collected near Mining activity
5.	Mana	SE	4.7	Sample collected near to Gangajalghati PF & close to riverbed.
6.	Napur	NEE	5.0	Sample collected near Agricultural Activity
7.	Anandapur	S	1.4	Sample representing Agricultural activity
8.	Ghusea	W	2.7	Sample collected Residential area.

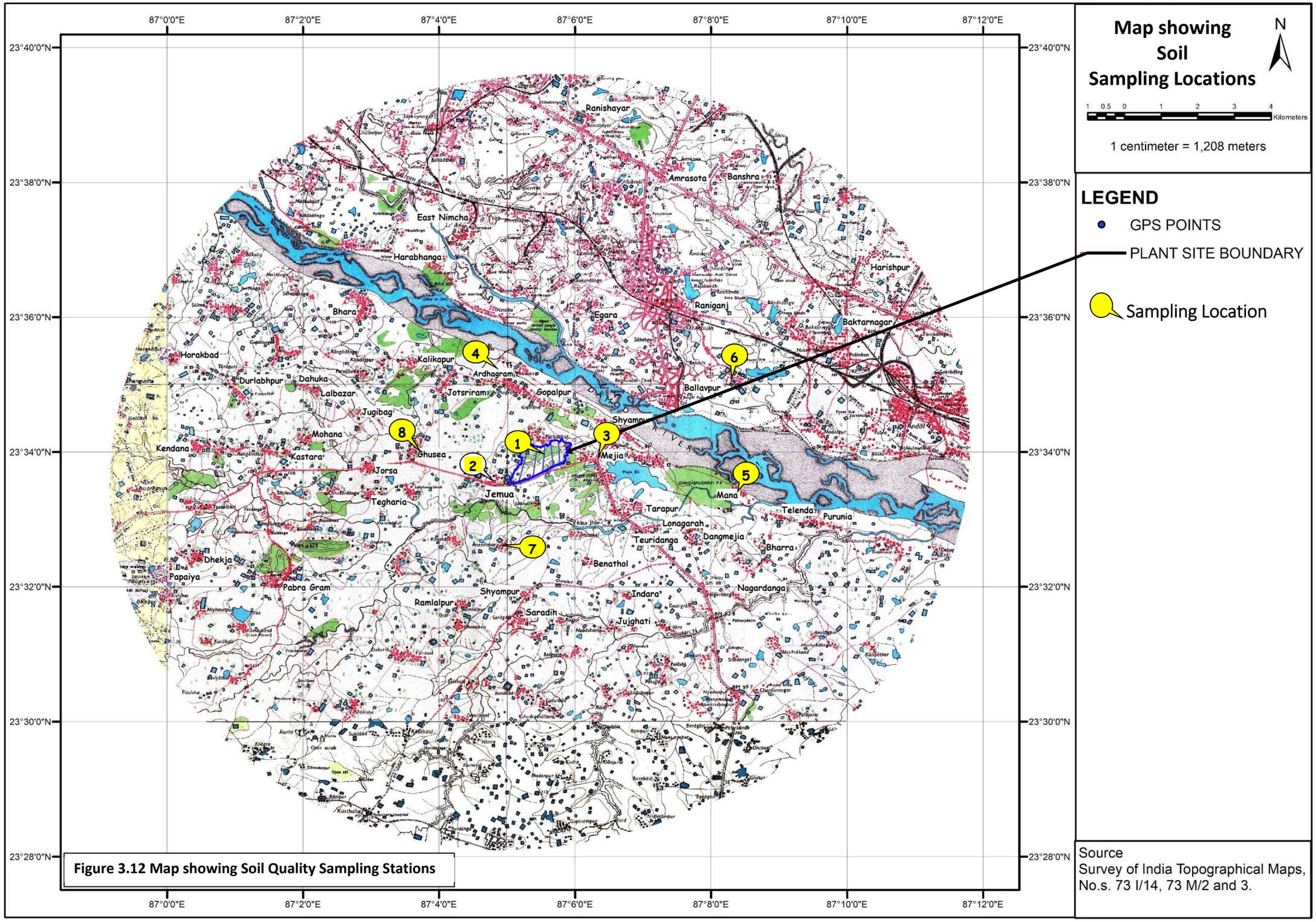


Figure 3.12 Map showing Soil Quality Sampling Stations

TABLE No. 3.5.3 : SOIL CHARACTERISTICS

Month: March 2021

S.No.	Parameter	Units	Sampling Locations							
			S1	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**
1.	Bulk Density	g/cc	1.3	1.2	1.4	1.5	1.6	1.9	1.5	1.6
2.	Infiltration rate	cm/sec	1.5	1.4	1.6	1.7	1.8	2.1	1.8	1.9
3.	pH	---	7.3	7.1	7.0	7.6	7.7	7.2	7.4	7.3
4.	Soil type	---	Clay Loam	Clay Loam	Clay Loam	Sandy Loam	Sandy Loam	Sandy Clay loam	Clay Loam	Sandy Loam
5.	Calcium	mg/100 gm	488	624	729	477	554	633	702	731
6.	Electrical Conductivity	µS/cm	114	135	177	158	144	182	182	146
7.	Nitrogen	Kg/Ha	359	388	281	393	251	426	311	328
8.	Available Phosphorous as P_2O_5	Kg/Ha	58	69	78	90	47	81	55	38
9.	Potash	Kg/Ha	218	174	152	234	338	205	166	292
10.	Mn	mg/100 gm	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.	Zn	mg/100 gm	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
12.	Pb	mg/100 gm	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

3.5.4: Soil Standard Classification

S.No.	Parameters	Classification
1.	pH	<4.5 extremely acidic 4.51 - 5.0 very strong acidic 5.01 - 5.5 strongly acidic 5.51-6.0 moderately acidic 6.1 - 6.5 slightly acidic 6.51 - 7.3 Neutral 7.31-7.8 slightly alkaline 7.81-8.5 moderately alkaline 8.51 – 9.0 strongly alkaline >9.0 Very strongly alkaline
2.	Nitrogen (Kg/ha)	Up to 50 very less 51-100 less 110-150 good 151-300 better >300 sufficient
3.	Phosphorus (Kg/ha)	Up to 15 very less 15 – 30 less 31-50 medium 51-65 on average sufficient 66-80 sufficient >80 more than sufficient
4.	Potassium (Kg/ha)	0 – 120 very less 120-180 less 180-240 medium 241-300 average 301-360 better >360 more than sufficient

3.5.6 INTERPRETATION OF SOIL QUALITY ANALYSIS

Samples collected from identified locations indicate pH value ranging from 7.0 to 7.7, which shows that the soil is neutral to moderately alkaline in nature. Soil texture is Sandy Clay loamy in the study area. Total nitrogen ranges from 251 to 426 kg/ha, indicates that nitrogen is present better quantity to sufficient quantity in the soil and Phosphorous is present in the range of 38 to 90 kg/ha which is medium quantity to more than sufficient quantity. Potassium is found to be ranging from 152 to 338 Kg/ha which is less quantity to better quantity. Hence, there is requirement to supplement Phosphorous & Potassium to the farmers in the area, so that soil fertility and accordingly agriculture yield will increase.

3.6 BIOLOGICAL ENVIRONMENT [Std. TOR # 6 (x)]

The Biological Environment study has been carried out as a part of the EIA study report to understand the present status of ecosystem prevailing in the study area and to study the floristic and fauna diversity of the terrestrial and aquatic environment of the study area within the 10 km radius of the plant site.

Data collection has been sourced from:

a) Primary source (i.e. Field study)

b) Secondary source (i.e. Local habitants, Literature, Internet, concern Govt. departments etc.)

All the collected data were classified to interpret the impact of emissions from the proposed project on the flora and fauna of the region. Survey of the wild plants as well as cultivated crop plants was made and all the available information was recorded.

3.6.1 OBJECTIVES OF THE STUDY

The present study was undertaken with the following objectives:

i. To assess the nature and distribution of vegetation in and around the project within the study area.

ii. To assess the biodiversity of natural system present in the study area.

iii. Details of flora and fauna, Endemic, Rare, Endangered and Threatened (RET Species) separately for core and buffer area based on such primary field survey and secondary secures and clearly indicating the Schedule of fauna present. In case of any scheduled -I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department.

iv. To study the likely impact of the proposed project on the Biological Environment and to suggest mitigation measure, if required.

3.6.2 METHODOLOGY OF THE FLORAL AND FAUNAL STUDY

Biological Environment Study was conducted in the month of March 2021 during Summer season by Dr. K. Bayapu Reddy (FAE – EB) & team to assess the list of terrestrial plant and animal species that occur in the core area and the buffer area up to 10 Km radius from proposed project site.

3.6.3 DESCRIPTION OF THE PROJECT SITE & STUDY AREA

Existing plant is located at J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal. **225.64 acres (91.34 Ha.)** of land is envisaged for the existing & proposed expansion project.

Out of the total area**, 81 acres (32.79 Ha.)** is earmarked for Greenbelt development. The land acquired for the proposed project is primarily an Land with scrub converted for Industrial purpose. It is more or less a plain land with a gentle slopes. Vegetation, flora and fauna of the project site and its surroundings up to a radius of 10 Km were studied. A survey of the flora and fauna of the project site and its environs up to a radius of 10 Km reveals the absence of thick forests but open scrub type communities were very common. There are no National Parks or Sanctuaries or Biosphere reserves or Reserved forests or any other protected or ecologically sensitive areas within a radius of 10 Km from the plant site. The plant site is surrounded by the Industrial Land, Scrublands, residential areas.

As per LULC of the study area, following is land use within 10 Km. radius:

Settlements – 6.1 %; Industrial Area – 3.8 %; Tank / River etc. – 10.5 %; Scrub Forest – 1.5 %; Single crop – 56.4 %; Double crop – 3.7 %; Land with scrub – 7.1 %; Land without scrub – 5.7 %; Mining area – 3.9 %; Sheet rock area – 1.3 %

3.6.4 DETAILS OF FLORA IN THE STUDY AREA

Vegetation and flora of the project site:

Detailed primary survey of the total land of **225.64 acres (91.34 Ha.)** earmarked for existing & expansion projects and its buffer zone was carried out during March 2021 by Prof.K.B.Reddy (FAE in EB&SC). The project site is considered as the core area. All the plants grown in the greenbelt, block plantations and avenue plantations in the 150 Acres of existing plant were enumerated. The additional land of **62.34 Acres (25.24 Ha.)** of is proposed to be used for expansion was also thoroughly surveyed.

All species of plants found in the **225.64 acres (91.34 Ha.)** site are listed. There are no ecologically sensitive areas such as the Biosphere Reserves, National Parks, Wildlife Sanctuaries or Migratory corridors of Tigers or Elephants, or Important Bird Areas (IBAs) or Wetlands of National Importance or any other protected areas including reserve forests

except the Gangajalghati Protected Forest at a distance of about 13 Km towards the east of the project site.

The land use of the additional **62.34 Acres (25.24 Ha.)** of land is going to change as it gets converted to industrial use. On account of construction, fabrication and erection of different units, few changes occur in the core area. Hence, due attention was paid to ensure every plant present in the core area is collected, identified and listed in Table No. 3.6.1.

But in case of the buffer zone, a total of 20 quadrats of 10m x 5m were taken at random using restricted randomization in such way that the number of samples (quadrats) from each type of vegetation are proportionate to the area under that particular vegetation. All the species found in the quadrats were listed. Most of the vacant areas without trees were heavily colonized by two notorious invasive weeds, namely *Saccharum spontaneum, Imperata cylindrica, Chromolaena odorata, Xanthium strumarium, Alternanthera sessilis* and many other weeds. Among the plants grown in the greenbelt and avenue plantations, *Acacia auriculiformis, Tectona grandis, Polyalthia longifolia, Azadirachta indica and Peltophorum pterocarpum* were fairly abundant and widespread. A list of all the plants found in the core area is given in Table No. 3.6.1.

Table No. 3.6.1: List of plants found in the existing steel plant site including the additiaonal area of 62.34 Acres (25.24 Ha.) envisaged for proposed expansion

Scientific name	Common / Local name	Family
Abrus precatorius	Kaincha	Fabaceae
Acacia auriculiformis	Australian Wattle	Mimosaceae
Acacia nilotica	Babul	Mimosaceae
Aibizia lebbeck	Siris	Mimosaceae
Ailanthus excelsa	Mahalimbo	Simaroubaceae
Alangium salvifolium	Hill sage tree	Alangiaceae
Albizia lebbeck	Siris	Mimosaceae
Alstonia scholaris	Saptaparni /Chhatiana	Apocynaceae
Alternanthera philoxeroides	Alligator weed	Solanaceae
Alternanthera sessilis	Sessile joyweed	Solanaceae
Anthocephalus indicus	Kadamb	Rubiaceae
Azadirachta indica	Neem	Meliaceae
Bauhinia purpurea	Kanchan	Caesalpiniaceae
Borassus flabellifer	Tal	Arecaceae
Bothriochloa pertusa	Indian couch grass	Poaceae
Butea monosperma	Palash / Dhak	Fabaceae

Calotropis gigantea	Arakha	Asclepiadaceae
Calotropis procera	Arakha	Asclepiadaceae
Caryota urens	Sarap(Calap)	Arecaceae
Cassia alata	Guajava	Caesalpiniaceae
Cassia fistula	Simaro	Caesalpiniaceae
Cassia occidentalis	Kasunda	Caesalpiniaceae
Cassia siamea	Chakhunda	Caesalpiniaceae
Cassia tora	Sickle Senna	Caesalpiniaceae
Cenchrus setigerus	Anjan	Poaceae
Chamaedorea seifrizii	Bamboo Palm	Arecaeae
Chloris barbata	Swollen finger grass	Poaceae
Chromolaena odorata	Siam weed	Asteraceae
Cissus quadrangularis	Veldt Grape	Vitaceae
Cocos nucifera	Coconut	Arecaceae
Colocasia esculenta	Taro	Araceae
Croton bonplandianus	Ban Tulsi	Euphorbiaceae
Cryptolepris buchanani	Milk wine	Periplocaceae
Cryptostegia grandiflora	Vishabudhi	Periplocaceae
Cynodon dactylon	Turf grass	Poaceae
Cyperus distans	Nut grass	Cyperaceae
Cyperus dubius	Sedge	Cyperaceae
Cyperus haspan	Flat sedge	Cyperaceae
Cyperus mitis	Nut sedge	Cyperaceae
Cyperus nutans	Sedge	Cyperaceae
Cyperus triceps	Sedge	Cyperaceae
Cyperus papyrus	Paper sedge	Cyperaceae
Cyperus rotundus	Nut grass	Cyperaceae
Dalbergia sisoo	Sishum	Caesalpiniaceae
Decalepis hamiltonii	Swallow root	Periplocaceae
Delonix regia	Gulmohar	Caesalpiniaceae
Dendrocalamus strictus	Bamboo	Poaceae
Dichanthium annulatum	Marvel grass	Poaceae
Duranta erecta	Duranta	Verbenaceae
Euphorbia nivulia	Sijhu	Euphorbiaceae
Ficus hispida	Hairy Fig	Moraceae
Fimbristylis dichotoma	Tall Fringe Rush	Cyperaceae
Fimbristylis miliacea	Ghueen	Cyperaceae
Gliricidia sepium	Mexican Lilac	Fabaceae
Grevillea robusta	Silver oak	Proteaceae
Hemidesmus indicus	Anantamul	Apocynaceae
Ichnocarpus frutescens	Black creeper	Apocynaceae
Imperata cylindrica	Darbha	Poaceae
Ipomoea carnea	Bush morning glory	Convolvulaceae
Jatropha curcas	Wild castor	Euphorbiaceae
Kyllinga nemoralis	White water sedge	Cyperaceae
Lantana camara	Nagabari	Verbenaceae

Lasiurus scindicus	Sewan grass	Poaceae
Leptadenia reticulata	Jivanti	Apocynaceae
Leucaena leucocephala	Subabul	Mimosaceae
Madhuca longifolia	Mahua	Sapotaceae
Mangifera indica	Amba / Mango	Anacardiaceae
Panicum maximum	Guinea grass	Poaceae
Parthenium hysterophorus	Congress grass	Asteraceae
Peltophorum pterocarpum	Copper pod	Caesalpiniaceae
Pennisetum purpureum	Hybrid Napier grass	Poaceae
Pergularia daemia	Utaran	Apocynaceae
Phoenix sylvestris	Bankhajuri	Arecaceae
Phyllanthus reticulatus	Black honey shrub	Euphorbiaceae
Polyalthia longifolia	Asok	Anacardiaceae
Polyalthia pendula	Asok	Anacardiaceae
Prosopis spicigera	Kejdi	Mimosaceae
Prosopis julifloa	Mesquite	Mimosaceae
Saccharum spontaneum	Kans grass	Poaceae
Samanea saman	Rain tree	Mimosaceae
Sesbania bispinosa	Dhaincha	Fabaceae
Spathodea companulata	African Tulip Tree	Bignoniaceae
Streblus asper	Sahada	Moraceae
Tectona grandis	Teak	Verbenaceae
Terminalia catappa	Almond tree	Combretaceae
Thuja occidentalis	Thuja	Cupressaceae
Tylophora indica	Antamul	Apocynaceae
Typha angustata	Cattail	Typhaceae
Urochloa mutica	Para grass	Poaceae
Vitex negundo	Begunia	Verbenaceae
Wattakaka volubilis	Sneezewort	Apocynaceae
Xanthium strumarium	Cocklebur	Asteraceae
Ziziphus nummularia	Kontikoli	Rhamnaceae

Terrestrial Vegetation and flora of the Buffer zone:

Except for a few small patches of vacant lands, small ditches and the Damodar River, the rest of the buffer zone was mostly under cultivation of Paddy during the rainy season. There are also small stretches of double croplands. There are no National Parks or Wildlife Sanctuaries or Biosphere Reserves or Important Bird Areas (IBAs) within 10 Km radius of the project site. There are no Reserve Forests or Protected Forests within 10 Km radius of the project site. Similarly, there are no historical places and places of tourist importance within 10 Km radius of the project site. But there are wetlands including double crop paddy fields and rivers in the buffer zone. Damodar River (Northwest to Southeast) and its tributaries in the buffer zone. The vegetation is mostly similar to that of the core area

except that the tree diversity is relatively higher because of large area and the presence of residential areas where avenue trees are widely grown. List of trees, shrubs and perennial climbers' plants found in the buffer zone is given in Table No. 3.6.2. All the grasses, sedges and forbs present in the core area are widely scattered and they were found in the buffer zone also. A list of herbs and herbaceous plants found in the buffer zone are given in Table No. 3.6.3. It may be mentioned that there are no rare or endangered or threatened (RET) species in the buffer zone.

Table No. 3.6.2: List of trees, shrubs and perennial climbers found in the buffer zone of the plant site

Scientific name	Common / Local name	Family
Abrus precatorius	Kaincha	Fabaceae
Acacia auriculiformis	Australian Wattle	Mimosaceae
Acacia catechu	Khair	Mimosaceae
Acacia nilotica	Babul	Mimosaceae
Achrus sapota	Sapota	Sapotaceae
Aegle marmelos	Bel	Rutaceae
Aganosoma dichotoma	Malati	Apocynaceae
Aibizia lebbeck	Siris	Mimosaceae
Ailanthus excelsa	Mahalimbo	Simaroubaceae
Alangium salvifolium	Hill sage tree	Alangiaceae
Alstonia scholaris	Chhatiana	Apocynaceae
Anacardium occidentale	Cashew nut	Anacardiaceae
Anisomeles indica	Bhutamari	Lamiaceae
Annona squamosa	Ato	Annonaceae
Anthocephalus cadamba	Kadamba	Rubiaceae
Artocarpus heterophyllus	Panas	Moraceae
Azadirachta indica	Neem	Meliaceae
Bauhinia purpurea	Kanchan	Caesalpiniaceae
Bauhinia racemosa	Ambansia	Caesalpiniaceae
Bauhinia variegata	Kachnar	Caesalpiniaceae
Bombax ceiba	Simili	Bombacaceae
Borassus flabellifer	Tal	Arecaceae
Butea monosperma	Palash / Dhak	Fabaceae
Calophyllum inophyllum	Alexandrian Laurel	Clusiacae
Calotropis gigantea	Arakha	Asclepiadaceae
Calotropis procera	Arakha	Asclepiadaceae
Caryota urens	Sarap(Calap)	Arecaceae
Cassia alata	Guajava	Caesalpiniaceae
Cassia fistula	Simaro	Caesalpiniaceae
Cassia siamea	Chakhunda	Caesalpiniaceae
Casuarina equisetifolia	Casuarinas	Casuarinaceae
Chromolaena odorata	Siam weed	Asteraceae

Cissus quadrangularis	Veldt Grape	Vitaceae
Cocos nucifera	Coconut	Arecaceae
Cordia dichotoma	Indian Cherry	Cordiaceae
Couropita guinensis	Cannon ball tree	Lecythidaceae
Crataeva religiosa	Barun	Capparaceae
Cryptolepris buchanani	Milk wine	Periplocaceae
Cryptostegia grandiflora	Vishabudhi	Periplocaceae
Dalbergia sisoo	Sishum	Caesalpiniaceae
Delonix elata	Radhachuda	Caesalpiniaceae
Delonix regia	Krisnachuda	Caesalpiniaceae
Dendrocalamus strictus	Bamboo	Poaceae
Dioscorea alata	Kanta alu	Dioscoreaceae
Dioscorea bulbifera	Pitalu	Dioscoreaceae
Dioscorea pentaphylla	Banaalu	Dioscoreaceae
Erythrina indica	Paldhua	Fabaceae
Eucalyptus camaldulensis	Eucalyptus	Myrtaceae
Eucalyptus tereticornis	Eucalyptus	Myrtaceae
Euphorbia nivulia	Sijhu	Euphorbiaceae
Feronia elephantum	Kaitha	Rutaceae
Ficus benghalensis	Bata / Bata	Moraceae
Ficus glomerata	Dimiri	Moraceae
Ficus hispida	Hairy Fig	Moraceae
Ficus racemosa	Fig tree	Moraceae
Ficus religiosa	Peepal tree	Moraceae
Gliricidia sepium	Mexican Lilac	Fabaceae
Grevillea robusta	Silver oak	Proteaceae
Hemidesmus indicus	Anantamul	Apocynaceae
Hygrophila auriculata	Marsh Barbel	Acanthaceae
Gmelina arborea	Gambhari	Verbenaceae
Hemidesmus indicus	Anantamul	Apocynaceae
Ichnocarpus frutescens	Black creeper	Apocynaceae
Ipomoea carnea	Bush morning glory	Convolvulaceae
Jatropha curcas	Wild castor	Euphorbiaceae
Lagerstroemia parviflora	Sidha / Sudha	Lythraceae
Lantana camara	Nagabari	Verbenaceae
Leptadenia reticulata	Jivanti	Apocynaceae
Leucaena leucocephala	Subabul	Mimosaceae
Macaranga peltata	Chand Kal	Euphorbiaceae
Mangifera indica	Amba / Mango	Anacardiaceae
Melia azadirachta	Bakain	Meliaceae
Michelia champaca	Champa	Magnoliaceae
Millingtonia hortensis	Cork Tree	Bignoniaceae
Mimosops elengi	Spanish cherry	Sapotaceae
Moringa oleifera	Sajana (muniga)	Moringaceae
Muntingia calabura	Jamaica Cherry	Muntingiaceae
Murraya koenigi	Curry leaf	Rutaceae

Nerium tinctorium	Nerium	Apocynaceae
Nyctanthes arbor-tristis	Gangasiuli	Oleaceae
Parkinsonia aculeata	Jerusalem Thorn	Mimosaceae
Peltophorum pterocarpum	Copper pod	Caesalpiniaceae
Pergularia daemia	Utaran	Apocynaceae
Phoenix sylvestris	Bankhajuri	Arecaceae
Phyllanthus emblica	Amla	Euphorbiaceae
Phyllanthus reticulatus	Black honey shrub	Euphorbiaceae
Pithecellobium dulce	Madras Thorn	Mimosaceae
Plumbago indica	Raktchita	Plumbaginaceae
Plumeria alba	Temple tree	Apocynaceae
Plumeria rubra	Pagada tree	Apocynaceae
Polyalthia longifolia	Debadaru	Annonaceae
Polyalthia pendula	Ashok	Annonaceae
Pongamia pinnata	Karanja	Fabaceae
Prosopis spicigera	Kejdi	Mimosaceae
Prosopis julifloa	Mesquite	Mimosaceae
Psidium guajava	Guava	Myrtaceae
Punica granatum	Pomegranate	Punicaeae
Quisqualis indica	Burma Creeper	Combretaceae
Samanea saman	Rain tree	Mimosaceae
Sapindus emarginatus	Ritha	Sapindaceae
Spathodea companulata	African Tulip Tree	Bignoniaceae
Sterculia urens	Bendia mardhan	Sterculiaceae
Sterculia villosa	Kodal	Sterculiaceae
Stereospermum suaveolens	Patuli	Bignoniaceae
Streblus asper	Sahada	Moraceae
Syzigium cumini	Jamun	Myrtaceae
Tamarindus indica	Tentuli	Caesalpiniaceae
Tecoma stans	Yellow oleander	Bignoniaeae
Tectona grandis	Saguan / Teak	Verbenaceae
Terminalia arjuna	Arjuna	Combretaceae
Terminalia catappa	Almond tree	Combretaceae
Thespesia populnea	Portia tree	Malvaceae
Tylophora indica	Antamul	Apocynaceae
Vitex negundo	Begunia	Verbenaceae
Walsura trifolia	Mandika (Kuruna)	Meliaceae
Wattakaka volubilis	Sneezewort	Apocynaceae
Wrightia tinctoria	Ludukurum	Apocynaceae
Ziziphus nummularia	Kontikoli	Rhamnaceae

Table No. 3.6.3: List of herbs and herbaceous species found in the study area

Scientific name	Family
Abutilon crispum	Malvaceae
Abutilon graveolens	Malvaceae

Achyranthes aspera	Amaranthaceae
Aeluropus lagopoides	Poaceae
Aerva javanica	Amaranthaceae
Aerva lanata	Amaranthaceae
Aerva tomentosa	Amaranthaceae
Alternanthera sessiles	Amaranthaceae
Apluda mutica	Poaceae
Asystasia gangetica	Acanthaceae
Barleria prionitis	Acanthaceae
Blepharis repens	Acanthaceae
Bothriochloa pertusa	Poaceae
Brachiaria distachya	Poaceae
Brachiaria ramosa	Poaceae
Brachiaria reptans	Poaceae
Cenchrus ciliaris	Poaceae
Chloris barbata	Poaceae
Chrysopogon fulvus	Poaceae
Chrysopogon verticillatus	Poaceae
Costus igneus	Costaceae
Cymbopogon coloratus	Poaceae
Cymbopogon flexuosus	Poaceae
Cynodon dactylon	Poaceae
Cyperus compressus	Cyperaceae
Cyperus rotundus	Cyperaceae
Dichanthium annulatum	Poaceae
Digitaria sanguinalis	Poaceae
Echinops echinata	Asteraceae
Emilia sonchifolia	Asteraceae
Eragrostis coarctata	Poaceae
Eragrostis viscosa	Poaceae
Gentelbua urens	Acanthaceae
Hyptis sauveolens	Lamiaceae
Hygrophila auriculata	Acanthaceae
Imperata cylindrica	Poaceae
Indigofera ennaephylla	Fabaceae
Indigofera linifolia	Fabaceae
Indigofera linni	Fabaceae
Indigofera oblongifolia	Fabaceae
Indigofera tinctoria	Fabaceae
Indigofera trita	Fabaceae
Iseilema laxum	Poaceae
Iseilema prostratum	Poaceae
Malvastrum coromandelianum	Malvaceae
Panicum brevifolium	Poaceae
Panicum maximum	Poaceae
Parthenium hysterophorus	Asteraceae

Paspalidium flavidum	Poaceae
Peristrophe bicalyculata	Acanthaceae
Peristrophe paniculata	Acanthaceae
Polycarpaea aurea	Caryophyllacae
Polycarpaea corymbosa	Caryophyllacae
Polycarpon prostratum	Caryophyllacae
Ruellia tuberosa	Acanthaceae
Sesbania aculeata	Fabaceae
Sida acuta	Malvaceae
Sida cordata	Malvaceae
Sorghum halepense	Poaceae
Sphaeranthus indicus	Asteraceae
Tehrosia purpurea	Fabaceae
Tephrosia procumbens	Fabaceae
Tephrosia villosa	Fabaceae
Themeda triandra	Poaceae
Tridax procumbens	Asteraceae
Xanthium strumarium	Asteraceae

3.6.5 DETAILS OF FAUNA IN THE STUDY AREA

The Fauna species listed below are found in a radius of about 10 Km from the site of the project site.

Terrestrial Fauna of the study area:

The area under consideration is basically under paddy cultivation. There are no National Parks or Wildlife Sanctuaries or Biosphere Reserves or Important Bird Areas (IBAs) within 10 Km radius of the project site. There was only one block of Protected Forest within10 Km radius of the project site. But there are wetlands including double crop paddy fields and rivers in the buffer zone. A survey of published literature as well as the surroundings and circumstances of the project site reveals that the area is not a suitable habitat for any rare or endangered or threatened (RET) wildlife. There is no evidence of any wildlife migratory corridors or breeding grounds of any RET wildlife. None of the species reported or spotted belong to Schedule I of the Indian Wildlife (Protection) Act 1972 and its amendments thereon. A list of vertebrate species other than birds either reported or spotted by the survey team is given in Table No.3.6.4. Similarly, a list of birds either spotted or reported from the study area is given in Table No.3.6.5.

Table No. 3.6.4: List of vertebrate species other than birds either recorded or reported from the study area.

Latin name	Common name	WPA Schedule
Mammals		
Bandicota indica	Large bandicoot rat	IV
Canis aureus	Asiatic Jackal	II
Cynopterus sphinx	Short-nosed fruit bat	IV
Funambulus palmarum	Three striped squirrel	IV
Golunda ellioti	Indian bush rat	IV
Herpestes edwardsinyula	Indian grey mongoose	IV
Macaca mulatta	Rhesus monkey	II
Mus booduga	Common Indian field mouse	IV
Mus musculus	Home mouse	IV
Nosokia indica	Bandicoot rat	IV
Plecotus auritus	Long-eared bat	IV
Rattus rattus	Common Indian rat	IV
Scotophillus heathi	Greater yellow bat	IV
Suncus etruscus	Savi pygmy shrew	IV
Suncus murinus	House shrew	IV
Sus scofa	Wild boar	III
REPTILES		
Bungarus caeruleus	Common Indian Krait	IV
Calotes versicolor	Garden lizard	IV
Chamaeleo zeylanicus	Indian Chameleon	IV
Chrysopelea taprobanica	Tree Snake	IV
Dryphis nasutus	Whip Snake	IV
Echis carinatus	Saw scaled viper	IV
Geochelone elegans	Indian star tortoise	IV
Hemidactylus flaviviridis	Indian wall lizard	IV
Hemidactylus triedrus	Termite Hill Gecko	IV
Melanochelys trijuga	Indian Black Turtle	IV
Naja naja	Cobra	II
Ptyas mucosa	Rat snake	IV
Sphenomorphus indicus	Indian Skink	IV
Typhlops diardii	Giant Blind Snake	IV
Typhlops porrectus	Slender Blind Snake	IV
Varanus bengalensis	Common Indian Monitor	IV
Vipera russseli	Russell's viper	IV
AMPHIBIANS		
Bufo melonosticatus	Common Indian Toad	IV
Hoplobatrachus tigerinus	Indian Bull Frog	IV
Polypedates maculatus	Indian Tree Frog	IV
Rana hexadactyla.	Green Pond Frog	IV
Sphaerotheca breviceps	Indian Burrowing frog	IV

Table No. 3.6.5: List of birds either spotted or reported from the study area.

Scientific Name	Common Name	Family	WPA Schedule
Accipiter badius	Shikra	Accipitridae	IV
Acridotheres tristis	Common myna	Sturnidae	IV
Aegithinia tiphia	Common Iora	Irenidae	IV
Alcedo atthis	Small blue kingfisher	Alcedinidae	IV
Amaurornis phoenicurus	White-breasted waterhen	Recurvirostridae	IV
Athene brama	Spotted owlet	Noctuidae	IV
Bubulcus ibis	Cattle Egret	Ardeidae	IV
Centropus sinasis	Greater coucal	Phasianidae	IV
Ceryle rudis	Lesser pied Kingfisher	Alcedinidae	IV
Columba livia	Blue rock pigeon	Columbidae	IV
Coracias benghalensis	Indian roller	Coraciidae	IV
Corvus splendens	House crow	Corvidae	V
Dendrocitta vagabunda	Indian tree pie	Corvidae	IV
Dicaeum erythrorhynchos	Tickell's flower pecker	Dicaeidae	IV
Dicrurus macrocercus	Black drongo	Dicruridae	IV
Egretta garzetta	Little egret	Ardeidae	IV
Elanus caeruleus	Black-shouldered kite	Accipitridae	IV
Eudynamys scolopace	Asian koel	Cuculidae	IV
Fulica atra	Coot	Rallidae	IV
Gallinula chloropus	Indian Moorhen	Rallidae	IV
Halcyon smyrnensis	White-Breasted King fisher	Alcedinidae	IV
Himantopus himantopus	Black-winged stilt	Recurvirostridae	IV
Hydrophasianus chrugus	Pheasant tailed Jacana	Jacanidae	IV
Lanius excubitor	Great grey shrike	Daniidae	IV
Ixobrychus cinnamomeus	Chestnut bittern	Ardeidae	IV
Megalaima haemacephala	Copper smith Barbet	Capitonidae	IV
Merops orientalis	Small Bee eater	Meropidae	IV
Milvus migrans	Black kite (Common Pariah)	Accipitridae	IV
Motacilla alba	White wagtail	Motacillidae	IV
Motacilla flava	Yellow wagtail	Motacillidae	IV
Motacilla maderaspatensis	Large pied wagtail	Motacillidae	IV
Nectarinia asiatica	Purple sunbird	Nectariniidae	IV
Nectarinia zeylonica	Purple-rumped sunbird	Nectariniidae	IV
Oriolus oriolus	Eurasian golden oriole	Oriolidae	IV
Passer domesticus	House sparrow	Passeridae	IV
Perirocotus cinnomomeus	Small Minivet	Phasianidae	IV
Phalacrocorax carbo	Large Cormorant	Phalacrocoracidae	IV
Phalacrocorax niger	Little cormorant	Phalacrocoracidae	IV
Porphyrio porphyrio	Purple moorhen	Rallidae	IV
Prinia inornata	Plain prinia	Cisticolidae	IV
Prinia socialis	Ashy prinia	Cisticolidae	IV
Psittacula cyanocephala	Blossom headed Parakeet	Psittacidae	IV
Psittacula krameri	Rose-Ringed Parakeet	Psittacidae	IV
Pycnonotus cafer	Red-vented bulbul	Pycnonotidae	IV

Saxicolodies fulicata	Indian robin	Turdinae	IV
Streptopelia chinensis	Spotted dove	Columbidae	IV
Streptopelia decaocto	Eurasian Collared-Dove	Columbidae	IV
Streptopelia Senegalensis	Little brown dove	Columbidae	IV
Streptopelia tranquebarica	Red Collared-Dove	Columbidae	IV
Sturnus pagodarum	Brahminy starling	Sturnidae	IV
Terpsiphone paradisi	Asian paradise-flycatcher	Muscicapidae	IV
Turdoides caudatus	Common babbler	Timalinae	IV
Upupa epops	Common hoopoe	Upupidae	IV
Vanellus indicus	Red-wattled lapwing	Charadriidae	IV

Aquatic flora and fauna of the study area:

Both the core area as well as the buffer zone is rich in aquatic or semi aquatic macrophytes. It is mainly due to irrigation and cultivation of paddy. A list of aquatic / semi aquatic macrophytes found in the wetlands of the study area is given in Table-3.6.6. List of fishes either caught by the fisherman or reported from the Damodar River and tanks present in the buffer zone of the project site are given in Table-3.6.7. There are few rare or endangered and threatened (RET) species of fishes reported from the Damodar River. But the data does not specifically refer to that stretch of the River that runs in the buffer zone. The present status of these RET species in the study area is not clearly known.

Table No. 3.6.6: List of aquatic / semi aquatic macrophytes found in the wetlands and Damodar River of the study area.

Latin name	Family
Acanthus ilicifolius	Acanthaceae
Alternanthera philoxeroides	Solanaceae
Ammania baccifera	Lythraceae
Aponogeton natans	Aponogetonaceae
Azolla pinnata	Azollaceae
Brachiaria mutica	Poaceae
Carex cruciata	Cyperaceae
Centella asiatica	Apiaceae
Chrysopogon aciculatus	Poaceae
Cynodon dactylon	Poaceae
Cynodon dactylon	Poaceae
Cyperus arenarius	Cyperaceae
Cyperus distans	Cyperacee
Cyperus dubius	Cyperacee
Cyperus haspan	Cyperacee
Cyperus mitis	Cyperacee
Cyperus nutans	Cyperacee

Cyperus triceps	Cyperacee
Cyperus diffusus	Cyperacee
Cyperus exaltatus	Cyperaceae
Cyperus rotundus	Cyperacee
Echinochloa colona	Poaceae
Echinochloa stagnina	Poaceae
Eclipta alba	Asteraceae
Eclipta prostrata	Asteraceae
Eichhornia crassipes	Pontederiaceae
Hydrilla verticillata	Hydrocharitaceae
Hygrophila auriculata	Acanthaceae
Ipomoea aquatica	Convolvulaceae
Ludwigia perennis	Onagraceae
Marsilia quadrifoliata	Marsiliaceae
Nelumbo nucifera	Nelumbiaceae
Nymphaea nauchali	Nympheaceae
Nymphaea stellata	Nympheaceae
Nymphoides hydrophylla	Nympheaceae
Nymphoides indica	Nympheaceae
Ottelia alismoides	Hydrocharitaceace
Oxalis corniculata	Oxalidaceae
Paspalidium geminatum	Poaceae
Pistia stratoides	Araceae
Polygonum hydropiper	Polygonaceae
Salvinia cucullata	Salviniaceae
Typha angustata	Typhaceae
Vallisneria spiralis	Hydrocharitaceae

Table No. 3.6.7: List of fishes reported from Damodar River within the Bankura District

Scientific name	Common / local name	Family	IUCN
Amblypharyngodon mola	Mourola	Cyprinidae	LC
Amblypharyngodon mola	Mourola	Cyprinidae	LC
Aplocheilus panchax	Kanpona	Aplocheilidae	DD
Bagarius bagarius	Garua	Sisoridae	VU
Catla catla	Katla	Cyprinidae	LC
Chanda nama	Chanda	Ambassidae	LC
Chanda ranga	Ranga	Ambassidae	LC
Channa gachua	Chang	Channidae	LC
Channa marulias	Sal	Channidae	LC
Channa punctata	Lata	Channidae	LC
Channa striatus	Sol	Channidae	LC
Cirrhinus mrigala	Mrigel	Cyprinidae	LC
Clarias batrachus	Magur	Clariidae	LC
Colisa fasciata	Khalisa	Osphronemidae	LC
Colisa lalia	Khalisa	Osphronemidae	NE
Danio devario	Techokha	Cyprinidae	LC

Danio rerio	Techokha	Cyprinidae	NT
Glossogobius giuris	Bele	Gobiidae	LC
Gudusia chapra	Khaira	Clupeidae	LC
Heteropneustes fossilis	Singi	Siluridae	NT
Labeo bata	Bata	Cyprinidae	LC
Labeo calbasu	Kalbose	Cyprinidae	LC
Labeo rohita	Rui / Rohu	Cyprinidae	LC
Lepidocephalichthys guntea	Guntey	Cobitidae	LC
Macrognathus aculeatum	Ban	Mastacembelidae	LC
Macrognathus armatus	Ban	Mastacembelidae	LC
Macrognathus pancalus	Pankal	Mastacembelidae	NT
Mystus aor	Aard	Bagridae	VU
Mystus cavassius	Tengra	Bagridae	LC
Mystus seenghala	Tangra	Bagridae	NE
Mystus tengara	Tangra	Bagridae	LC
Mystus vittatus	Tangra	Bagridae	LC
Nandus nandus	Bheda	Nandidae	LC
Notopterus chitala	Chital	Notopteridae	EN
Notopterus notopterus	Pholui	Notopteridae	LC
Pungasius pungasius	Pangus	Pangasidae	LC
Puntius conchonius	Punti	Cyprinidae	VU
Puntius phutunio	Punti	Cyprinidae	LC
Puntius sophore	Punti	Cyprinidae	LC
Puntius ticto	Punti	Cyprinidae	LC
Rita rita	Rita	Bagridae	LC
Salmostoma bacalia	Chela	Cyprinidae	LC
Tetradon cutcutia	Tepa	Tetraodontidae	NT
Tetraodon fluviatilis	Potoka	Tetraodontidae	NE
Wallago attu	Boal	Siluridae	NT
Xenentodon cancila	Kakia	Belonidae	LC

3.6.6 INTERPRETATION OF BIOLOGICAL ENVIRONMENT STUDY

- As per the study carried out and Botanical Survey of India, it is found that No Endemic, Rare, Endangered and Threatened (RET) species of flora were found in the study area.
- As per the study carried out and Wildlife Protection Act, no Schedule – I fauna was observed in the study area.

Prediction of impacts is based both on the direct & indirect; short-term as well as long-term; irreversible & irreversible impacts that are most likely to occur owing to the proposed industrial activity during establishment and operation. Following are ecological factors that are considered most significant as far as the impact on flora and fauna are concerned:

(a) Whether there shall be any reduction in species diversity

(b) Whether there shall be any habitat loss or fragmentation

(c) Whether there shall be any additional risk or threat to the rare or endangered or endemic or threatened (REET)species

(d) Whether there shall be any impairment of ecological functions such as (i) disruption of food chains, (ii) decline in species population and or (iii) alterations in predator-prey relationships.

Table No. 3.6.8 : Interpretation on Ecology and Biodiversity Study

S.No.	Factor/Objective	Remark
(a)	Whether there shall be any reduction in species diversity	No Land use of the proposed project site is Land with scrub. The land is converted for Industrial purpose. It is also observed that no Endemic, Rare, Endangered and Threatened (RET) species of flora were found in the entire study area listed by Botanical Survey of India and also no Schedule – I fauna was observed in the entire study area as recognised in Wildlife Protection Act & IUCN.
(b)	Whether there shall be any habitat loss or fragmentation	No • Proposed project site and study area does not come under the any specific habitat for specific species. • Study area is not the part of any Elephant corridors / Migratory routes for birds etc.
(c)	Whether there shall be any additional risk or threat to the rare or endangered or endemic or threatened (REET) species	No • As per the study carried out and Botanical Survey of India, it is found that No Endemic, Rare, Endangered and Threatened (RET) species of flora were found in the study area. • As per the study carried out and Wildlife Protection Act, no Schedule – I fauna was observed in the study area.

(d)	Whether there shall be any impairment of ecological functions such as (i) disruption of food chains, (ii) decline in species population and or (iii) alterations in predator-prey relationships.	No In the proposed project following environment protection measures will be provided for duly complying with norms stipulated by MOEF&CC / WBPCB: • ESP's (High performance rigid electrodes with transformer) will be provided to Pellet Plant to bring down the particulate matter emission to less than 30 mg/Nm^3. • ESP's (High performance rigid electrodes with transformer) will be provided to DRI Kilns to bring down the particulate matter emission to less than 30 mg/Nm^3. • ESP will be provided to Power plant to bring down the particulate matter emission to less than 30 mg/Nm^3. • Fume Extraction system with PTFE membrane bag filters will be provided to Induction Furances to bring down the particulate matter emission to less than 30 mg/Nm^3 • All conveyor will be covered with GI sheets to control the dust emission. Interlocking system will be provided to ESP. This will ensure that whenever ESP fails, the raw material feed to the unit will be stopped and will commence production after ESP is rectified to comply with the norms. • Net resultant Ground level concentrations during operation of the plant after superimposing the incremental concentrations over the maximum baseline concentrations are well within the National Ambient Air Quality Standards.

		• Zero liquid effluent discharge will be implemented in the proposed project. • Greenbelt will be developed in **81 acres (32.79 Ha.)** of land which will further mitigate the emissions. • All these environmental protection systems will be installed and operated to comply with the norms.

3.7 DEMOGRAPHIC DETAILS OF STUDY AREA [Std. TOR # 6 (xi)]

The study area covers within a radius of 10 km from the Project site. The socio-economic profile of the study area of 54 Villages is presented based on site visits; discussions with the villagers and the secondary data available from various agencies such as Hand Books for Census 2011.

Social Impact Assessment study of the 10 km. Radius is furnished in **Pg. No. 7.34 to 7.46** of **Chapter # 7** of EIA report.

Demographic details based on Hand Books for Census 2011 of the study area is shown below

TABLE - 3.7.1 : POPULATION BREAK UP AS PER CENSUS 2011

S.No.	Village Name	Total No. of House Holds	Total Population	Total males	Total females	SC Population	SC Males	SC Females	ST Population	ST males	ST Females
1.	Amkula (CT)	1099	5445	2928	2517	499	276	223	955	510	445
2.	Anandapur	162	714	381	333	337	179	158	1	1	0
3.	Andal(Gram) (CT)	1308	6177	3160	3017	1752	887	865	142	77	65
4.	Arddhagram	254	1189	601	588	559	258	301	155	88	67
5.	Baktarnagar (CT)	1106	5112	2643	2469	1305	684	621	389	189	200
6.	Bakulia	138	671	352	319	559	291	268	0	0	0
7.	Ballavpur (CT)	1441	6468	3399	3069	1313	677	636	7	4	3
8.	Banshra (CT)	1252	5703	3001	2702	1868	957	911	902	449	453
9.	Belekuri (Belguria)	201	937	497	440	428	227	201	0	0	0
10.	Benathol	92	534	281	253	52	28	24	139	68	71
11.	Bharra	384	1912	995	917	971	504	467	1	0	1
12.	Bhului (Bhulul)	46	249	134	115	0	0	0	0	0	0
13.	Bishjor	269	1186	594	592	667	329	338	0	0	0
14.	Dahuka	192	1174	622	552	0	0	0	0	0	0
15.	Damalia	218	1118	581	537	703	355	348	0	0	0
16.	Damra	94	504	251	253	0	0	0	0	0	0
17.	Dhekia	303	1473	765	708	476	238	238	1	1	0
18.	Durlabhpur	373	1725	894	831	968	498	470	3	2	1
19.	Egara (CT)	1597	7623	3918	3705	4626	2349	2277	350	174	176
20.	Gopalpur	219	980	509	471	413	212	201	0	0	0
21.	Gopinathpur	320	1638	843	795	496	252	244	0	0	0
22.	Jamkuri	126	719	368	351	313	164	149	4	3	1
23.	Jemua	618	3267	1666	1601	820	417	403	473	224	249
24.	Jorsa	159	852	454	398	569	298	271	0	0	0
25.	Jujghati	119	494	250	244	329	165	164	0	0	0
26.	Kalikapur	143	666	340	326	237	119	118	0	0	0
27.	Kansara	328	1687	866	821	468	233	235	0	0	0
28.	Kanshai	182	965	507	458	246	122	124	0	0	0

S.No.	Village Name	Total No. of House Holds	Total Population	Total males	Total females	SC Population	SC Males	SC Females	ST Population	ST males	ST Females
29.	Kendana	272	1292	666	626	503	261	242	0	0	0
30.	Kotabaid	272	1292	666	626	503	261	242	0	0	0
31.	Lakshmanbandi	256	1125	578	547	121	58	63	51	29	22
32.	Madanpur	145	896	482	414	162	85	77	0	0	0
33.	Mejhia	1086	5308	2772	2536	1220	602	618	1	1	0
34.	Mochrakend	434	1919	957	962	697	332	365	1	0	1
35.	Nabashan	49	193	94	99	193	94	99	0	0	0
36.	Nimra	278	1445	736	709	620	307	313	0	0	0
37.	Pabra	914	4179	2128	2051	1236	603	633	237	126	111
38.	Pairasol	264	1277	643	634	713	362	351	0	0	0
39.	Palajuria	252	1323	698	625	10	5	5	0	0	0
40.	Parbatipur	254	1338	684	654	415	215	200	0	0	0
41.	Parulia	117	563	299	264	80	45	35	0	0	0
42.	Purunia	232	1031	553	478	344	174	170	0	0	0
43.	Raghunathchak (CT)	1305	6006	3149	2857	1432	751	681	27	11	16
44.	Ramlalpur	161	710	371	339	566	291	275	0	0	0
45.	Raniganj	17008	83418	43825	39593	28221	14645	13576	6584	3317	3267
46.	Ranipur	407	1912	1004	908	568	284	284	0	0	0
47.	Sahebganj (CT)	1068	4715	2430	2285	1058	538	520	168	78	90
48.	Salma	749	3732	1958	1774	1757	911	846	339	174	165
49.	Shalroha	409	1552	819	733	690	358	332	0	0	0
50.	Shyampur - 1	678	3302	1668	1634	1939	977	962	296	142	154
51.	Sitarampur	258	1003	510	493	387	197	190	0	0	0
52.	Tarapur	1004	4611	2395	2216	1389	725	664	11	5	6
53.	Tegharia	356	1787	930	857	744	375	369	76	36	40
54.	Tirat	851	4224	2184	2040	1553	795	758	1174	599	575

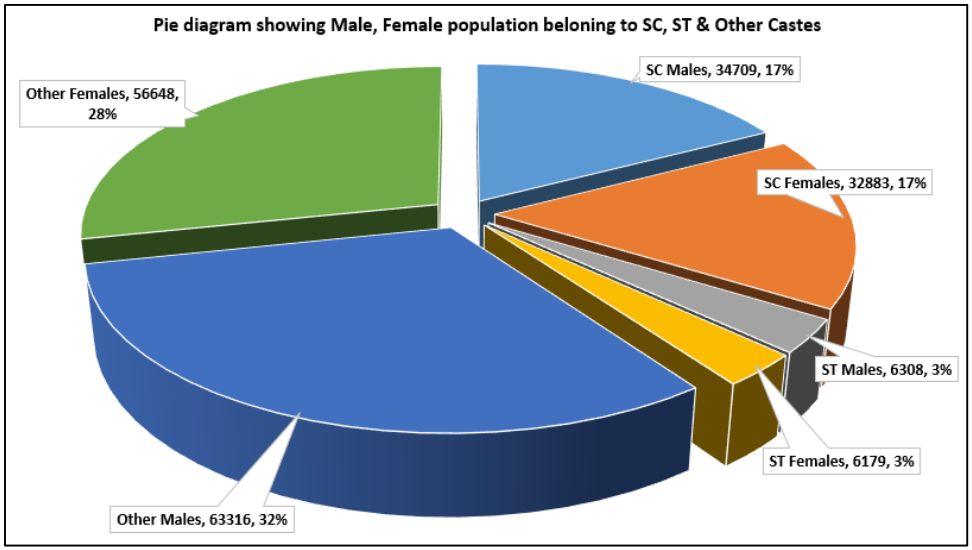


TABLE - 3.7.2 : LITERACY LEVELS OF THE POPULATION UP AS PER CENSUS 2011

S.No.	Village Name	Total population Literates	Male literates	Female literates	Total population illiterates	Male illiterates	Female illiterates
1.	Amkula (CT)	3239	1987	1252	2206	941	1265
2.	Anandapur	369	236	133	345	145	200
3.	Andal(Gram) (CT)	4410	2431	1979	1767	729	1038
4.	Arddhagram	636	377	259	553	224	329
5.	Baktarnagar (CT)	3221	1866	1355	1891	777	1114
6.	Bakulia	306	183	123	365	169	196
7.	Ballavpur (CT)	4680	2709	1971	1788	690	1098
8.	Banshra (CT)	3746	2213	1533	1957	788	1169
9.	Belekuri (Belguria)	413	282	131	524	215	309
10.	Benathol	256	175	81	278	106	172
11.	Bharra	818	500	318	1094	495	599

S.No.	Village Name	Total population Literates	Male literates	Female literates	Total population illiterates	Male illiterates	Female illiterates
12.	Bhului (Bhulul)	187	105	82	62	29	33
13.	Bishjor	633	374	259	553	220	333
14.	Dahuka	417	280	137	757	342	415
15.	Damalia	731	440	291	387	141	246
16.	Damra	377	217	160	127	34	93
17.	Dhekia	952	587	365	521	178	343
18.	Durlabhpur	1086	624	462	639	270	369
19.	Egara (CT)	5262	3004	2258	2361	914	1447
20.	Gopalpur	631	372	259	349	137	212
21.	Gopinathpur	1001	618	383	637	225	412
22.	Jamkuri	401	258	143	318	110	208
23.	Jemua	1850	1071	779	1417	595	822
24.	Jorsa	599	360	239	253	94	159
25.	Jujghati	302	188	114	192	62	130
26.	Kalikapur	476	273	203	190	67	123
27.	Kansara	967	606	361	720	260	460
28.	Kanshai	560	352	208	405	155	250
29.	Kendana	724	436	288	568	230	338
30.	kotabaid	724	436	288	568	230	338
31.	Lakshmanbandi	510	353	157	615	225	390
32.	Madanpur	607	363	244	289	119	170
33.	Mejhia	3592	2103	1489	1716	669	1047
34.	Mochrakend	1037	616	421	882	341	541
35.	Nabashan	93	64	29	100	30	70
36.	Nimra	582	399	183	863	337	526
37.	Pabra	2545	1521	1024	1634	607	1027
38.	Pairasol	687	415	272	590	228	362
39.	Palajuria	650	430	220	673	268	405

S.No.	Village Name	Total population Literates	Male literates	Female literates	Total population illiterates	Male illiterates	Female illiterates
40.	Parbatipur	797	483	314	541	201	340
41.	Parulia	233	146	87	330	153	177
42.	Purunia	537	353	184	494	200	294
43.	Raghunathchak (CT)	3768	2209	1559	2238	940	1298
44.	Ramlalpur	437	259	178	273	112	161
45.	Raniganj	54839	32232	22607	28579	11593	16986
46.	Ranipur	1271	747	524	641	257	384
47.	Sahebganj (CT)	3424	1936	1488	1291	494	797
48.	Salma	1714	1085	629	2018	873	1145
49.	Shalroha	798	508	290	754	311	443
50.	Shyampur - 1	1724	1045	679	1578	623	955
51.	Sitarampur	740	414	326	263	96	167
52.	Tarapur	3026	1774	1252	1585	621	964
53.	Tegharia	1130	651	479	657	279	378
54.	Tirat	2554	1519	1035	1670	665	1005

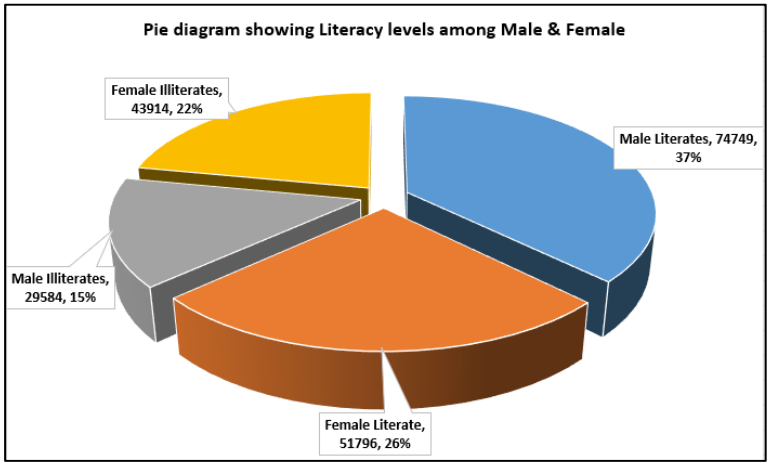


TABLE- 3.7.3: WORKERS CLASSIFICATION AS PER CENSUS 2011 (MAIN & MARGINAL)

S.No.	Village Name	TOTAL WORK_P	TOTAL WORK_M	TOTAL WORK_F	MAIN WORK_P	MAIN WORK_M	MAIN WORK_F	MARGINAL WORK_P	MARGINAL WORK_M	MARGINAL WORK_F
1.	Amkula (CT)	1484	1360	124	1395	1305	90	89	55	34
2.	Anandapur	229	210	19	203	197	6	26	13	13
3.	Andal(Gram) (CT)	1998	1785	213	1409	1280	129	589	505	84
4.	Arddhagram	451	338	113	374	293	81	77	45	32
5.	Baktarnagar (CT)	1594	1387	207	1023	908	115	571	479	92
6.	Bakulia	314	185	129	41	33	8	273	152	121
7.	Ballavpur (CT)	2338	2018	320	1904	1714	190	434	304	130
8.	Banshra (CT)	1940	1550	390	1538	1341	197	402	209	193
9.	Belekuri (Belguria)	296	288	8	237	232	5	59	56	3
10.	Benathol	238	144	94	236	143	93	2	1	1
11.	Bharra	615	524	91	391	375	16	224	149	75
12.	Bhului (Bhulul)	75	74	1	71	70	1	4	4	0
13.	Bishjor	504	311	193	223	185	38	281	126	155
14.	Dahuka	340	320	20	206	195	11	134	125	9
15.	Damalia	416	333	83	175	137	38	241	196	45
16.	Damra	155	151	4	153	150	3	2	1	1
17.	Dhekia	581	440	141	464	346	118	117	94	23
18.	Durlabhpur	543	446	97	485	418	67	58	28	30
19.	Egara (CT)	2683	2220	463	2120	1911	209	563	309	254
20.	Gopalpur	366	256	110	293	196	97	73	60	13
21.	Gopinathpur	583	473	110	402	372	30	181	101	80
22.	Jamkuri	230	221	9	13	13	0	217	208	9
23.	Jemua	1078	867	211	861	720	141	217	147	70
24.	Jorsa	299	242	57	184	177	7	115	65	50
25.	Jujghati	301	160	141	276	159	117	25	1	24
26.	Kalikapur	205	192	13	90	87	3	115	105	10
27.	Kansara	617	484	133	575	466	109	42	18	24

S.No.	Village Name	TOTAL WORK_P	TOTAL WORK_M	TOTAL WORK_F	MAIN WORK_P	MAIN WORK_M	MAIN WORK_F	MARGINAL WORK_P	MARGINAL WORK_M	MARGINAL WORK_F
28.	Kanshai	358	313	45	245	229	16	113	84	29
29.	Kendana	513	375	138	302	256	46	211	119	92
30.	Kotabaid	513	375	138	302	256	46	211	119	92
31.	Lakshmanbandi	402	309	93	133	118	15	269	191	78
32.	Madanpur	339	274	65	321	267	54	18	7	11
33.	Mejhia	1738	1600	138	1478	1397	81	260	203	57
34.	Mochrakend	725	524	201	311	279	32	414	245	169
35.	Nabashan	109	50	59	0	0	0	109	50	59
36.	Nimra	546	414	132	391	362	29	155	52	103
37.	Pabra	1366	1149	217	602	543	59	764	606	158
38.	Pairasol	438	371	67	220	206	14	218	165	53
39.	Palajuria	393	382	11	62	57	5	331	325	6
40.	Parbatipur	417	370	47	360	331	29	57	39	18
41.	Parulia	189	183	6	18	17	1	171	166	5
42.	Purunia	438	315	123	170	162	8	268	153	115
43.	Raghunathchak (CT)	2044	1754	290	1776	1593	183	268	161	107
44.	Ramlalpur	265	191	74	23	22	1	242	169	73
45.	Raniganj	25999	22119	3880	19889	17802	2087	6110	4317	1793
46.	Ranipur	929	614	315	489	350	139	440	264	176
47.	Sahebganj (CT)	1544	1313	231	1280	1129	151	264	184	80
48.	Salma	1465	968	497	726	675	51	739	293	446
49.	Shalroha	652	484	168	482	334	148	170	150	20
50.	Shyampur - 1	1254	890	364	857	714	143	397	176	221
51.	Sitarampur	435	335	100	308	281	27	127	54	73
52.	Tarapur	1539	1350	189	1312	1205	107	227	145	82
53.	Tegharia	551	489	62	451	408	43	100	81	19
54.	Tirat	1423	1181	242	1152	991	161	271	190	81

TABLE- 3.7.4: CULTIVATORS CLASSIFICATION AS PER CENSUS 2011 (MAIN & MARGINAL)

S.No.	Village Name	MAIN_CL_P	MAIN_CL_M	MAIN_CL_F	MARG_CL_P	MARG_CL_M	MARG_CL_F
1.	Amkula (CT)	8	6	2	6	2	4
2.	Anandapur	51	50	1	3	3	0
3.	Andal(Gram) (CT)	10	10	0	6	2	4
4.	Arddhagram	9	8	1	1	0	1
5.	Baktarnagar (CT)	2	1	1	25	23	2
6.	Bakulia	0	0	0	21	20	1
7.	Ballavpur (CT)	77	75	2	9	7	2
8.	Banshra (CT)	13	13	0	2	0	2
9.	Belekuri (Belguria)	71	71	0	38	38	0
10.	Benathol	45	44	1	2	1	1
11.	Bharra	100	98	2	10	10	0
12.	Bhului (Bhulul)	0	0	0	1	1	0
13.	Bishjor	11	11	0	46	23	23
14.	Dahuka	173	165	8	4	3	1
15.	Damalia	10	8	2	18	18	0
16.	Damra	114	113	1	1	1	0
17.	Dhekia	189	126	63	19	15	4
18.	Durlabhpur	13	12	1	0	0	0
19.	Egara (CT)	36	23	13	10	5	5
20.	Gopalpur	54	52	2	46	45	1
21.	Gopinathpur	176	174	2	2	2	0
22.	Jamkuri	3	3	0	42	40	2
23.	Jemua	126	121	5	11	9	2
24.	Jorsa	60	59	1	8	3	5
25.	Jujghati	0	0	0	1	0	1
26.	Kalikapur	34	34	0	0	0	0
27.	Kansara	76	75	1	2	1	1
28.	Kanshai	128	128	0	4	4	0

29.	Kendana	111	110	1	22	14	8
30.	Lakshmanbandi	62	62	0	23	22	1
31.	Madanpur	212	189	23	5	5	0
32.	Mejhia	186	180	6	5	5	0
33.	Mochrakend	67	51	16	9	2	7
34.	Nabashan	0	0	0	1	1	0
35.	Nimra	91	80	11	75	28	47
36.	Pabra	152	145	7	110	99	11
37.	Pairasol	111	110	1	69	53	16
38.	Palajuria	20	19	1	148	147	1
39.	Parbatipur	33	32	1	0	0	0
40.	Parulia	15	15	0	0	0	0
41.	Purunia	105	105	0	42	38	4
42.	Raghunathchak (CT)	10	8	2	5	3	2
43.	Ramlalpur	0	0	0	78	72	6
44.	Raniganj	177	151	26	94	61	33
45.	Ranipur	105	78	27	67	55	12
46.	Sahebganj (CT)	2	2	0	2	1	1
47.	Salma	213	212	1	115	93	22
48.	Shalroha	53	52	1	25	24	1
49.	Shyampur - 1	219	206	13	158	71	87
50.	Sitarampur	36	34	2	0	0	0
51.	Tarapur	203	194	9	41	38	3
52.	Tegharia	33	31	2	15	14	1
53.	Tirat	24	19	5	4	3	1

TABLE- 3.7.5: AGRICULTURAL LABOURS CLASSIFICATION AS PER CENSUS 2011 (MAIN & MARGINAL)

S.No.	Village Name	MAIN_AL_P	MAIN_AL_M	MAIN_AL_F	MARG_AL_P	MARG_AL_M	MARG_AL_F
1.	Amkula (CT)	25	23	2	6	5	1
2.	Anandapur	3	2	1	6	1	5
3.	Andal(Gram) (CT)	3	3	0	5	5	0
4.	Arddhagram	56	40	16	5	2	3
5.	Baktarnagar (CT)	37	35	2	30	25	5
6.	Bakulia	0	0	0	239	123	116
7.	Ballavpur (CT)	26	24	2	8	5	3
8.	Banshra (CT)	11	10	1	41	22	19
9.	Belekuri (Belguria)	117	116	1	13	10	3
10.	Benathol	84	9	75	0	0	0
11.	Bharra	86	81	5	107	62	45
12.	Bhului (Bhulul)	0	0	0	0	0	0
13.	Bishjor	4	3	1	40	10	30
14.	Dahuka	10	10	0	119	114	5
15.	Damalia	11	10	1	62	61	1
16.	Damra	9	9	0	0	0	0
17.	Dhekia	24	14	10	23	20	3
18.	Durlabhpur	3	3	0	10	0	10
19.	Egara (CT)	21	12	9	21	16	5
20.	Gopalpur	193	108	85	19	14	5
21.	Gopinathpur	101	84	17	108	28	80
22.	Jamkuri	0	0	0	49	46	3
23.	Jemua	202	140	62	105	68	37
24.	Jorsa	55	53	2	99	56	43
25.	Jujghati	267	150	117	24	1	23
26.	Kalikapur	4	4	0	3	3	0
27.	Kansara	270	174	96	35	13	22
28.	Kanshai	7	5	2	44	36	8

S.No.	Village Name	MAIN_AL_P	MAIN_AL_M	MAIN_AL_F	MARG_AL_P	MARG_AL_M	MARG_AL_F
29.	Kendana	127	88	39	163	85	78
30.	Kotabaid	127	88	39	163	85	78
31.	Lakshmanbandi	19	6	13	176	107	69
32.	Madanpur	81	52	29	6	0	6
33.	Mejhia	178	165	13	64	23	41
34.	Mochrakend	54	53	1	244	146	98
35.	Nabashan	0	0	0	108	49	59
36.	Nimra	144	135	9	39	9	30
37.	Pabra	38	31	7	226	165	61
38.	Pairasol	44	43	1	23	15	8
39.	Palajuria	0	0	0	72	68	4
40.	Parbatipur	1	1	0	6	1	5
41.	Parulia	0	0	0	171	166	5
42.	Purunia	15	13	2	183	84	99
43.	Raghunathchak (CT)	8	7	1	6	4	2
44.	Ramlalpur	1	1	0	152	87	65
45.	Raniganj	506	403	103	294	212	82
46.	Ranipur	15	9	6	243	132	111
47.	Sahebganj (CT)	1	1	0	3	3	0
48.	Salma	313	284	29	600	186	414
49.	Shalroha	126	14	112	30	29	1
50.	Shyampur - 1	155	105	50	81	50	31
51.	Sitarampur	8	8	0	10	10	0
52.	Tarapur	50	48	2	92	36	56
53.	Tegharia	87	67	20	35	18	17
54.	Tirat	15	11	4	13	9	4

TABLE- 3.7.6: HOUSEHOLD INDUSTRY WORKERS CLASSIFICATION AS PER CENSUS 2011 (MAIN & MARGINAL)

S.No.	Village Name	MAIN_HH_P	MAIN_HH_M	MAIN_HH_F	MARG_HH_P	MARG_HH_M	MARG_HH_F
1.	Amkula (CT)	12	12	0	1	1	0
2.	Anandapur	0	0	0	1	0	1
3.	Andal(Gram) (CT)	9	8	1	1	0	1
4.	Arddhagram	14	9	5	3	1	2
5.	Baktarnagar (CT)	44	36	8	12	8	4
6.	Bakulia	0	0	0	0	0	0
7.	Ballavpur (CT)	22	15	7	17	4	13
8.	Banshra (CT)	14	13	1	10	1	9
9.	Belekuri (Belguria)	0	0	0	0	0	0
10.	Benathol	4	4	0	0	0	0
11.	Bharra	6	6	0	19	3	16
12.	Bhului (Bhulul)	0	0	0	0	0	0
13.	Bishjor	9	8	1	17	8	9
14.	Dahuka	0	0	0	0	0	0
15.	Damalia	2	2	0	4	3	1
16.	Damra	0	0	0	0	0	0
17.	Dhekia	1	1	0	4	4	0
18.	Durlabhpur	4	4	0	0	0	0
19.	Egara (CT)	20	15	5	61	33	28
20.	Gopalpur	0	0	0	6	1	5
21.	Gopinathpur	2	2	0	1	1	0
22.	Jamkuri	1	1	0	1	1	0
23.	Jemua	7	5	2	2	1	1
24.	Jorsa	0	0	0	1	0	1
25.	Jujghati	0	0	0	0	0	0
26.	Kalikapur	0	0	0	1	0	1
27.	Kansara	7	6	1	1	1	0

S.No.	Village Name	MAIN_HH_P	MAIN_HH_M	MAIN_HH_F	MARG_HH_P	MARG_HH_M	MARG_HH_F
28.	Kanshai	0	0	0	0	0	0
29.	Kendana	11	11	0	13	10	3
30.	Kotabaid	11	11	0	13	10	3
31.	Lakshmanbandi	0	0	0	2	2	0
32.	Madanpur	1	1	0	0	0	0
33.	Mejhia	27	26	1	56	51	5
34.	Mochrakend	28	26	2	2	2	0
35.	Nabashan	0	0	0	0	0	0
36.	Nimra	2	1	1	4	1	3
37.	Pabra	7	6	1	11	10	1
38.	Pairasol	22	18	4	48	32	16
39.	Palajuria	0	0	0	0	0	0
40.	Parbatipur	4	4	0	7	4	3
41.	Parulia	0	0	0	0	0	0
42.	Purunia	8	5	3	9	4	5
43.	Raghunathchak (CT)	27	19	8	5	4	1
44.	Ramlalpur	0	0	0	2	0	2
45.	Raniganj	268	222	46	217	126	91
46.	Ranipur	133	73	60	34	17	17
47.	Sahebganj (CT)	8	8	0	8	5	3
48.	Salma	12	9	3	9	4	5
49.	Shalroha	22	14	8	10	7	3
50.	Shyampur - 1	6	6	0	50	24	26
51.	Sitarampur	13	10	3	9	0	9
52.	Tarapur	27	24	3	4	3	1
53.	Tegharia	17	16	1	2	1	1
54.	Tirat	13	9	4	9	7	2

TABLE- 3.7.7: OTHER WORKERS CLASSIFICATION AS PER CENSUS 2011 (MAIN & MARGINAL)

S.No.	Village Name	MAIN_OT_P	MAIN_OT_M	MAIN_OT_F	MARG_OT_P	MARG_OT_M	MARG_OT_F
1.	Amkula (CT)	1350	1264	86	76	47	29
2.	Anandapur	149	145	4	16	9	7
3.	Andal(Gram) (CT)	1387	1259	128	577	498	79
4.	Arddhagram	295	236	59	68	42	26
5.	Baktarnagar (CT)	940	836	104	504	423	81
6.	Bakulia	41	33	8	13	9	4
7.	Ballavpur (CT)	1779	1600	179	400	288	112
8.	Banshra (CT)	1500	1305	195	349	186	163
9.	Belekuri (Belguria)	49	45	4	8	8	0
10.	Benathol	103	86	17	0	0	0
11.	Bharra	199	190	9	88	74	14
12.	Bhului (Bhulul)	71	70	1	3	3	0
13.	Bishjor	199	163	36	178	85	93
14.	Dahuka	23	20	3	11	8	3
15.	Damalia	152	117	35	157	114	43
16.	Damra	30	28	2	1	0	1
17.	Dhekia	250	205	45	71	55	16
18.	Durlabhpur	465	399	66	48	28	20
19.	Egara (CT)	2043	1861	182	471	255	216
20.	Gopalpur	46	36	10	2	0	2
21.	Gopinathpur	123	112	11	70	70	0
22.	Jamkuri	9	9	0	125	121	4
23.	Jemua	526	454	72	99	69	30
24.	Jorsa	69	65	4	7	6	1
25.	Jujghati	9	9	0	0	0	0
26.	Kalikapur	52	49	3	111	102	9
27.	Kansara	222	211	11	4	3	1

28.	Kanshai	110	96	14	65	44	21
29.	Kendana	53	47	6	13	10	3
30.	Kotabaid	53	47	6	13	10	3
31.	Lakshmanbandi	52	50	2	68	60	8
32.	Madanpur	27	25	2	7	2	5
33.	Mejhia	1087	1026	61	135	124	11
34.	Mochrakend	162	149	13	159	95	64
35.	Nabashan	0	0	0	0	0	0
36.	Nimra	154	146	8	37	14	23
37.	Pabra	405	361	44	417	332	85
38.	Pairasol	43	35	8	78	65	13
39.	Palajuria	42	38	4	111	110	1
40.	Parbatipur	322	294	28	44	34	10
41.	Parulia	3	2	1	0	0	0
42.	Purunia	42	39	3	34	27	7
43.	Raghunathchak (CT)	1731	1559	172	252	150	102
44.	Ramlalpur	22	21	1	10	10	0
45.	Raniganj	18938	17026	1912	5505	3918	1587
46.	Ranipur	236	190	46	96	60	36
47.	Sahebganj (CT)	1269	1118	151	251	175	76
48.	Salma	188	170	18	15	10	5
49.	Shalroha	281	254	27	105	90	15
50.	Shyampur - 1	477	397	80	108	31	77
51.	Sitarampur	251	229	22	108	44	64
52.	Tarapur	1032	939	93	90	68	22
53.	Tegharia	314	294	20	48	48	0
54.	Tirat	1100	952	148	245	171	74

TABLE- 3.7.8: NON WORKERS CLASSIFICATION AS PER CENSUS 2011

S.No.	Village Name	NON_WORK_P	NON_WORK_M	NON_WORK_F
1.	Amkula (CT)	3961	1568	2393
2.	Anandapur	485	171	314
3.	Andal(Gram) (CT)	4179	1375	2804
4.	Arddhagram	738	263	475
5.	Baktarnagar (CT)	3518	1256	2262
6.	Bakulia	357	167	190
7.	Ballavpur (CT)	4130	1381	2749
8.	Banshra (CT)	3763	1451	2312
9.	Belekuri (Belguria)	641	209	432
10.	Benathol	296	137	159
11.	Bharra	1297	471	826
12.	Bhului (Bhulul)	174	60	114
13.	Bishjor	682	283	399
14.	Dahuka	834	302	532
15.	Damalia	702	248	454
16.	Damra	349	100	249
17.	Dhekia	892	325	567
18.	Durlabhpur	1182	448	734
19.	Egara (CT)	4940	1698	3242
20.	Gopalpur	614	253	361
21.	Gopinathpur	1055	370	685
22.	Jamkuri	489	147	342
23.	Jemua	2189	799	1390
24.	Jorsa	553	212	341
25.	Jujghati	193	90	103
26.	Kalikapur	461	148	313
27.	Kansara	1070	382	688
28.	Kanshai	607	194	413

29.	Kendana	779	291	488
30.	Kotabaid	779	291	488
31.	Lakshmanbandi	723	269	454
32.	Madanpur	557	208	349
33.	Mejhia	3570	1172	2398
34.	Mochrakend	1194	433	761
35.	Nabashan	84	44	40
36.	Nimra	899	322	577
37.	Pabra	2813	979	1834
38.	Pairasol	839	272	567
39.	Palajuria	930	316	614
40.	Parbatipur	921	314	607
41.	Parulia	374	116	258
42.	Purunia	593	238	355
43.	Raghunathchak (CT)	3962	1395	2567
44.	Ramlalpur	445	180	265
45.	Raniganj	57419	21706	35713
46.	Ranipur	983	390	593
47.	Sahebganj (CT)	3171	1117	2054
48.	Salma	2267	990	1277
49.	Shalroha	900	335	565
50.	Shyampur - 1	2048	778	1270
51.	Sitarampur	568	175	393
52.	Tarapur	3072	1045	2027
53.	Tegharia	1236	441	795
54.	Tirat	2801	1003	1798

CHAPTER – 4
ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

4.1 INTRODUCTION

Impact prediction is a very important phenomenon in evaluating the environmentally potential adverse impacts for any proposed industrial project. The impact prediction is always carried out under worst possible conditions so as to mitigate or to eliminate the environmental hazards. These predictions are superimposed over the baseline data to calculate the net impact on the environment after the proposed plant comes into production.

4.2 AIR ENVIRONMENT

It is possible that increase in the background concentration of even a minor constituent of the atmosphere may lead to significant changes in the atmospheric properties. So these changes are essential in understanding potential climatic changes due to air pollutants. For example under strongly stable conditions, disturbances are highly damped and mixing of pollutants is strongly suppressed. It is under such conditions that the worst air pollution episodes have occurred. Several scientific techniques and methodologies are available to predict impacts of developmental activities on physico, ecological and socioeconomic environments. Such predictions are superimposed over the baseline (pre project) status of environmental quality to derive the ultimate (post project) scenario of environmental conditions. The prediction of impacts helps to identify the environmental management plan required to be executed during and after commissioning of the proposed plant to minimize the adverse impacts on environmental quality.

The mathematical models are the best tools to quantitatively describe cause-effect relationships between sources of pollution and different components of environment. In case, mathematical models are not available or it is not possible to identify / validate through models for particular situation, prediction could be arrived at through available scientific knowledge and judgments.

The mathematical model used for predictions in the present study include, steady state Gaussian Plume dispersion model designed for multiple point sources for air quality, Wave divergence and Federal Highway Administration (FHWA) models for noise levels. In case of water, land, biological and socio-economic environments the prediction have been made based on available scientific knowledge and judgments.

4.2.1 IMPACT ON TOPOGRAPHY AND CLIMATE

4.2.1.1 IMPACT ON TOPOGRAPHY

The major envisaged topographical changes would be limited to the immediate vicinity of the plant. The change in topography will be only due to manmade structures like Industrial complex and Administrative building. Similarly, it will invite positive benefits in the form of land levelling and green belt development in the plant vicinity.

4.2.1.2 IMPACTS ON CLIMATE

As the temperature of the effluent gases will not be high, generally this will not cause any thermal imbalance as extensive greenbelt will be developed within the plant premises. However, there will be natural dispersion of heat due to unstable conditions during day and as such there would be no significant micro / macro climatologically changes of any consequence.

4.2.2 PREDICTION OF IMPACTS ON AIR ENVIRONMENT [Std.TOR # 6 (i) & 7(i)]

It is absolutely essential to study the impacts of air pollution on its environs due to the proposed project. These impacts are assessed with the help of Mathematical model based on steady state Gaussian Plume Dispersion Model designed for multiple point sources for short term. In the present case, Industrial Source Complex Short Term (ISC-3), 1993 dispersion model based on steady state Gaussian plume dispersion, designed for multiple point sources for short term developed by United States Environment Protection Agency (USEPA) has been used for simulations from point sources.

Model Input

Emissions: The stack emissions from the of proposed unit, Fugitive emissions, Vehicular emissions &Other Industries in the study area are considered for modelling. The emission data from the stack of proposed unit is shown in **Table 4.2.3.**

Receptor Locations

The software is capable of generating a polar receptor grid at every 10 radial angles at specified distances (in Kms).

Meteorological data

For the prediction of rise in Ground Level concentrations of pollutants, the actual hourly meteorological data recorded at the site during the study period **(1st March 2021 to 31st May 2021)** is converted to mean meteorological hourly data as specified by CPCB and the same is used in the model. In the absence of site specific mixing heights, mixing heights published in 'Spatial distribution of hourly mixing depths over Indian region' by Dr. R.N.Gupta have been used.

For each hour the following meteorological information required

- Wind direction
- Wind speed
- Ambient Temperature
- Stability class
- Mixing Height

Predictions have been carried out for these emissions considering the following points.

- Predictions have been carried out for 100% load where the maximum emissions are emitted and which would be the worst environmental scenario.
- Predictions have been carried out for PM_{10}, SO_2 and NOx.

- **Pasquill Stability Class Through Sigma Theta Method**

Hourly meteorological data recorded hourly, at the continuous weather monitoring station on wind speed and direction, has been used for calculating the stability by using Sigma Theta method (Ref: On site meteorological program guidance for regulatory modeling applications, US-EPA).

Calculation of standard deviation of wind direction:

Hourly wind direction has been recorded. The one hourly wind direction data (standard deviation; σA) in degrees has been used for determining the hourly stability.

Lateral Turbulence (σA) and Wind Speed or Sigma Theta Method:

The hourly σA values calculated by the data logger are used for arriving at the hourly stability's by the following procedure:

The following section describes the method of estimating stability categories in terms of standard deviation of the lateral wind direction fluctuations (σA) and the scalar mean wind speed (us). The lateral wind direction turbulence criteria for initial estimate of PG stability category are given in Table - 4.2.1. The wind speed adjustments for determining final estimate of PG stability category from σA is given in Table - 4.2.2. The criteria laid down in the tables below are for the data collected at 10m and roughness length of 15 cm. Night time is defined as the period from one hour before sunset to one hour after sunrise. The method specifies that the data need to be collected at 10 m height. The relationship employed in the estimation methods assumes conditions are of steady state.

Table No. 4.2.1: Lateral Turbulence Criteria For Initial Estimate Of Stability

Initial estimate of Pasquill Stability Category	Standard deviation of horizontal wind direction fluctuations, σA, in degrees
A	22.5 ≤ σA
B	17.5 ≤ σA < 22.5
C	12.5 ≤ σA < 17.5
D	7.5 ≤ σA < 12.5
E	3.8 ≤ σA < 7.5
F	σA < 3.8

Table No. 4.2.2 :

Wind Speed Adjustments For Determining Final Estimate Of Pg Stability Category From σA

	Initial Estimated Category	10 m Scalar Wind Speed (US) (m/s)	Final Estimate of Stability Category
Day time	A	US<3 3<US<4 4<US<6 6<US	A B C D
	B	US<4 4<US<6 6<US	B C D
	C	US<6 6<US	C D
	D, E or F	ANY	D
Night time	A	US<2.9 2.9<US<3.6 3.6<US	F E D

	Initial Estimated Category	10 m Scalar Wind Speed (US) (m/s)	Final Estimate of Stability Category
	B	US<2.4 2.4<US<3.0 3.0<US	F E D
	C	US<2.4 2.4<US	E D
	D	ANY	D
	E	US<5.0 5.0<US	E D
	F	US<3.0 3.0<US<5.0 5.0<US	F E D

Atmospheric inversion levels have been determined for assessment of Ground Level concentrations.

Presentation of results

In the present case model simulations have been carried out for the Summer season. For the short term simulations, the concentrations have been estimated around 1600 receptors to obtain optimum description of variations in concentrations over the site in 10 Km. radius covering 16 directions.

Model Output

The output contains the first through sixth highest concentration values at each receptor, Maximum concentration tables and daily concentration tables for each averaging period.

Table No. 4.2.3: Prediction of Impacts & Mitigation Measures

IMPACT ENVIRONMENT	IDENTIFIED IMPACTS	MITIGATION MEASURES
Air Environment	**Particulate emissions**	
	• Coal transportation	• Covered trucks
	• Unloading of coal	• Dust suppression system (fog type and water spray system)
	• Coal Handling Plant	• Dust extraction system with bagfilters
	• Coal transfer points	• Dust extraction system with bagfilters
	• Coal conveying	• Covered conveyers to prevent flying of dust during conveying
	• Stacks attached to the DRI Kiln, FBC Boiler	• Electro Static Precipitator (ESP) will be provided to bring down the PM to 30 mg/Nm^3 for DRI plant and 30 mg/Nm^3 for Power plant.

IMPACT ENVIRONMENT	IDENTIFIED IMPACTS	MITIGATION MEASURES
	• Ash handling & storage	• Fly ash will be stored in silos only.
	• Vehicular movement	• All internal roads will be made pucca. • Avenue plantation will be developed on both sides of village roads and internal roads.
	• Sulphur dioxide emissions	• Limestone to be used as Raw material in DRI kiln to act as sulphur absorbent. • Automated Lime dosing system will be provided to treat the flue gases from the Power Plant to bring down the SO_2 emissions to below 100 mg/Nm^3 as per MoEF&CC emission standards applicable from 1st January 2017. • A flue gas velocity of 15 m/s will be maintained for effective dispersion of emissions.
	• NOx emissions	• Ultralow NOx burner with three stage combustion, flue gas recirculation and auto combustion control system will be provided to CFBC boiler. • NOx emissions from the Power Plant will be brought down to below 100 mg/Nm^{3}as per MoEF&CC emission standards applicable from 1st January 2017.

4.2.3 STACK HEIGHT CALCULATION [Spec. ToR # 5]

a) FOR PELLET PLANT (0.8 MTPA)

with LDO / LSHS

LDO / LSHS consumption	:	25.1 TPD (25.6 KLD)
Sulphur content furnace oil	:	1.8 %
SO2 emission	:	25.1 x 1000 x 1.8 x 2 / 2400
	:	37.65 Kg/hr
Stack Height H,	:	14 $(Q)^{0.3}$
	:	14 $(37.65)^{0.3}$
	:	41.57 m

With Anthracite Coal

Anthracite Coal consumption	:	85 TPD
Sulphur content in Coal	:	0.6 %
SO_2 emission	:	85 x 1000 x 0.6 x 2 / 2400
	:	42.5 Kg/hr

Stack Height H, : $14 (Q)^{0.3}$
: $14 (42.5)^{0.3}$
: 43 m

Hence a Stack of 43 m height provided to 0.8 mTPA Pellet Plant will be adequate for effective dispersion of Sulphur dioxide emissions into the atmosphere.

b) For Sponge Iron (for 1 x 425 TPD DRI Kiln attached to WHRB)

With Indian Coal

Coal consumption for 425 TPD DRI Kiln	:	553 TPD
Max. Sulphur content in coal	:	1.0 % (by mass max.)
Total Sulphur dioxide Emission	:	553 x 1000 x 1.0 x 2 / 24 x 100
	:	460.86 kg / hour
Considering 40 % Sulphur absorption of SO2 emission		
	:	276.51 kg / hour
Stack height H	:	$14 (Q)^{0.3}$
	:	$14 (276.15)^{0.3}$
	:	**75.62 m Say 76 m**

With Imported Coal

Coal consumption for 425 TPD DRI Kiln	:	379 TPD
Max. Sulphur content in coal	:	1.0 % (by mass max.)
Total Sulphur dioxide Emission	:	379 x 1000 x 1.0 x 2 / 24 x 100
	:	315.66 kg / hour
Considering 40 % Sulphur absorption of SO2 emission		
	:	189.40 kg / hour
Stack height H	:	$14 (Q)^{0.3}$
	:	$14 (189.40)^{0.3}$
	:	**67.51 m Say 68 m**

Hence a stacks of 76 m height will be provided to each 425 TPD DRI Kiln for effective dispersion of emission into the atmosphere.

a) For Induction Furnace

3 nos. of combined stacks (with twin flue) each of 30 m height (minimum as per CPCB norms) will be provided 3 x 15 T, 3 x 17 T & 2 x 17 T Induction Furnaces for effective dispersion of emissions.

c) For 1 x 1000 TPD & 1 x 300 TPD Rolling Mills (With 80% Hot charging & 20 % RHF)

It is proposed with 80% Hot charging & 20 % RHF. Hence 1040 TPD will be through Hot charging & 260 TPD will be through RHF.

It is proposed to use LDO/LSHS as fuels for Reheating Furnace.

With LDO / LSHS as fuel

LDO / LSHS consumption for 260 TPD Rolling mill	:	8.3 TPD
Sulphur content LDO	:	1.8 %
SO_2 emission	:	8.3 x 1000 x 1.8 x 2 / 2400
	:	12.48 Kg/hr
Stack Height H,	:	$14 (Q)^{0.3}$
	:	$14 (12.48)^{0.3}$
	:	29.9 Say **30 m**

Hence a stack of 30 m height will be provided to RHF attached to Rolling mill unit considering worst case scenario for effective dispersion of SO_2 emission into the atmosphere.

d) For 1x 18 MW Power Plant (through FBC boiler – 1 x 72 TPH)

Entire dolochar generated from the plant i.e. 425 TPD will be used as fuel in FBC boiler. The following will be the fuel requirement which represents the worst environmental scenario.

With Indian Coal

Coal consumption for 72 TPH Boiler	:	366.54 TPD
Max. Sulphur content in coal	:	0.5 % (by mass max.)
Total Sulphur dioxide Emission	:	366.54 x 1000 x 0.5 x 2 / 24 x 100
	:	152.72 kg / hour
Stack height H	:	$14 (Q)^{0.3}$
	:	$14 (152.73)^{0.3}$
	:	**63.3 m Say 64 m**

With Imported Coal

Coal consumption for 72 TPH Boiler	:	266.67 TPD
Max. Sulphur content in coal	:	1.0 % (by mass max.)
Total Sulphur dioxide Emission	:	266.67 x 1000 x 1.0 x 2 / 24 x 100
	:	222.22 kg / hour
Stack height H	:	$14 (Q)^{0.3}$
	:	$14 (222.22)^{0.3}$
	:	**70.8 m Say 71.0 m**

Hence a stack of 71 m height will be provided to 1 x 72 TPH boiler for effective dispersion of emission into the atmosphere.

4.2.4 INCREMENTAL GROUND LEVEL CONCENTRATIONS

The predicted max. incremental PM_{10} concentrations (24 hourly) due to the emissions from operation of proposed expansion project will be **1.3 µg/m³** at a distance of 1100 m from the stack in the down wind direction over the baseline concentrations.

The predicted incremental rise in PM concentration due to the Vehicular emission will be **1.2 µg/m³**.

Hence the total predicted incremental rise in Particulate Matter concentration due to the emission from proposed expansion project and due the vehicular emissions will be 1.3 µg/m³ + 1.2 µg/m³ = **2.5 µg/m³.**

The predicted max incremental SO_2 concentrations (24 hourly) due to the emissions from operation of proposed expansion project will be **18.1 µg/m³** at a distance of 1100 m from the stack in the down wind direction over the baseline concentrations.

The predicted max incremental NOx concentrations (24 hourly) due to the emissions from operation of proposed project will be **6.0 µg/m³** at a distance of 1100 m from the stack in the down wind direction over the baseline concentrations.

The predicted incremental rise in NOx concentration due to the Vehicular emission will be **9.1 µg/m³**.

Hence the total predicted incremental rise in NOx concentration due to the emission from project and due the vehicular emission will be 6.0 µg/m³ + 9.1 µg/m³ = **15.1 µg/m³**

The predicted incremental rise in CO concentration due to the Vehicular emission will be **6.4 µg/m³**.

The net resultant concentrations (Maximum baseline conc. + predicted incremental rise in conc.) of PM, SO_2 and NO_X shown in Table No. 4.2.4, by considering the emissions from other industries in the area will be well within the National Ambient Air Quality Standards (NAAQS) when the plant will commence the operation.

Table No.4.2.4: STACK EMISSION DETAILS [Std. ToR # 3 (vi) & 7 (v)]

S.No.	Stack attached to	Dia (m)	Height (m)	Temp. of flue gas (°C)	Velocity of flue gas (m/sec)	PM (g/s)	SO_2 (g/s)	NOx (g/s)
	Units yet to be implemented as per Earlier E.C							
1.	Electric Arc Furnace with LRF & AOD converter (1 x 30 T)	1.6	35 (1 no.)	100	15	0.78	---	5.2
2.	SEAF (2 x 9 MVA) **(Combined Stack)**	1.3 per flue	35 (1 no.)	150	15	0.42 (per flue)	---	2.8 (per flue)
	Present Proposal							
3.	I/O Beneficiation plant **(1.0 MTPA)**	1.2	30 (1 no.)	50	15	0.4	---	---
4.	Pellet Plant ***(1 x 0.8 mTPA)***	1.8	43 (1 no.)	140	15	0.6	11.8	3.9
5.	DRI kiln with WHRB (1 x 425 TPD)	2.7	76	170	15	1.74	76.7	11.6
6.	DRI kiln with WHRB (1 x 425 TPD)	2.7	76	170	15	1.74	76.7	11.6
7.	DRI kiln with WHRB (1 x 425 TPD)	2.7	76	170	15	1.74	76.7	11.6
8.	DRI kiln with WHRB (1 x 425 TPD)	2.7	76	170	15	1.74	76.7	11.6
9.	Induction Furnace (3 x 15 T) **(Combined Stack)**	1.3 (per flue)	30 (1 no.)	100	15	0.46 (per flue)	---	3.1 (per flue)
10.	Induction Furnace (3 x 17 T) **(Combined Stack)**	1.3 (per flue)	30 (1 no.)	100	15	0.53 (per flue)	---	3.5 (per flue)
11.	Induction Furnace (2 x 17 T) **(Combined Stack)**	1.3 (per flue)	30 (1 no.)	100	15	0.53 (per flue)	---	3.5 (per flue)

12.	Rolling Mill # 1 (20% RHF)	1.0	32	180	15	0.2	3.5	1.4
13.	Rolling Mill # 2 (20% RHF)	1.0	32	180	15	0.2	3.5	1.4
14.	AFBC Boiler * (1 x 72 TPH Boiler)	2.2	71 (1 no.)	170	15	1.11	3.69	3.69
*** Emission calculation are based on emission standards notified by MoEF&CC vide S.O. no. 3305 (E) dated 7th December 2015.** **# In DRI & AFBC boiler SO_2 emission is considered after Lime Absorption.**								

Table No. 4.2.5 : NET RESULTANT MAXIMUM CONCENTRATIONS DURING THE OPERATION OF THE PROPOSED PROJECT (APCS WORKING SCENARIO)[Gen. TOR # 7(i)]

Item	PM_{10} ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	CO ($\mu g/m^3$)
Maximum baseline conc. in the study area	77.8	14.2	28.9	1445
Maximum predicted incremental rise in concentration due to proposed expansion of **SSML**	1.3	18.1	6.0	6.4
Maximum predicted incremental rise in concentration due to **Vehicular Emissions from the proposed expansion project**	1.2	---	9.1	---
Net resultant concentrations during operation of the plant	80.3	32.3	44.0	1451.4
National Ambient Air Quality Standards	**100**	**80**	**80**	**2000**

The net resultant Ground level concentrations during operation of the proposed project are within the NAAQS. Hence, there will not be any adverse impact on air environment due to the proposed project.

Air Quality contour maps showing net resultant maximum concentrations are shown below.

[Gen.TOR # 7 (i)]

Figure 4.1: Air Modelling Contour diagram due to Plant (PM)

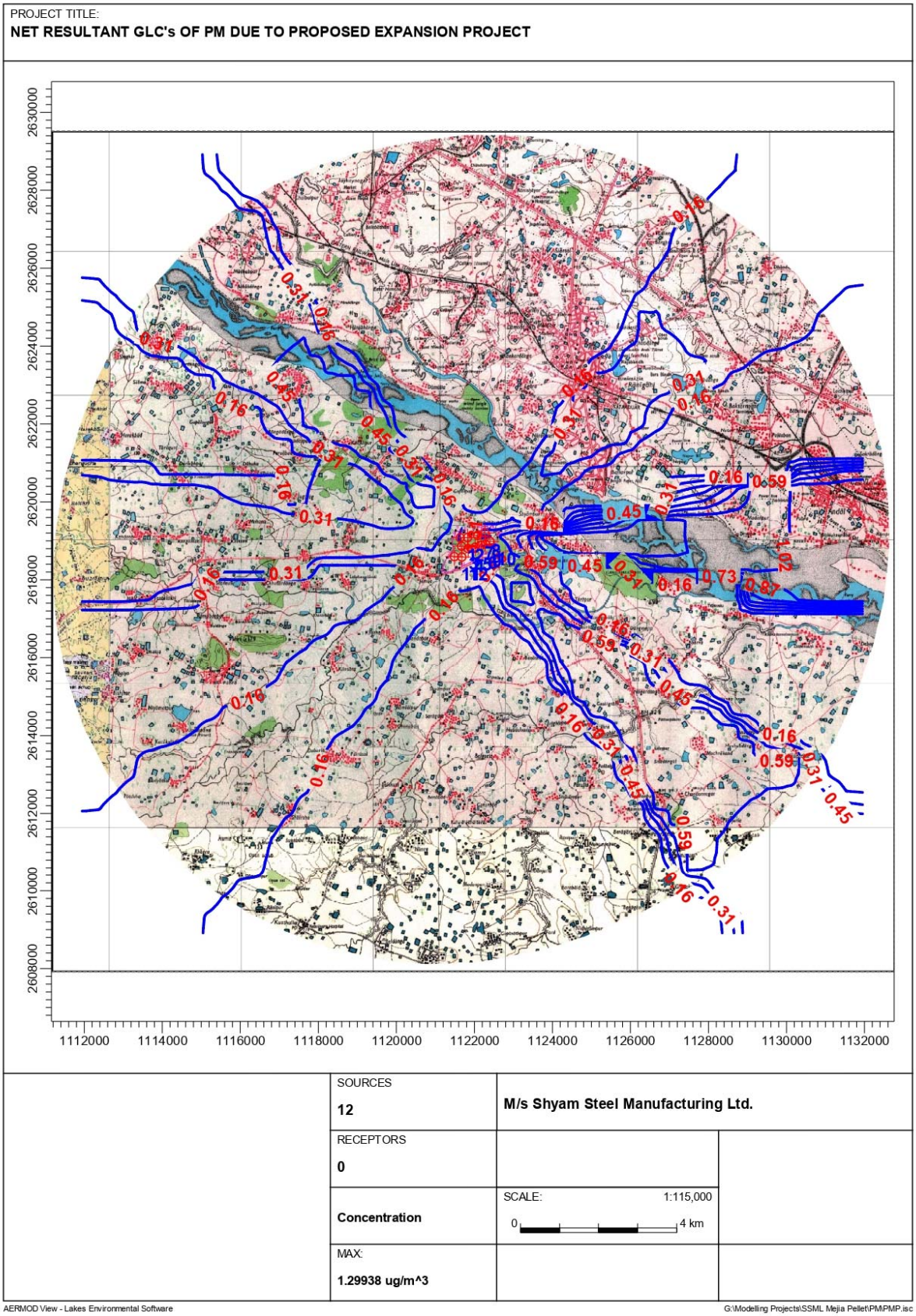


Figure 4.2 : Air Modelling Contour diagram due to Vehicle (PM)

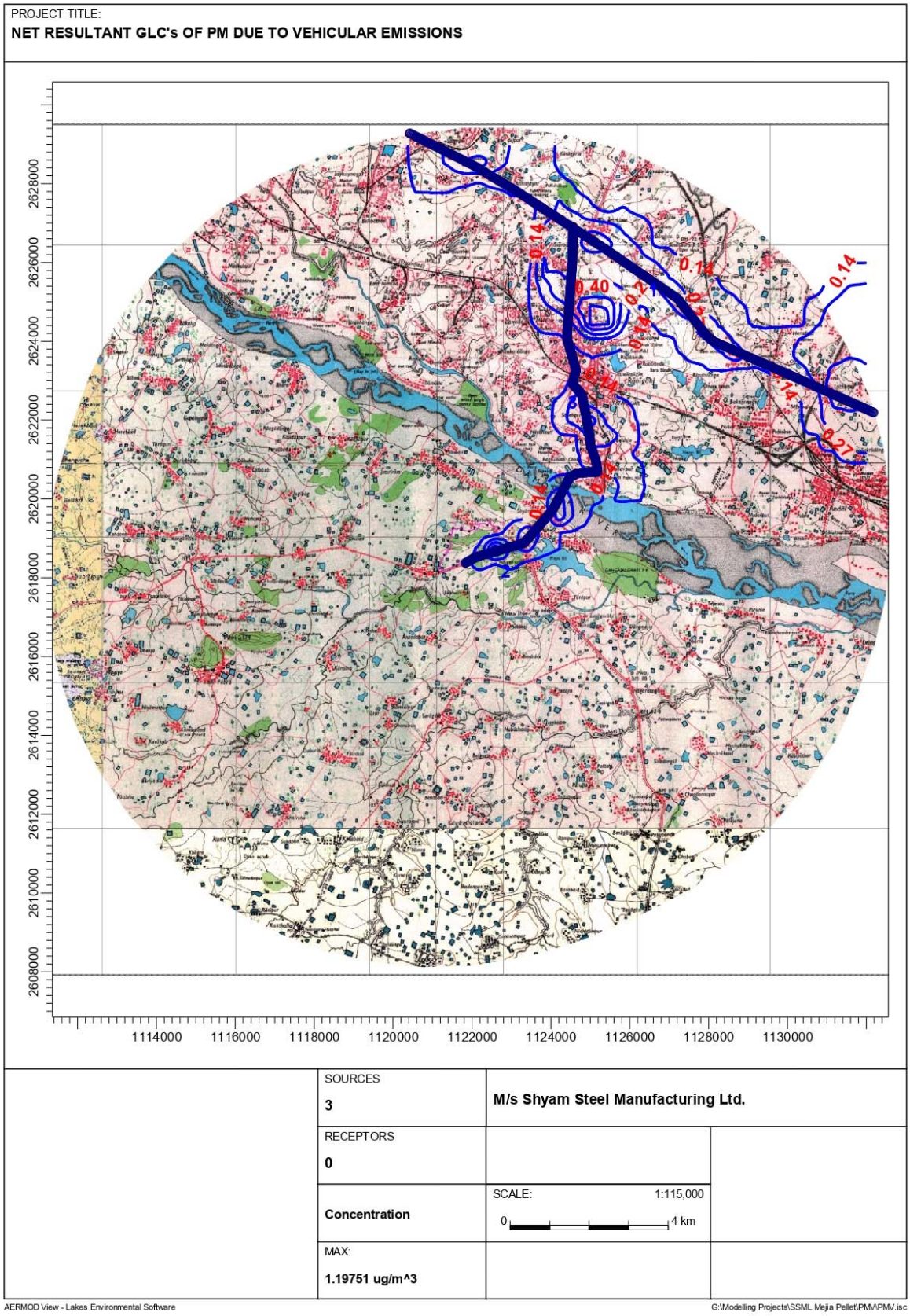


Figure 4.3: Air Modelling Contour diagram due to Plant (SO_2)

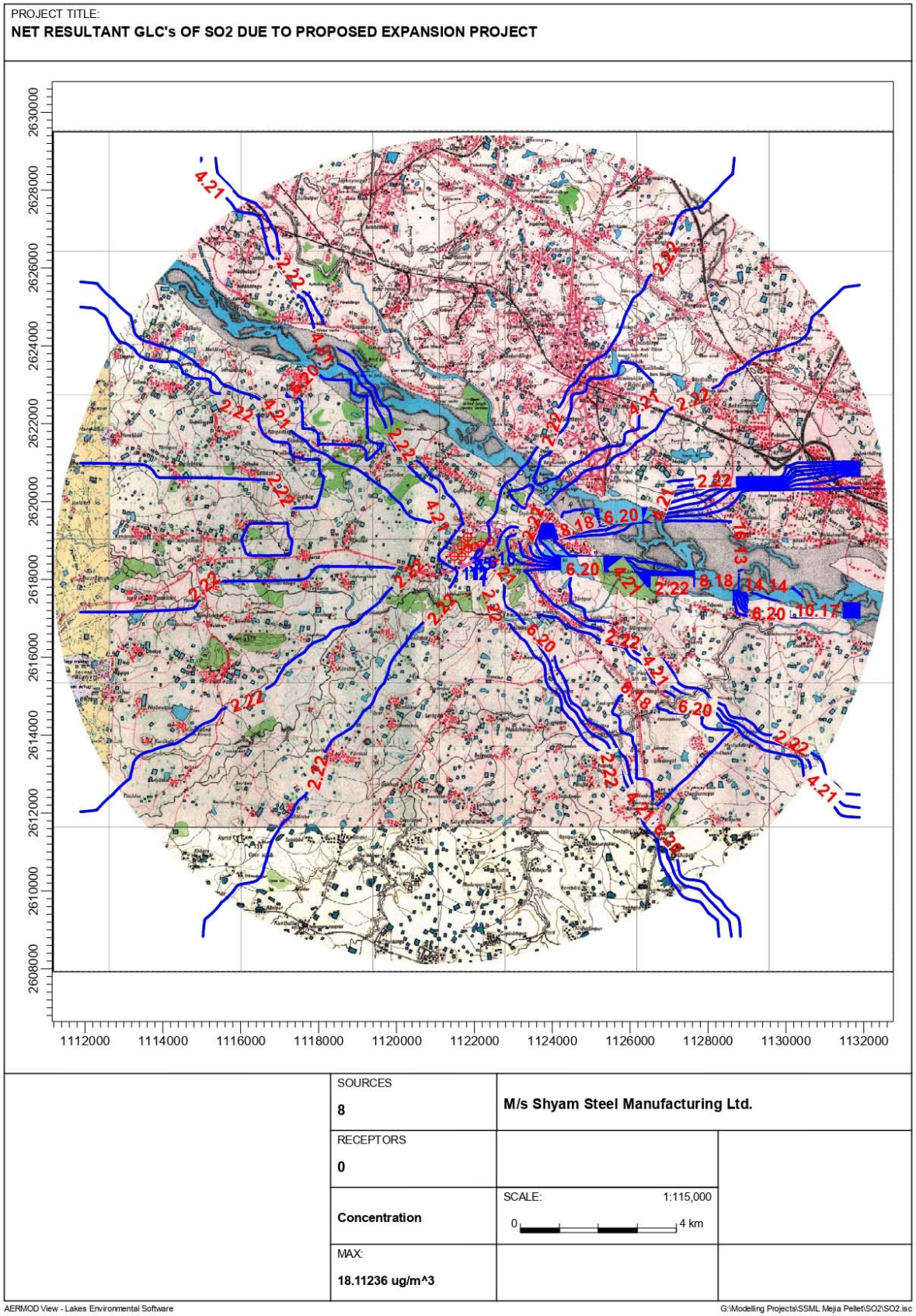


Figure 4.4: Air Modelling Contour diagram due to Plant (NOx)

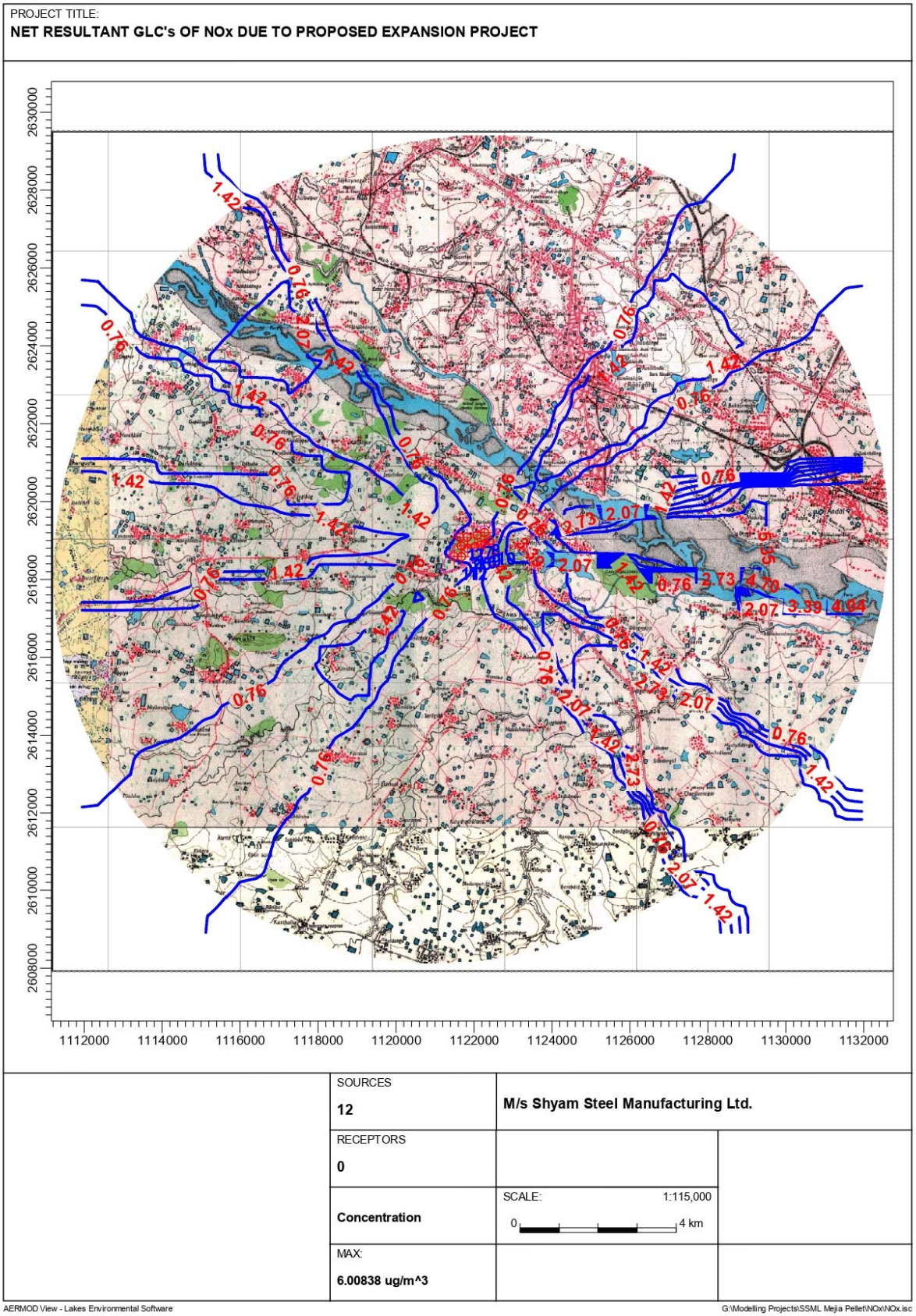


Figure 4.5: Air Modelling Contour diagram due to Vehicle (NOx)

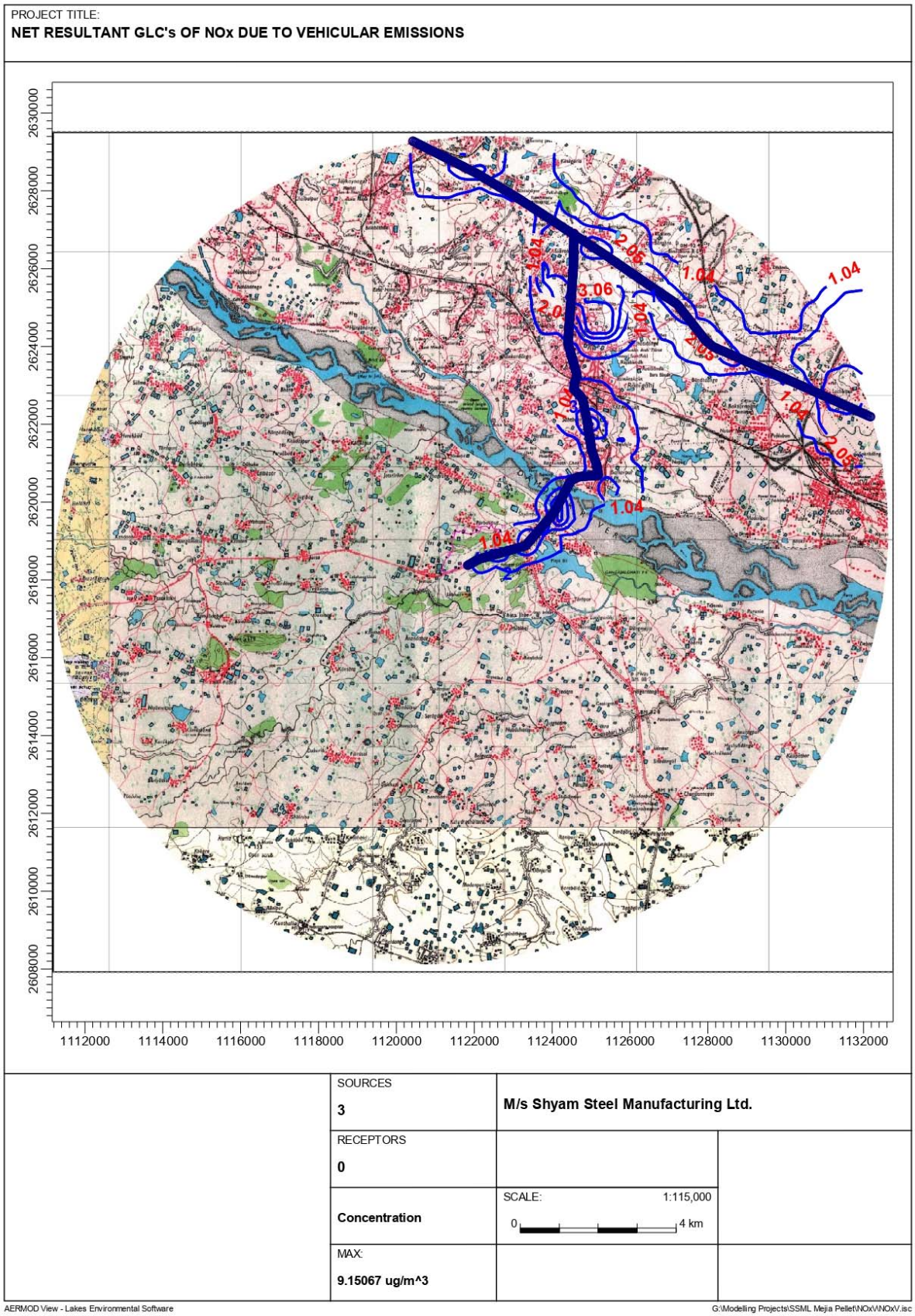


Figure 4.6: Air Modelling Contour diagram due to Vehicle (CO)

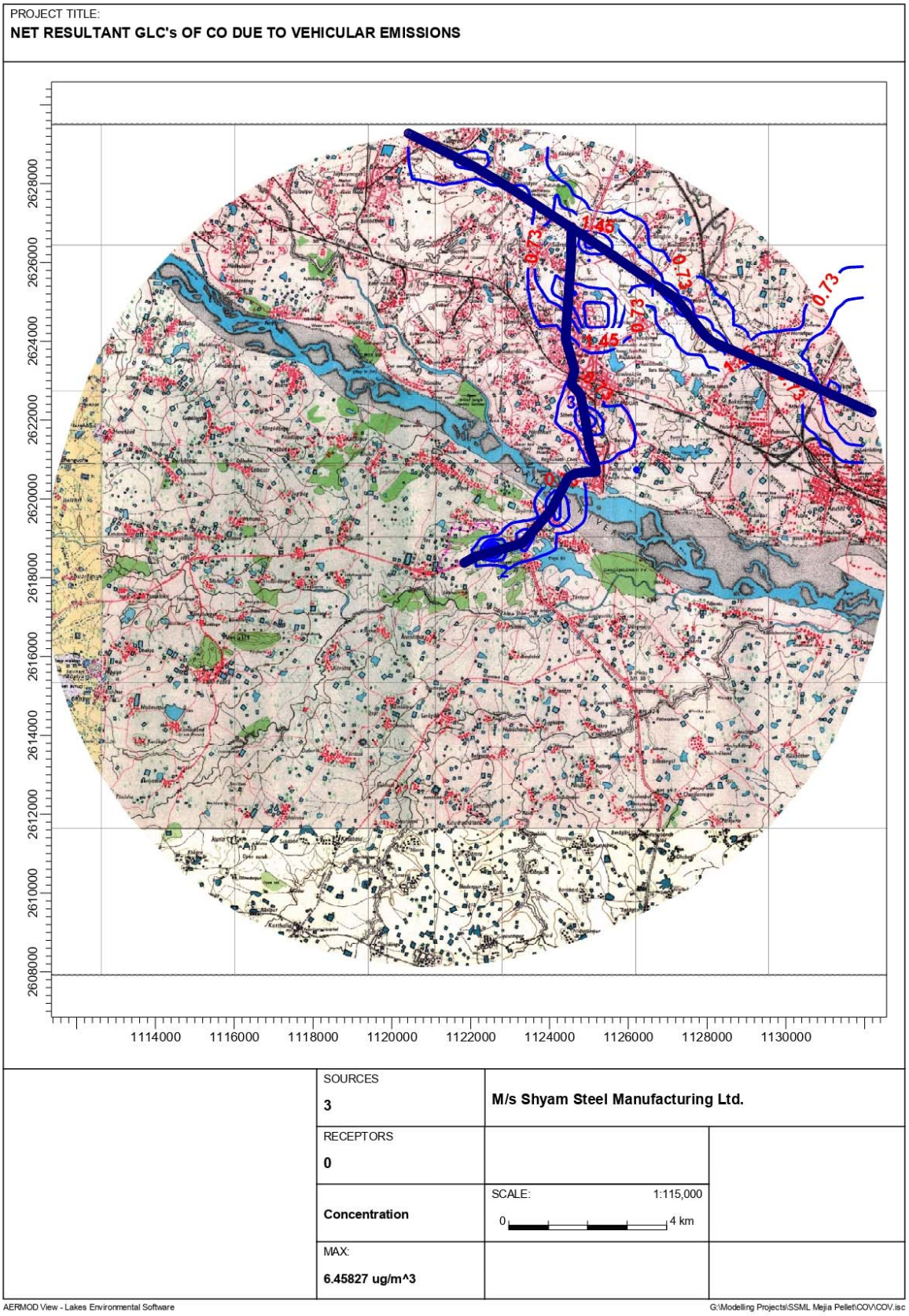


TABLE No.4.2.6: NET RESULTANT MAXIMUM CONCENTRATIONS DURING THE OPERATION OF THE PROPOSED PROJECT (APCS NOT WORKING SCENARIO)

Item	PM_{10} ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	CO ($\mu g/m^3$)
Maximum baseline conc. in the study area	77.8	14.2	28.9	1445
Maximum predicted incremental rise in concentration due to proposed expansion of **SSML**	130.5	18.1	6.0	6.4
Maximum predicted incremental rise in concentration due to Vehicular Emissions from the proposed expansion project.	1.2	---	9.1	---
Net resultant concentrations during operation of the plant	209.5	32.3	44.0	1451.4
National Ambient Air Quality Standards	**100**	**80**	**80**	**2000**

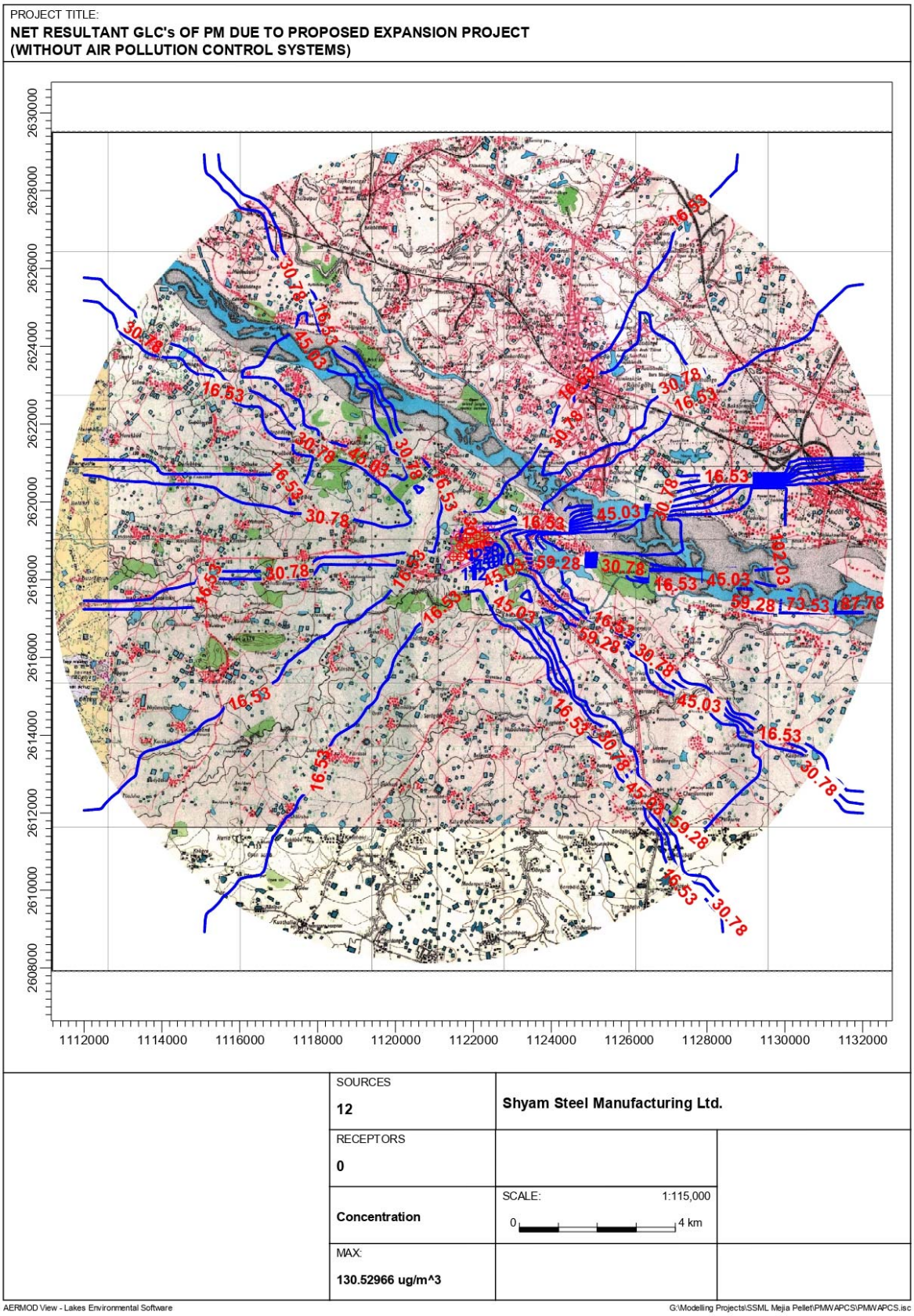
The net resultant Ground level concentrations during operation of the project when APCS is not working is exceeding the NAAQS. If APCS is not working, then raw material feed will be stopped. Consequently, there will be no production in the unit till APCS is rectified.

Air Quality contour map showing net resultant maximum concentration of PM during APCS not working scenario are shown in Figure 4.6.

The net resultant Ground level concentrations during operation of the project when APCS is not working is exceeding the NAAQS.

- Whenever APCS is not working, then raw material feed will be stopped.
- Consequently, there will be no production in the unit till APCS is rectified.
- Emergency alert will be made to inform the nearest habitations.
- Water sprinklers will be utilised for dust suppression.

Figure 4.7 : Air Modelling Contour diagram due to Plant (PM) without APCS working



4.3 PREDICTION OF IMPACTS ON WATER ENVIRONMENT

4.3.1 WATER REQUIREMENT [Std.TOR # 3(vii)]

- Water required in the existing plant is 1050 KLD and same being sourced from Damodar river.
- Water required for the proposed expansion project will be 3420 KLD and same will be sourced from Damodar river.
- Air cooled condensers have been provided in existing power plant. In expansion also air-cooled condensers will be provided.
- Total water requirement after the proposed expansion will be 4470 KLD.
- Water permission from Damodar Valley Corporation has already been obtained for 1.3 MGD (i.e. 5909.75 KLD). A copy of the Agreement for drawl of water from Damodar river, between Damodar Valley Corporation (DVC) and Shyam Steel Manufacturing Ltd. (Earlier Sova Ispat Ltd.) is enclosed as **Annexure # 4**.
- Hence separate water drawl permission will not be required even after the present expansion also.

The details of total water consumption, it's breakup and total waste water generation and it's breakup are shown in Table No. 4.3.1. & 4.3.2. Characteristics of waste water are shown in Tables No. 4.3.3. Rain water harvesting pits have been proposed to recharge the precious ground water in consultation with Ground Water Board. The depth of ground water table will certainly increase Rain water harvesting measures.

Table No. 4.3.1: Water Requirement breakup

S.No.	Unit	Quantity in KLD		
		Existing Plant	Proposed Expansion	Total after Expansion
1.	Iron Ore Beneficiation Plant	---	500	500
2.	Pellet Plant	---	300	300
3.	DRI Kilns	100	560	660
4.	Induction Furnace	200	320	520
5.	Electric Arc Furnace	---	200	200
6.	Rolling Mill with RHF	200	390	590
7.	Ferro Alloy Plant	30	30	60
8.	Cement Plant	150	---	150
9.	Power Plant (WHRB & FBC)	350	1080	1430

10.	Domestic	20	40	60
	Total water requirement	**1050**	**3420**	**4470**

4.3.2 WASTEWATER GENERATION

Existing

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

Proposed

- There will be no effluent discharge in the I/O Beneficiation, Pellet Plant, DRI Unit, Induction Furnace Unit, Electric Arc Furnace, Ferro Alloys as closed circuit cooling system will be adopted.
- Effluent from Rolling mill will be sent to settling tank and will be recycled through closed circuit cooling system.
- Effluent from power plant will be treated in ETP and after ensuring compliance with WBPCB norms, it will be utilized for dust suppression, ash conditioning and for greenbelt development.
- Air cooled condenser will be provided in the power plant, which will reduce the water consumption significantly. Hence wastewater generation will be also be minimized.
- Sanitary waste water will be treated in STP and after treatment it will be utilized for greenbelt development.
- Zero liquid effluent discharge practice will be continued in the proposed expansion also.
- During monsoon the treated effluent will be utilized as makeup water in Rolling Mill. Accordingly, the makeup water for Rolling mill also reduces during the rainy period.

TABLE NO. 4.3.2: BREAKUP OF WASTEWATER GENERATION

S.No.	Source	Generation (KLD)		
		Existing Operating plant	Proposed Expansion	After Proposed Expansion
1.	DRI Kilns	---	---	---
2.	Induction Furnaces	---	---	---
3.	Electric Arc Furnace	---	---	---
4.	Submerged Electric Arc Furnaces	---	---	---
5.	Power Plant	133	410	543
	a) Cooling Tower blowdown	42	130	172
	b) Boilers blowdown	36	110	146
	c) D.M. plant regeneration water	55	170	225
6.	Sanitary Wastewater	16	32	48
	Total	**149**	**442**	**591**

4.3.3 IMPACT ON SURFACE WATER BODIES

- Damodar river is flowing at a distance of 1.5 Kms. From the plant site.
- Water required is being / will be sourced from Damodar river for existing plant and for proposed expansion project.
- Water permission from Damodar Valley Corporation has already been obtained for 1.3 MGD (i.e. 5909.75 KLD).
- There will be no effluent discharge in the Pellet Plant, DRI Kiln, Induction Furnace & Rolling Mill as closed circuit cooling system will be adopted.
- Air-cooled condensers will be provided in power plant.
- Effluent from power plant will be treated and after ensuring compliance with SPCB norms, it will be utilized for dust suppression, ash conditioning and for greenbelt development.
- Garland drains will be constructed around the storage yards to prevent any run off from the storage yards entering into the water bodies.
- Sanitary waste water will be treated in STP. There will not be any effluent discharge outside the premises. ZLD will be followed.
- Rain water harvesting pits have been proposed to recharge the precious ground water in consultation with SGWB. The depth of ground water table will certainly increase due to Rain water harvesting measures.

Hence there will not be any significant impact on surrounding water bodies due to the existing and proposed expansion project.

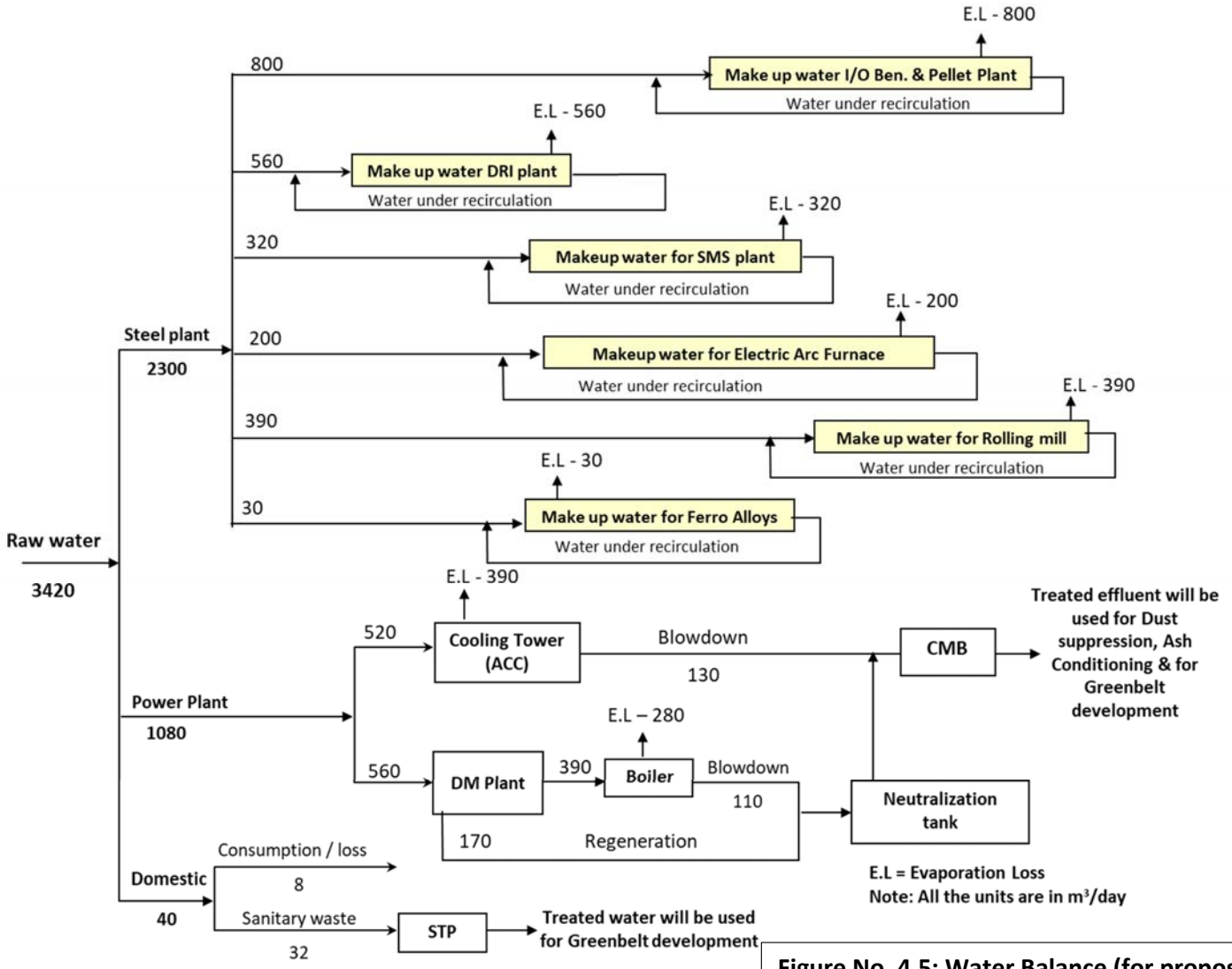


Figure No. 4.5: Water Balance (for proposed units)

TABLE NO. 4.3.3: CHARACTERISTICS OF UN-TREATED EFFLUENT [Std.TOR # 7(iv)]

PARAMETER	CONCENTRATION			
	DM plant regeneration	Boiler blowdown	Cooling Tower blowdown	Sanitary waste water
pH	4 – 10	9.5 – 10.5	7.0 – 8.0	7.0 – 8.5
BOD (mg/l)	--	--	--	200 – 250
COD (mg/l)	--	--	--	300 – 400
TDS (mg/l)	5000 -6000	1000	1000	800 – 900
Oil & Grease (mg/l)	--	10	--	--

4.4 PREDICTION OF IMPACTS DUE TO NOISE

4.4.1 PREDICTION OF IMPACT DUE TO THE PROPOSED ACTIVITY

The sound pressure level generated by noise source decreases with increasing distance from the source due to wave divergence.

An additional decrease in sound pressure level with distance from the source is expected, due to atmospheric effect or its interaction with objects in the path of transmission. For hemispherical sound wave propagation through homogeneous loss free medium, one can estimate noise levels at various locations, due to different sources using model based on first principle, as per the following equation:

$Lp_2 = Lp_1 - 20 \text{ Log } (r_2/r_1) - Ae1.2$

Where Lp1 and Lp2 are sound pressure levels at points located at distance r1 and r2 from the source and Ae1.2 is the excess attenuation due to environmental conditions. Combined affect of all the sources then can be determined at various locations by logarithmic addition. In first approximation one can assume that for all general population in the villages, every noise source in the plane is a point source. The average equivalent sound power level of such a point source can be estimated for different distances and directions from hypothetical source by applying following equation:

$Lp = Lw - 20 \text{ Log } r - Ae - 8$

Where Lw is the sound power level of the source, Lp is sound pressure level at a distance r and Ae is environmental attenuation factor. A combined noise level Lp (total) of all the sources at a particular place is given by:

$Lp \text{ (total)} = 10 \text{ Log } (10^{Lp1/10)} + 10^{(Lp2/10)} + \text{---------})$

Major noise generating sources were identified from the proposed activity for prediction purposes. The major noise generating sources are Turbine, Boiler, Compressors, DG set. The predictions have been made to represent the worst case. The noise levels at various distances were calculated using wave divergence model. The model was run for ascertaining the areas where we could get the noise levels of 35, 45, 50, 55, 60, 65 and considering the other noise generating sources from the plant.

Acoustic enclosures will be provided to turbines. Silencers will be provided to the DG Set. All machinery will be manufactured keeping in view of the MOEF&CC/OSHA standards on Noise levels. The Ambient Noise levels will be within the standards prescribed by MOE&F, GOI vide Notification dated 14-02-2000 under the Noise pollution (regulation & control) Rules, 2000 i.e. ambient noise levels will be less than 75 dBA during day time & less than 70 dBA during night time.

4.4.2 PREDICTION OF IMPACTS ON COMMUNITY

Day and Night sound pressure levels, Ldn are often used to describe the community noise exposure which includes 10 dBA night time penalties. N**earest human settlement is 0.1 Kms. from the site,** the impact of noise will be confined to the plant premises only.

As per the WHO recommendation, there is no identified risk and damage of hearing due to the noise levels (Leq = 8 hours) less than 75 dBA. Most of the international damage risk criteria for hearing loss permit (Leq = 12 hours) upto 87 dBA. Further, WHO recommendation on community noise annoyance, permits day time out door noise levels of 55 dBA.

4.4.3 PREDICTION OF IMPACT ON OCCUPATIONAL HEALTH

The damage risk criteria as enforced by OSHA (Occupation Safety and Health Administration) to reduce hearing loss, stipulates that noise level upto 85 dBA are acceptable for 8 hour working shift per day. Plant authorities will provide ear plugs to the employees and will be enforced to be used by the employees.

4.5 PREDICTION OF IMPACTS ON LAND ENVIRONMENT

Total land envisaged for the entire project is **91.34 Ha. (225.64 Acres).** As there are no endangered species in the vicinity of the proposed activity, there will not be any concern for the loss of important germoplasm that needs conservation.

To control the fugitive emissions dust extraction system and dust suppression system will be installed at all the dust emanating areas. All required pollution control systems will be installed and operated to comply with the norms. Hence there will not be any impact on nearby top soil.

Proposed plant will maintain Zero effluent discharge and closed circuit cooling system will be implemented. Hence there will not be any adverse impact on water environment.

Solid waste generated from the plant will be disposed /utilized as per the norms. Hence there will not be any adverse impact on land environment due to the proposed plant. Land price in the nearby area will increase which will benefit the local people. This industry may attract some ancillary works also which will also help in improving the land use pattern of the area. Greenbelt is considered essential for maintaining the stability of the environment of the area. **32.79 Ha. (81 acres) of extensive greenbelt (inclusive of existing)** will be developed in the plant premises.

4.6 PREDICTION OF IMPACTS DUE TO VEHICULAR MOVEMENT

[Std. TOR # 6 (ix), 7 (iii) & Addl. ToR # 2]

- SSML is in the process of having it's own Railway Siding upto the plant site.
- Most of the major materials required for expansion will be transported by Rail.
- All the trucks used for the transport of raw materials, products and wastes will be completely covered with tarpaulin and ensured no spillage during transportation.
- No. of trucks required for proposed expansion project will be 431 trucks /day (considering worst scenario i.e. whole transport by road through covered trucks)
- Existing Road network is capable of taking additional traffic load due to expansion project & Internal roads in the proposed expansion project will be made pucca.
- All the raw material required for the proposed steel plant will be stored on pucca platform above ground level.
- All the raw material yards are equipped with water sprinkling system, so as to avoid fugitive emission during the material handling.
- 2.83 Ha. (7.0 Acres) is area is earmarked for Truck parking (considered for 100 % of the Total requirement).

Hence there will not be much fugitive dust generation during transportation of raw materials, products & Solid wastes. The following table shows the baseline traffic, additional traffic due to the proposed expansion project.

Traffic Study

Name of Project : Shyam Steel Manufacturing Ltd.
Location of the Project : J.L.No. 11, Jemua Mouza, Mejia Block, Bankura District, West Bengal

Type of Vehicle	Baseline Vehicular Traffic (Existing)							Peak Traffic during operation of the proposed expansion project							Carrying Capacity PCU (per day) as per IRC : 73-1980
	Bankura to Ranigunj (NH # 60)			Ranigunj to Bankura (NH # 60)			Total	Bankura to Ranigunj (NH # 60)			Ranigunj to Bankura (NH # 60)			Total	
	Actual Count (per Day)	As % of Total Vehicular Count	As PCU (per Day)	Actual Count (per Day)	As % of Total Vehicular Count	As PCU (per Day)	Total PCU (per Day)	Actual Count (per Day)	As % of Total Vehicular Count	As PCU (per Day)	Actual Count (per Day)	As % of Total Vehicular Count	As PCU (per Day)	Total PCU (per Day)	
Passenger car, Tempo, Auto rickshaw or Agricultural Tractor	477	12.8	**477**	512	13.1	**512**	989	4	0.9	**4.0**	4	0.9	**4**	8.0	**20000 (National Highway)**
Cycle, Motor Cycle or Scooter	1384	37.1	**692**	1422	36.3	**711**	1403	35	7.4	**17.5**	35	7.4	**17.5**	35.0	
Truck, Bus, or Agricultural Tractor Trailer unit	1874	50.2	**5622**	1978	50.6	**5934**	11556	431	91.7	**1293.0**	431	91.7	**1293**	2586.0	
Total (daily basis)	**3735**	**100.0**	**6791**	**3912**	**100**	**7157**	**13948**	**470**	**100**	**1314.5**	**470**	**100**	**1314.5**	**2629.0**	

Total load on the road from Bankura - Ranigunj (NH # 60), during operation of the proposed expansion project will be

Traffic load before operation of the Proposed project	:	13948.0	PCU/day
Additional traffic load during operation of the proposed project :	:	2629.0	PCU/day
Total load	**:**	**16577.0**	**PCU/day**
Traffic Capacity as per IRC 73: 1980	**:**	**20000.0**	**PCU/day**

Hence there will not be any impact on the traffic load due to the proposed project

4.7 PREDICTION OF IMPACTS ON FLORA & FAUNA

- There are no National Parks, Wild life Sanctuaries and Bird Sanctuaries within 10 Km. radius of the plant site.
- There are no Reserve Forests exist within 10 Km. radius of the plant site. However, Gangajalghati PF exists outside the study area of 10 Km. radius.
- No Rare and Endangered species are present within the study area.
- All the required Air emissions control systems will be installed and operated to comply with MOEF&CC/CPCB/WBPCB norms.
- All ESPs will have interlocking system and whenever the emission standard for PM exceeds the norm, the raw material feed to the unit will stop. Consequently, there will be no production in the unit till ESP is rectified. Whenever any other Air emission Control system fails to comply with the norms, then immediately stop the supply of raw materials to the Furnace to have least environmental impact. Accordingly, applicable emergency procedures will be followed.
- Zero liquid effluent discharge is being maintained in the existing plant and similar practice will be maintained after expansion also.
- All solid waste disposal will be in accordance with the norms.
- Greenbelt of **32.79 Ha. (81 acres)** will be developed (inclusive of existing greenbelt) in the existing plant premises as part of expansion project.

All the norms will be complied; there will not be any adverse impact on Flora & Fauna due to the proposed expansion project.

4.8 PREDICTION OF IMPACTS ON SOCIO ECONOMIC ENVIRONMENT

Socio-economic impacts of proposed project are predicted as follows:

S.No.	Impact Parameter	Predicted Impacts		Budget Allocation / Remark
		Positive	Negative	
1	Human Settlement	• No displacement of people or habitations would occur as there are no habitations in the additional land proposed for expansion. Proposed expansion will be taken up in the existing plant premises & partly in adjoining land only.	Nil	----
2	Livelihoods	• No loss of existing livelihoods. Direct or indirect is expected to occur. • Additional non-agricultural livelihood opportunities are expected both directly and as spinoffs.	A moderate influx of people in project construction and operation phases.	Priority will be given local people in employment
3	Employment Generation	• No loss of existing employment due to the proposed expansion project is expected. • Creation of additional employment for about 1800 skilled, semi-skilled & unskilled workers during project operation. • Indirect employment to about 500 persons as a sequel to income multiple effect and induced growth during construction & operation phases of the project. • Majority of them will be local women and youth.	Nil	----
4	Incomes and Revenues	• Improvement of money incomes of locals engaged in tertiary businesses by an average approx. 10% through induced spending. • Improved tax revenues of Gram Panchayat. • The successful commissioning and running of the proposed plant will attract more industrial investments, which in turn will benefit the society	Nil	----

		and the nation.		
5	Demographics	• The population levels of the neighboring villages are not likely to change in any significant manner. • The lifestyles of people is expected to improve in tune with the rise in incomes and improvement in infrastructure facilities. • The skill sets of the local residents are expected to improve in keeping with the emerging employment opportunities.	Nil	---
6	Community Health	• Health of people residing in all the three impact zones is not likely to be impacted adversely considering the nature of emissions and the state of the art air pollution control systems planned.	• If effective systems are not adopted for control of Air Emissions & disposal of fly ash, it may raise community health issues.	• Budget of **Rs. 87.55 Crores** has been earmarked for Air emission Management, Wastewater management, Solid waste management.
7	Physical Infrastructure	• Road and power network in the area is expected to be strengthened as a sequel to industrial development around.	• If major Increase in vehicular traffic may lead to higher incidence of road accidents.	• Speed breakers will be provided in front of Main gate & awareness training will be given to truck drivers on speed restriction. Local awareness camps will be conducted on Road safety.
8	Social Infrastructure	• Improvement in housing stock and educational facilities could be expected in the long run as industrialization in the area gains acceleration.	• Increased pressure on residential accommodation, water supply and sanitation in the neighborhood during construction phase due to influx of workers.	---

CHAPTER – 5
ANALYSIS OF ALTERNATIVES
(TECHNOLOGY & SITE)

5.1 ALTERNATIVE TECHNOLOGIES

Project proponent proposed to adopt Rolled product manufacturing by utilization of MS Billets is the conventional technology. We have advised the Project Proponent to consider the 80 % Hot Charging to produce Rolled products without Re-heating furnace due to the following Environmental Benefits.

***Advantages of Hot charging of Billets for Rolling**:*

- Energy conservation by eliminating the cooling of hot metal and making of Billets.
- Energy conservation as Reheating of Billets is eliminated
- No requirement for reheating furnace. Hence fuel conservation.
- As no reheating furnace and no fuel, there will be no air emissions from the fuel burning.

Accordingly, the Project Proponent agreed and advised us to submit the proposal with 80% Hot charging and 20% through reheating furnace technology.

There are no new viable technologies for manufacturing of Pellets, Sponge Iron. Hence no alternative technologies are considered for Sponge Iron, MS billets & Rolled Products manufacturing.

5.2 ALTERNATIVE SITES [Std.TOR # 4 (i)]

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

Chronology of permission obtained:

- Existing plant has obtained Environment Clearance from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 4th August 2008. Accordingly obtained Consent to Establishment and Consent to Operate from the WBPCB for few units and same are under operation.

- Subsequently another EC has been obtained from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 24th May 2019 for expansion of steel plant.
- Later obtained NIPL Certificate (for capacities of EC dt. 4th August 2008)vide dt. vide letter no. 406-2N-29/2019 (E)-PT-II dt. 26th April 2021 from West Bengal Pollution Control Board (WBPCB) for increase in production capacity of Sponge Iron, Induction Furnaces & Rolling Mill.
- Now as part of expansion, company proposed to the expand the existing capacity of steel plant i.e. DRI Kilns (Sponge Iron from 2,25,000 TPA to 7,86,000 TPA), Induction Furnaces along with CCM & LRF (MS Ingots / Billets/ Hot Charging from 2,34,300 TPA to 6,95,800 TPA), Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod - 2,90,000 TPA to 7,19,000 TPA), 2 x 9 MVA Ferro Alloys, 1 x 30 T Electric Arc Furnace, WHRB based Power Plant from 10 MW to 46 MW, FBC based Power Plant from 7 MW to 25 MW, New 1.2 MTPA of I/O Beneficiation plant, New 0.8 MTPA of I/O Pellet Plant.

Existing plant is located in 66.1 Ha. (163.3 Acres) of land. Additional 25.24 Ha. (62.34 Acres) of land is envisaged by management adjacent to the existing plant. Total land after the proposed expansion will be 91.34 Ha. (225.64 Acres).

There are no habitations in the additional land proposed for expansion. Hence, no alternative sites have been identified for the proposed expansion proposal.

CHAPTER – 6

ENVIRONMENTAL MONITORING PROGRAM

6.1 TECHNICAL ASPECTS

6.1.1 METHODOLOGY

To know the effectiveness of environmental mitigation measures post project environmental monitoring program will be strictly followed as per the statutory requirement.

- The flue gases from Pellet plant will be treated in High efficiency ESP and discharged in the atmosphere through a stack of **43 m height** to bring down the particulate emission in the exhaust gases to below **30 mg/Nm^3**
- The flue gases from the DRI kilns will pass through Waste Heat Recovery Boiler and after heat recovery the gases will be treated in High efficiency ESP and then discharged into the atmosphere through a stack of **76 m height** to each 425 TPD DRI Kiln to bring down the particulate emission in the exhaust gases to below **30 mg/Nm^3**.
- The Fugitive emissions from the Induction furnaces will be sucked through hoods and will pass through a fume extraction system with bag filters and then the treated gases will be discharged into the atmosphere through **3 nos.** of combined stacks each of **30 m** height to **3 x 15 T, 3 x 17 T & 2 x 17 T** Induction Furnaces. The outlet dust emission in the exhaust gases will be less than **30 mg/Nm^3**. The dust will be pneumatically carried to covered bins.
- The flue gases from RHF attached to rolling mill will be discharged into the atmosphere through a stack of **32 m** height for effective dispersion of emissions from Rolling Mill.
- The Exhaust emissions from FBC Boiler will pass through a high efficiency ESP to bring down the particulate matter to less than **30 mg/Nm^3** and will be let out into the atmosphere through a stack of **71 m height** for effective dispersion of emissions into the atmosphere.
- Energy meters will be provided to all air pollution control systems to ensure effective operation of the control systems.
- Fugitive emissions will be monitored as per CPCB norms.
- All air emission control systems will be taken-up for maintenance as per prescribed schedule and compliance with norms will always be ensured.

- Stack monitoring and ambient air quality checks at regular interval by SPCB will also help in cross checking the performance of Pollution control systems installed in the plant.

6.1.2 FREQUENCY & LOCATIONS OF POST PROJECT ENVIRONMENTAL MONITORING

[Std. TOR # 7 (xii)]

A comprehensive monitoring programme is given as under. This environmental monitoring will be entrusted to a third party.

TABLE NO. 6.1.1: MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS

S.No.	Particulars	Frequency of Monitoring	Duration of sampling	Parameters required to be monitored
1. Water & Waste water quality				
A.	Water quality in the area	Quarterly Once	Grab sampling	As per IS: 10500
B.	Effluent at the inlet & outlet of the ETP	Once in a month	composite sampling	As per EPA Rules, 1996
C.	Sanitary Wastewater (inlet & outlet of STP)	Once -in a month	composite sampling	As per EPA Rules, 1996
2. Air Quality				
A.	Stack Monitoring	CEMS (all Stacks) Once in a month	-- --	PM, SO_2 & NOx PM, SO_2 & NOx
B.	Ambient Air quality	CAAQMS Quarterly Once	continuously 24 Hourly	$PM_{2.5}$, PM_{10}, SO_2, NOx $PM_{2.5}$, PM_{10}, SO_2, NOx & CO
C.	Fugitive emissions	Once in a Month	8 hours	PM
3. Meteorological Data				
A.	Meteorological data to be monitored at the plant.	Daily	Continuous monitoring	Temperature, Relative Humidity, rainfall, wind direction & wind speed.
4. Noise level monitoring				
A.	Ambient Noise levels	Once in a month (Hourly)	Continuous for 24 hours with 1-hour interval	Noise levels

6.1.3 DATA ANALYSIS

All the parameters will be analyzed as per IS procedures specified for those parameters. All water samples will be analyzed for various parameters as per IS: 10500 procedures.

The methodology adopted for monitoring & analysis of $PM_{2.5}$ & PM_{10} is as per IS: 5182 Part IV, SO_2 & NO_X as per IS: 5182 Part II & Part VI respectively. Samples were analyzed for SO_2 using improved West-Gaeke method for air samples using a spectrophotometer at a wavelength of

560nm. Samples were analyzed for NO_X using Jacob and Hocheiser modified (Na-As) method, for Air samples using a spectrophotometer at wavelength of 540 nm.

PM_{10} & $PM_{2.5}$ in ambient air are found by using Respirable Dust Sampler (RDS) & APM-550. CO was analysed on Gas Chromatograph.

6.1.4 REPORTING SCHEDULE

After completion of analysis, copies of all the analysis reports will be sent to Ministry of Environment, Forests & Climate Change and SPCB on monthly basis. Copies of the reports will be maintained in the plant and will be made available to the concerned inspecting authorities as and when required.

6.1.5 EMERGENCY PROCEDURES

All ESPs will have interlocking system and whenever the emission standard for PM exceeds the norm, the raw material feed to the unit will stop. Consequently, there will be no production in the unit till ESP is rectified. Whenever any other Air emission Control system fails to comply with the norms, then immediately stop the supply of raw materials to the Furnace to have least environmental impact. Accordingly, applicable emergency procedures will be followed.

6.1.6 DETAILED BUDGET & PROCUREMENT SCHEDULES

The budgetary allocation for Environmental monitoring is approximately **Rs. 20 Lakhs/Annum**. A third party will be engaged to monitor all the environmental parameters as per CPCB / SPCB norms once the proposed project comes into operation. Following is the detailed break up of Budget allocation towards Environmental monitoring.

TABLE NO. 6.1.2: BREAK-UP OF BUDGET FOR ENVIRONMENT MONITORING

S.No.	Description	No. of units		Monitoring Parameters	Frequency of Monitoring	No. of Samples /annum	Cost / Sample (Rs.)	Total cost in (in Rs.)
		Existing	Un-implemented & proposed					
1	Stack	8	11	PM & SO_2, NOx	Once in a month	228	5000	1140000
2	AAQ	4	0	PM_{10}, $PM_{2.5}$ NOx & CO	Quarterly once	16	7000	112000
3	Effluent	2	2	pH, TDS, TSS, O&G, Free	Once in a month	48	6000	288000

				Available Cl, Cu, Fe, Zn, Chromium, PO_4				
4	Fugitive emissions	2	2	PM	Quarterly once	16	4000	64000
5	Ground water	1	1	As per IS: 10500	Quarterly once	8	7000	56000
6	Noise levels	2	4	---	Once in a month (hourly)	1728	100	172800
7	Performance Evaluation of APCD	0	1	---	Once in a year	1	100000	100000
					Total			**1932800**
							TOTAL (IN RS. LAKH)	**19.33**

Note:

- **CAAQMS & Continuous Weather Monitoring Station has already been provided in the Existing Plant**
- **CEMS will be provided for proposed unit also**

CHAPTER – 7
ADDITIONAL STUDIES

7.1 INTRODUCTION

As per the Standard TOR issued vide letter No**. J-11011/724/2007-IA.II(I) dated 1st June 2021** by MoEF&CC, New Delhi, following Additional Studies were required to be carried out for the proposed expansion project:

i. Public Consultation
ii. Risk Assessment and Disaster Management Plan
iii. Social Impact Assessment Study

7.2 PUBLIC CONSULTATION

Public Hearing for the proposed expansion project is yet to be conducted**.**

7.3 RISK ASSESSMENT [Std. TOR # 7 (xiii)]

7.3.1 INTRODUCTION

Risk analysis deals with the identification and quantification of risks, the plant equipments and personnel are exposed to, due to accidents resulting from the hazards present in the factory. Hazard analysis involves the identification and quantification of the various hazards that are likely to occur in the industry.

Both hazard and risk analysis are very extensive studies, and require a very detailed design and engineering information.

The various hazard analysis techniques that may be applied are Hazard and Operability (HAZOP) studies, Fault - Tree Analysis (FTA), event –tree analysis and, failure and effects mode analysis. Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks the neighboring populations are exposed to as a result of hazards present. This requires a through knowledge of failure probability, credible accident scenario, vulnerability of populations etc. Much of these information's are difficult to get or generate. Consequently, the risk analysis is often confined to maximum creditable accident studies.

7.3.2 SCOPE OF THE STUDY

The scope of study includes the study of proposed operations, storage and handling of raw materials with respect to Hazard Identification. Risk Assessment and preparation of Disaster Management plan. Based on the Hazard Identification and analysis, the major disaster scenarios would be worked out to estimate the consequence of failure. A Disaster Management Plan (DMP) would also be evolved to meet the emergency situation including the occupational health and safety.

7.3.3 FIRE PROTECTION SYSTEM

The following Fire Protection system will be provided in the plant.

- Hydrant system covering the entire plant including all important auxiliaries and buildings. The system will be complete with piping, valves, instrumentation, hoses, nozzles and hydrants, etc.
- Sprinkler system for cable galleries / vaults / spreader room etc.
- High velocity water system for FO storage tanks.
- Portable fire extinguishers such as pressurized water type, carbon dioxide type and foam type will be located at strategic locations through out the plant.
- Modular type carbon dioxide panel injection fire extinguishing system will be provided in control equipment room, cable space below control room and at other unmanned electrical and electronic equipment room.

The following pumps will be provided in the fire protection system.

Fire water pumps:

(Fire water reservoir is part of the main water reservoir)

a) AC motor driven fire water pumps for hydrant, medium velocity water spray system and foam system.
b) AC motor driven fire water pumps for high velocity water spray system.
c) Diesel engine driven pump as stand by for the above.
d) AC motor driven Jackey pump 1 No. for maintaining pressure.

Suitable number of electric motor driven and diesel engine operated hydrant and spray pumps with automatic starting will be provided for the above systems. The fire water pumps will take suction from the fire water reservoir to be created in the plant area.

7.3.4 METHODOLOGY OF MCA ANALYSIS

The MCA Analysis involved ordering and ranking of various sections in terms of potential vulnerability. The following steps were involved in MCA Analysis.

- Preparation of an inventory of major storages and rank them on the basis of their hazardous properties.
- Identification of potentially hazardous storage sections and representative failure cases from the vessels and the pipelines.
- Visualization of chemical release scenarios.
- Effect and damage calculation from the release cases through mathematical modeling.
- Inventory Analysis and Fire & Explosion and Toxicity Index (FETI) are the two techniques employed for hazard identification process.

7.3.5 FIRE & EXPLOSION AND TOXICITY INDEX

The role of Fire & Explosion Index (FEI) aids quantitative hazard identification. The FEI is calculated by evaluating the loss potential of all the units in the storage area and the hazardous areas are classified accordingly. The FEI plays an important role in

- Identification of the equipment/areas that could likely contribute to the creation or escalation of incident and relative ranking of the incidents.
- Quantification of the expected damage of potential fire and explosion incidents.
- Preparation of guidelines for mitigating fire hazards.

The loss potential which could actually be experienced under the most adverse operating conditions is quantitatively evaluated. The FEI is used for any operation in which a flammable, combustible or reactive material is stored, handled or processed.

FEI = MF * GPH * SPH

Where MF : Material factor
GPH : General Process Hazard
SPH : Special Process Hazard

TOXICITY INDEX

The Toxicity Index is calculated using the the following formula.

$$TI = \frac{(Nh + Ts) * (1 + GPH + SPH)}{100}$$

Where Nh:

Ts:

GPH: General Process Hazard

SPH: Special Process Hazard

7.3.6 ASSESSMENT OF RISK AT M/s. SHYAM STEEL MANUFACTURING LTD.

[Std.ToR # 3 (v) & (ix)]

Based on the storage inventory the following areas are identified as potential safety risk areas, shown in Table No. 7.3.1.

TABLE 7.3.1: TYPE OF HAZARDOUS IDENTIFIED DURING STORAGE & HANDLING

S.No.	Area	Capacity / quantity	Hazards identified
1.	Steam turbine generator building	10 MW + 7.0 MW + 4 x 9 MW + 18 MW	Fires in a) Lube oil system b) Short circuit in control room / switch gears c) Cable galleries d) Fire in oil drum storage
2.	Transformer	-	Explosion & fire
3.	Boilers	8 Nos. WHRB & 2 nos. FBC	Fire (mainly near oil burners) steam explosion, fuel explosion
4.	Coal handling plant	-	Fire and or dust explosion
5.	Coal storage	38,000 tones	Fire, spontaneous combustion
6.	LDO / LSHS tank farm	3 x 50 m^3	Fire
7.	HFO tank farm	1 x 25 m^3	Fire

The degree of hazard is identified based on FEI & TI range as per the criteria given below.

FEI RANGE	DEGREE OF HAZARD
0 – 60	LIGHT
61 - 96	MODERATE
97 - 127	INTERMEDIATE
128 - 158	HEAVY
159 & Above	SEVERE

TI RANGE	DEGREE OF HAZARD
0 – 5	LIGHT
5 - 10	MODERATE
> 10	SEVERE

Fire and Explosion are the likely hazards which may occur due to the fuel storage. Hence F&EI has been calculated for storage capacities of fuels in the plant and are shown in Table 7.2.

TABLE 7.3.2: FIRE & EXPLOSION AND TOXICITY INDEX FOR STORAGE FACILITIES

Fuel	Total quantity of storage	F& EI	Category	TI	Category
LDO / LSHS	3 x 50 m^3	1.5	Light	--	--
HFO	1x25 m^3	1.5	Light	--	--

TABLE No. 7.3.3: POSSIBLE RISKS FROM THE STEEL PLANT & PROPOSED MITIGATION MEASURES

Equipment	Process	Potential Hazard	Mitigation
Pellet Plant			
Raw material storage	Spillage of wet bentonite may lead to slip	Head injury / Broken bones	• Immediate barrier will be placed and warning signage around spillage area • Training to the workers
Balling & Mixing	Dust generation during running of loading circuit	Lung disorders	• Personal respiratory equipments will be provided to the workers at work place. • Exhaust ventilation system will be provided
DRI Plant			
Sponge Iron Kiln	Reduction of Iron Ore	Falling of Hot Mass & Dust	• Ensuring before opening the kiln bottom door, first clean the inner surface of the stack cap, such that the dust particle and hard clinkers which deposited in the cap is fallen into the DSC. • Ensure before opening the DSC bottom door to check the DSC bar position and condition and to clean if big block of castables or any hard clinkers which is blocking the dust flow passage to wet scrapper chute. • Ensure to clean the dust by opening the man hole provided in the chute and check the spiking rods and the screen. In built safety system is provided in the construction of furnace with suitable refractory walls. • Allow the wet scrapper to run to remove the sludge, then open the drain pipe of the wet scrapper, which is located at bottom on either side, pour sufficient water to clean the sludge and the slurry dust to flow through drain pipe.

Equipment	Process	Potential Hazard	Mitigation
			• Ensure to stop the wet scrapper and open the top plate to check the alignment, weak and tear of the plates and take necessary precaution against the excessive worn out plate.
Sponge Iron Kiln	Reduction of Iron Ore	Air emission	Adequately designed ESP and other Air Pollution control systems will be provided with interlock to the kiln feeding system in order to prevent by passing of emissions through safety cap and also during non operation of ESP or any other pollution control devices.
Power plant			
Turbine	Convert pressure in the flue gas into Mechanical Energy	Mechanical & Fire Hazards Noise	Layout of Equipment / Machinery will be in accordance to factory and electrical inspectorate. Acoustic enclosure to Turbine
Generator	Convert Mechanical energy into electrical energy	Mechanical & Fire Hazards a) Lube Oil System b) Cable galleries c) Short circuits	Layout of Equipment / Machinery will be in accordance to factory and electrical inspectorate
		Noise	• Acoustic enclosure • Isolated panel rooms • Special foundation with vibration absorbers
Power Transformers	----	Fire and explosion	Automatic fire fighting system will be provided. Isolated with fencing and restricted entry.
Switch Yard	transformer	Fire	All electrical fittings and cables are provided as per the specified standards.
Switch Yard control room		Fire in cable galleries and switch	
Coal storage shed	Storage of coal for 10 days requirement.	Fire and spontaneous combustion	Coal storage yard will be continuously sprinkled with water with garden type sprinklers.
Coal handling bunkers	----	Fire and dust explosions	Continuous water sprinkling
Compressor House	Plant operation	Governor failure due to the failure of pins and springs leading to opening of safety valves	The design precautions of safety will be followed in manufacture and erection of compressors.
Coal storage yard	Coal dust is combustible	Explosion Hazard	• Coal storage shall be minimised • Coal piles shall not be located above heat sources such as steam lines.

Equipment	Process	Potential Hazard	Mitigation
			• motors. • All mechanical & electrical equipment inside the coal storage area shall be approved for use in hazardous locations and provided with spark proof.
STG, draft fans, soot blowing from boiler, ventilation pipes	Noise generated due to operation of STG, working of fans, ventilation system,	Noise hazard	• Acoustic enclosures will be provided to STG. • Enclose fans, insulating ventilation pipes • use of dampeners.
LDO / FO storage area	MS tanks HFO: 1 x 25 m^3 LDO /LSHS: 3 x 50 m^3	Fire & explosion	Precautions as per TAC and OISD will be implemented.
Failure of APCS	DUST / SMOKE	Air emission	• Emergency alarm to be given to Villagers. • Interlocking system will be provide to APCS. • Water sprinkling arrangements

TABLE NO. 7.3.4: PROCESS HAZARD ANALYSIS RELATED TO INDUCTION FURNACE & NECESSARY RISK CONTROL MEASURES

S.No	Area/Section	Hazards	Risk Control Measures
A)	**ELECTRIC INDUCTION FURNACE**		
1)	IF proper	Explosion hazard due to Water Leakage from coil, Water Cooled panel or power cables.	• Stop operation. • Stop tilting or stop any Furnace movement • Identify the leakage point • Develop and Follow SOP
		Metal splash or explosion due to water coming into contact with molten metal. (Water may be present in scrap material or from leaks in the furnace cooling systems)	• Stop operation. • Ensure use of PPEs • Proper protection system like Ground Leak Detector (GLD) etc. in place • Ensure No unauthorized person on furnace platform • Ensure no wet scrap and leakage of water
		Metal splash or explosion due to improper scrap charging / wet scrap / chemicals in scrap	• Stop operation • Proper Segregation of scrap • Inspection of scrap and approval • process for worthiness. • Safe scrap charging through cranes/vibrators charging trolley • Use of Hydraulic pusher for melting
		Injury from Material Handling like DRI, Pig Iron, Scrap shifting to furnace floor	• Regular Maintenance of EOT cranes in respect of wire ropes, brakes, lifting hook, rails/wheels, electrical system/motors etc.

			• Provision of proper limit switches • Emergency main switch of cranes to be provided near platform or at an easily accessible place. • Bell/Siren is to be provided in the cabin for crane operator • Annual inspection of Cranes/Lifting tackles/Magnets by competent person every year as per factory act • Display of safe working load on each crane • Proper Guarding of all stairs and crane's CT Trolley
		Explosion due to high temperature/thinning of refractory with improper Melting system protection Additionally-Bridging in IF: Leading to superheating of furnace bottom and erosion of ramming mass and rupture of cooling water tubes and subsequent explosion.	• Water Temperature & flow sensors • Ground leak detector • Circuit breakers and tripping mechanism • Frequency monitoring • Lining conditions of crucibles & ladle etc. • Develop and follow SOP
2)	IF turnaround activity	Burn Injury due to splashing slag	• Proper PPE and visor. • Covering of all exposed area with cloth
		Injury from Pressurized Vessels	• Air compressors/pressure vessels should be checked regularly for proper working of Pressure switches, safety valves and Pressure gauges. • Auto drain valve is to be provided on each pressure vessel • Six monthly testing of PV Thickness and hydraulic testing every four years by competent person as per the factory act.
		Person hit by moving machines	• Siren, gong bell during movement machines. • Auto announcement during any operation. • Permit to work prior to undertaking any maintenance job
3)	Electrical system	Electrical failures and shock	• Proper Earthing pits • Earthing of all electrical motors/gadgets • Work permit system • Transformer testing (dielectric strength and dehydration of Transformer oil)

TABLE NO. 7.3.5: PROCESS HAZARD ANALYSIS RELATED TO ROLLING MILLS & NECESSARY RISK CONTROL MEASURES

Sl. No	Area/Section	Hazards	Risk Control Measures
A.	**Raw material section**	Injury in grinding operation	• Wear goggles for all grinding machine operations. • Operate grinding wheels at recommended speed with recommended depth of cut. • Use proper wheel guards on all grinding machines. • Use PPEs. • Develop and Follow SOPs
		Hazards due to conveyors	• Avoid sitting, standing, or walking on conveyors. • All conveyor to be provided with proper guards. • Never perform maintenance while a conveyor is in operation. • Ensure correct operation of conveyor controls. • Avoid loose clothing, long hair, jewellery and other loose items near conveyor • Emergency "shut-off" devices to be provided • Follow lock-out / tag-out procedures for maintenance • Only authorized / trained personnel to operate or maintain the conveyor.
		Hazards in Material handling & stacking area	• Maintained floors in proper condition • Stacked the material properly without any billet ends protruding out • Clearly defined walkways, proper stacking of material. • Regular clearance of debris. • Develop and Follow SOP
B.	**Reheating Furnace**	Gas poisoning due to leakage of gas	• All the gas line to be insulated from circuit by "U" seal and also fill up water in water seal and ensure overflow of water to drain. • Blanking of gas line to be done before Removal of valves or flanges. • Proper packing to be provided in fixing of valves or flanges. • Regular inspection of gas lines to detect leakage if any. • Use Portable “CO” monitors to detect gas leakage.

			• Ensure the closure of main valve to cut off supply • Check all the flange/ welded joints for gas leakage. • Purge the gas pipe line with nitrogen in small segments by opening the bleeder valve • Develop and Follow SOP
		Fire hazards	• Give clearance for cutting / welding etc. after ensuring that there is no leakage of gas • Keep the Portable fire extinguishers ready for any hazards • While lighting up or off of the furnace, laid down procedures are to be followed strictly. • Develop and Follow SOP
		Burn injury hazards, Exposed to hot flames and hot billets / ingots	• Use personal protection equipment. • Keep the first aid kit having burn injury medicine on standby • Develop and Follow SOP
		Hazards associated with re-lining of furnace with refractory bricks	• Work permit system to be followed. • Monitor the temperature of area before starting work • Hand held 24 V bulb to be used during repairs in furnace • Detail job safety protocol may be prepared to undertake the job, if job is irregular. • Develop and Follow SOP
		Hazard due to mechanical & Electrical Maintenance	• All electrical equipment/ machines to be earthed properly • Use electrical PPEs • Develop and Follow SOP
C)	**Rolling Mill**	Injury from Moving roller table	• Shutdown / permit to work with electrical isolation. • No work to be done on conveyor in running condition. • Local emergency switch to be operated for approaching conveyor. • Availability of Pull chord. • Siren system prior to restarting conveyor. • Loose cloths prohibited. • Area barricading if material is removed from height. • Develop and Follow SOP
		Injury from Rotating machineries	• Coupling guards to be in place. • Loose cloths to prohibited • Develop and Follow SOP

		Injury during Working on mill stands	• "Permit to work" practice to be followed strictly. • Display of "Men at Work" board is to be done at Operator Control Panel • Develop and Follow SOP
		Injury during Roll Change	• During Roll Change, Rolls to be cooled with water spray before work to avoid burn injury. • Ensure to take Power Shutdown for Roller Table and connected drive. • Ensure written Work Clearance to be given to concerned personnel for doing the work. • Cleanliness of area with respect to presence of oil, grease, jute and other inflammable materials before gas cutting/ welding job. • Availability of fire hydrant to be ensured if job involves gas cutting etc. • Display "Men at Work" board at Operator Control Panel. • Place a plate on rollers table for smooth entry of personnel. • Use required PPE when changing roll and after completion of jobs, ensure that men and materials are removed from site. • Ensure that "Job completion Report" is given in writing and then cancel "Power Shutdown," remove "Caution Tags" and give clearance for operation. • Develop and Follow SOP
		Electric shock	• Ensures safety precautions like "Power Shutdown", work clearance before stating the job • Displaying of "Men at Work" at HT switching on panel. • Proper earthing of brush holder arm etc. • Checking protection and safety devices may expose the maintainer to risks in the event that the devices are not functional. For this reason, the machines must be isolated from their main power sources (electrical switchboards, main delivery valves, etc.) under the supervision of the Manager of the plant, using established SOP's and written permissions. • Develop and Follow SOP
		Entanglement/ injury at Gear box/ coupling	• For working in gear box / coupling, take power shut-down for connected drive.

			• Display "Men at Work tag". • Develop and Follow SOP
		Injury while Working on EOT Cranes	• For safe working, ensure" power Shut down" Work clearance Men at work tag. • Watch by additional person to observe movement of nearby crane etc. • Stoppers are to be welded on both sides of crane on LT rails. • Submit job completion report after repair. • All the lifting tools and tackles to be checked every year as per statutory requirement. • Develop and Follow SOP
		Injury in Motors with belt/chain drives	• Provide guards on all the motors having belt / chain type transmission mechanism. • Develop and Follow SOP
		Injury with Flywheel	• Flywheel to run below safe speed limits. • Appropriate guard to be provided around flywheel. • Develop and Follow SOP
		Person hit by rolling hot material during looping and play	• Auto Announcement during • Proper guards to be provided to avoid material coming in the way of workmen. • Proper pathways to be provided for safe movement. • Use of appropriate PPE hand gloves, gum boots, Face shield, dust mask, goggles by persons working on stands and handling hot materials. • Proper leg / arms guards / safety goggles to be provided to tongs men • Permit to work prior to undertaking any maintenance job. • Develop and Follow SOP
		Injury from Cooling Fans	• Appropriate guards to be provided around fan blades. • Proper stand to be provided. • Earthing to be provided. • Develop and Follow SOP
		Injury from Manual Handling of Heavy loads	• Use appropriate lifting tackles like chain pulley block, hoist etc to lift heavy parts • Develop and Follow SOP
		Injury from Handling of stock at stands	• All hand tools to be well designed, frequently inspected and well maintained. • Rivets of tongs used at mills to be renewed frequently. • Develop and Follow SOP

		Injury during Mill maintenance	• Ring spanners and impact wrenches should be provided for roll changing crews; • Bent-out, open-ended spanners not be used. • Adequate training to be given to fitters in the use of all hand tools. • Develop and Follow SOP
		Injury from Capital Repair Job in Rolling Mill (Semi Automatic)	• All the power shutdowns of the required system to be taken as per the dully filled work permit form and necessary clearance from concerned operation and electrical area. • Using required PPE as per requirement. • Ensure that all lifting tools & tackles (winches, Hug-zugs, Chain Pulley Blocks etc.), mobile cranes are tested by a competent person and test certificates are submitted. • For working at height, a "Work at heights pass" to be obtained from safety department and use of appropriate safety belts. • All portable electrical equipment, welding machines to be earthed effectively (body earthing). • Before any heavy structural member is gas cut, it is to be supported by ropes, chains or any other means to prevent its dropping or swinging. • Suitable fire extinguisher in working condition must be kept close to all welding and gas cutting operations. • Rolling of gas cylinders to be avoided and transferred / shifted by proper trolleys. • • Proper protection to be provided to conveyor and electrical cables to prevent fall of sparks from welding/ gas cutting. • Isolation of electrical power and written clearance to be obtained from electrical section before start of dismantling operation. • Area of work to be illuminated, before starting the job. • Movement of the employees to be restricted to working area only. • Mono rail hoist/EOT crane, to be operated with in safe working load (SWL) of the equipment. • All the openings created during dismantling to be immediately covered/ barricaded.

			• Compressed air vessels and pipelines to be de-pressurized before dismantling. • Combustible / Inflammable materials such as coal powders, oil spillages etc. are to be removed from the place where gas cutting/ welding jobs are to be carried out. • A charged water hose pipe may be kept near the place of work. • People involved in hazardous area to be imparted first aid & fire fighting training. • Prior to actuation it must be ensured that no persons are in the active area of the dangerous energy (mechanical, electrical, hydraulic, pneumatic, etc.). • Only the hydraulic / pneumatic specialist is allowed to perform switching operations on hydraulic / pneumatic valves, provided the following conditions are fulfilled: • personnel involved in plant start-up and control must be warned of any operations that are to be carried out in the enclosed area before starting the machine • No persons must be present in the danger zone, • Voice contact must be established with a responsible person at the workplace in charge of monitoring the sequence of functions. • Develop and Follow SOP
D)	**General safety norms for rolling mills (Semi Automatic) I**		• All required PPEs are to be used while working • Use properly maintained tools & tackles. • Hand tools to be checked in every six months. • All the lifting tools and tackles to be every year as per statutory requirement. • Permit-to-work to be filled up before taking any job. • Before starting any job compliance to be proper safety isolation procedure to be ensured by concerned agencies. • Compliance of special measures to be undertaken such as cooling of rolls in hot areas, use of supports, use of stoppers, closing of valves, housekeeping in the area, availability of fire hose / extinguishers.

			• Standard Operation Practices (SOPs) and Standard Maintenance Practices (SMPs) are to be followed strictly.
			• All the mechanical moving equipments are to be barricaded / guarded properly. • All electrical equipments to be earthed properly. • All high- pressure vessels are to be tested as per statutory requirements. • Oil Cellar to be checked every month for leakages. • Proper loading / unloading procedure for raw materials / finished products to be prepared and followed. • Ensure the availability of firefighting equipment. • Ensure proper illumination • Proper housekeeping to be done. • Before restoration of power of the equipment, it is to be ensured that men, materials including tools and tackles, supports, scaffolding etc. are removed. • Develop and Follow SOP
			• Safety signs are intended to ensure the safety of personnel at their workplace. Depending on the kind of hazard, the following signs must be placed: ✓ Prohibitive signs ✓ Warning signs ✓ Mandatory signs ✓ Rescue signs ✓ Informative signs ✓ Signs identifying permanent danger areas • Signs for operating areas requiring individual safeguarding • In operating and danger areas of the plant/machine, it is necessary to place the signs listed above before equipment is put into operation. • Before commencing their activities, all personnel must be instructed as to the significance of the safety signs, and renewed instruction must be given at appropriate intervals, but at least once per year.

			• In addition to the signs listed above, the user of the equipment shall clearly and distinctly indicate and place signs for the following: • Escape routes/emergency exits • First-aid stations • Places where stretchers are available • Emergency showers/eye washing facilities
			• The operational reliability and the safe use of the plant /machine are ensured (among other things) by electrical and mechanical interlock devices. These must be inspected at regular maintenance intervals. ❖ Emergency push buttons / switches to be checked for their functioning at regular intervals. ❖ All fixed guards, when removed for any work on the machine, must be correctly replaced and secured at the end of the work.

Coal Handling Plant - Dust Explosion

Coal dust when dispersed in air can explode if it gets ignition source. Crusher houses and conveyor systems are most susceptible to this hazard. The minimum of explosive concentration of coal dust (33% volatiles) is 50 grams/m^3. Failure of dust extraction & suppression systems may lead to abnormal conditions and may increase the concentration of coal dust upto the explosive limits. The sources of ignition are incandescent bulbs, electric equipment & cables, friction & spontaneous combustion in accumulated dust. Dust explosion may occur at any time without any warning with maximum explosion pressure of 6.4 bars. Another dangerous characteristic of dust explosions is that it sets off secondary explosions after the occurrence of initial dust explosion.

Stock pile area shall be provided with automatic garden type sprinklers for dust suppression as well as to reduce spontaneous ignition/combustion in coal stock piles. Necessary water distribution net work will be provided for distributing water at all transfer points, crusher house, control room, etc.

A centralized control room with microprocessor based control system has been envisaged for operation of the coal handling plant. Except locally controlled equipment like travelling tripper, dust extraction / dust suppression / ventilation equipment, sump pumps, water distribution system all other equipments will have provision for local control as well.

Control Measures for Coal Storage Yard

The entire quantity of coal will be stored in separate stack piles, with proper drains around to collect washouts during the monsoon. Water sprinkling system will be installed in and around the stocks of pile to prevent spontaneous combustion and consequent fire hazards. The stack geometry will be adopted to maintain minimum exposure of stock pile areas towards predominant wind direction. Temperature will be monitored regularly to detect any abnormal rise in temperature inside the stock pile to be enabled to control the same.

7.3.7 RISK & CONSEQUENCE ANALYSIS OF FIRE

The principle objective of this study is to identify the potential hazards, estimate the effects of hazards to people both within and outside the plant premises.

- Identification of possible failure cases of the facilities, which might affect the population and property within the plant boundary.
- Assessment of consequential effect on surrounding population, property etc., due to onset of such failures.
- Suggest recommendations based on consequence analysis relevant to the situations.

7.3.7.1 METHODOLOGY

The hazards expected from this plant include the pool fire situation due to the leakage of HFO & LDO/ LSHS from the storage tanks. The tanks, made of Mild steel, will be provided with dyke. The most credible failure is due to the rupture of the pipe connecting the storage tank. The worst case can be assumed as when the entire contents leak out into the dyke forming a pool, which may catch fire after getting source of ignition.

HFO, LDO & FO STORAGE TANK - POOL FIRE SCENARIO

The maximum quantity of HFO & LDO/ LSHS stored at site will be 1 x 25 m^3 & 3 x 50 m^3 capacity respectively. In the event of oil spillage through a small leakage or due to rupture of pipeline connecting the tank fire will follow after getting ignition source. As the tanks are provided with dyke, the fire will be confined within the dyke. Threshold limit for first degree burns is 4.5 kw/m^2. Based on these results it may be concluded that the vulnerable zone in which the thermal fluxes above the threshold limit for first degree burns (4.5 kw/m^2) is restricted to 25 m.

The hazard distances for various radiation intensities are shown in Table No. 7.3.6

TABLE No. 7.3.6

HAZARD DISTANCES (Four Tanks on fire - scenario)

HFO : 1 x 25 m^3

LDO /LSHS : 3 x 50 m^3

Radiation intensity		**Hazard Distances**
37.5 kw/m^2	(100% lethality)	5 m
25.0 kw/m^2	(50% lethality)	10 m
12.5 kw/m^2	(1% lethality)	15 m
4.5 kw/m^2	(1^{st} degree burns)	20 m

The hazard distances for Thermal radiation are confined to the plant premises only. Hence there will not be any thermal radiation impact on outside the population due to the pool fire scenario. The thick green belt to be developed will help to further mitigate the radiation intensity level outside plant boundary.

7.4 DISASTER MANAGEMENT PLAN

7.4.1 DISASTERS

A disaster is catastrophic situation in which suddenly, people are plunged into helplessness and suffering and as a result need protection, clothing, shelter, medical and social care and other necessities of life.

Disasters can be divided into two main groups. The first group includes those disasters which result from natural phenomena like earthquakes, volcanic eruptions, cyclones, tropical storms, floods, avalanches, landslides etc. The second group includes disastrous events occasioned by humans, or by their impact upon the environment. Examples are industrial accidents, radiation accidents, factory fires, explosions, escape of toxic gases or chemical substances from an industrial unit, river pollution, mining or other structural collapses; air, sea, rail and road transport accidents. These disastrous events can reach catastrophic dimensions in terms of human loss.

There can be no set criteria for assessing the gravity of a disaster because it depends, to a large extent, on the physical, economic and social environment in which it occurs. What would be

considered a major disaster in developing country, equipped to cope with the problems involved, may not mean more than temporary emergency elsewhere. However, all disasters bring in their wake similar consequences that call for immediate action, whether at the local, national or international level, for the rescue and relief of the victims. This includes the search for the dead and injured, medical and social care, removal of the debris, the provision of temporary shelter for the homeless, food, clothing and medical supplies and the rapid re-establishment of essential services.

7.4.2 OBJECTIVES OF DISASTER MANAGEMENT OF PLAN

The disaster Management Plan is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. Effective implementation of Disaster Management Plan will be ensured by its wide circulation among the staff and workers and training of the personnel through rehearsals.

The Disaster Management Plan would reflect the probable consequential severity of undesired event due to deteriorating conditions or through knock on effects. Further the management should be able to demonstrate that their assessment of the consequences uses good supporting evidence and based on currently available and reliable information, incident data from internal and external sources and if necessary the reports of outside agencies.

To tackle the consequences of a major emergency inside the factory or immediate vicinity of the factory, a Plan has to be formulated and this emergency plan is called Disaster Management Plan.

The objective of the Industrial Disaster Management Plan is to make use of the combined resources of the Plant and the outside services to achieve the following:

- Pool fire scenario due to HFO/LDO / LSHS storage
- Minimize damage to the property and the environment.
- Effect the rescue and medical treatment of victims.
- Fulfill the needs of relatives.
- Provide authoritative information to news media.
- Secure the safe rehabilitation of affected areas.
- Safeguard other people.
- Initially contain and then ultimately bring the situation under the control.

- Preserve subsequent records and equipment for subsequent enquiry of the cause and circumstances leading to emergency.

7.4.3 EMERGENCIES

7.4.3.1 GENERAL EMERGENCIES ANTICIPATED:

The emergencies that could be envisaged in the Plant are as follows:

- Pool fire scenario at HFO/LDO/LSHS storage tanks.
- Contamination of food / water.
- Sabotage / social disorder.
- Structural failures.
- Slow isolated fires.

7.4.3.2 SPECIFIC EMERGENCIES ANTICIPATED

During the study of risk assessment, the probabilities of occurrence of hazards are worked out along with the nature of damage. This is the reason why one should study risk assessment in conjunction with DMP.

7.4.3.3 EMERGENCY ORGANISATION

It is recommended to setup an Emergency Organization. A senior executive who has control over the affairs of the Plant would be heading the Emergency Organization. He would be designated as Site Controller. In the case of stores, utilities, open areas which are the not under the control of production heads, executive responsible for maintenance of utilities would be designated as Incident Controller. All the Incident Controllers would be reporting to the Site Controller.

Each Incident Controller organizes a team responsible for controlling the incident with the personnel under his control. Shift in-charge would be the Reporting Officer, who would report the incident to the Incident Controller.

Emergency Coordinators would be appointed who would undertake the responsibilities like fire fighting, rescue, rehabilitation, transport and support services. For this purposes, Security in-charge, staff of the Personnel Department/ Essential services would be engaged. All these personnel would be designated as key personnel.

In each shift, electrical supervisor, pump house incharge and other maintenance staff would be drafted for emergency operations. In the event of Power communication system failure, some of staff members in the office/ Plant offices would be drafted and their services would be utilised as messengers for quick passing of communications. All these personnel would be declared as essential personnel.

7.4.3.4 EMERGENCY COMMUNICATION

Whosoever notices an emergency situation such as fire, growth of fire, leakage etc. would inform his immediate superior and Emergency Control Center. The person on duty in the Emergency Control Centre would appraise the site controller. Site controller verifies the situation from the Incident Controller of that area or the shift incharge and takes a decision about implementing on Site Emergency Plan. This would be communicated to all the Incident Controllers and Emergency Coordinators. Simultaneously, the emergency warning system would be activated on the instructions of the Site Controller.

7.4.3.5 EMERGENCY RESPONSIBILITIES

The responsibilities of the key personnel are appended below

7.4.3.5.1 SITE CONTROLLER

On receiving information about emergency, he would rush to Emergency Control Centre (ECC) and take the charge of ECC and the situation. He would assess the magnitude of the situation in consultation with the incident controller and decide:

- Whether affected area needs to be evacuated.
- Whether personnel who are at assembly points need to be evacuated.
- Declares Emergency and orders for operation of emergency siren.
- Organizes announcement by public address system about location of emergency.
- Assesses the areas which are likely to be affected, and need to be evacuated or alerted.
- Maintains a continuous review of possible development and assesses the overall situation to decide whether shutting down of any section or whole of the Plant is required.
- Directs personnel of rescue, rehabilitation, transport, fire brigade, medical and other designated mutual support systems, locally available, for meeting emergencies.

- Controls evacuation of affected areas. If the situation is likely to go out of control or effects are likely to go beyond the premises of the factory, informs to District Emergency Authority, Police, and Hospital and seeks their intervention and help.
- Informs Inspector of factories, Deputy Chief Inspector of factories, SPCB and other statutory authorities.
- Gives public statement, if necessary.
- Keeps record of chronological events and prepares an investigation report and preserves the evidences.

After managing the emergent situation and binging the normalcy at the work place, he makes an statement accordingly

7.4.3.5.2 INCIDENT CONTROLLER

- Assembles the incident control team.
- Directs operations within the affected areas with the priorities for safety to personnel, minimizes damage to the plant, property and environment and minimizes the loss of materials.
- Directs the shutting down and evacuation of Plant and areas likely to be adversely affected by the emergency.
- Ensures that all-key personnel help is sought.
- Provides advice and information to the Fire and Security officer and the local Fire Services as and when they arrive.
- Ensures that all non-essential workers / staff of the effected areas evacuated to the appropriate assembly points and the areas are searched for victims, if any
- Understands the need for preservation of evidence so as to facilitate any enquiry into the cause and circumstances, which resulted or escalated the emergency.
- Coordinates with emergency services at the site.
- Provides tools and safety equipments to the team members.
- Keeps in touch with the team and advise them regarding the method of control to be used.
- Keeps the Site Controller informed continuously about the progress being made?

7.4.3.5.3 EMERGENCY COORDINATOR - RESCUE, FIRE FIGHTING

- Rushes to Emergency Control Centre after knowing about the emergency.
- Helps the Incident Controller in containment of the emergency.
- Ensures fire pumps in operating conditions and instructs pump house operator to be ready for any emergency.
- Guides the fire fighting crew i.e. Firemen, trained Plant personnel and security staff.
- Organizes shifting the fire fighting facilities to the emergency site, if required.
- Takes guidance of the Incident Controller for firefighting as well as assesses the requirements of outside help.
- Arranges the traffic control at the gate and the incident area.
- Directs the security staff to the incident site to take part in the emergency operations under his guidance and supervision.
- Evacuates the people in the Plant or in the nearby areas as advised by site controller.
- Searches for any casualties and arranges proper aid for them.
- Assembles search and evacuation team.
- Decides paths for the workers evacuating the site
- Maintains law and order in the area, and if necessary seeks the help of police and local administration.
- Arranges safety tools/equipments for the members of his team.

7.4.3.5.4 EMERGENCY COORDINATOR - MEDICAL, MUTUAL AID, REHABILITATION, TRANSPORT AND COMMUNICATION

- The event of failure of electric supply and there by internal telephone, sets up communication point and establishes contact with the Emergency Control Center (ECC) in the event of failure of electric supply and communication network.
- Organizes medical treatment to the injured and if necessary, will shift them to nearby hospitals.
- Mobilizes extra medical help from outside, if necessary
- Keeps a list of qualified first aid providers of the factory and seek their assistance.
- Maintains first aid and medical emergency requirements.
- Makes sure that all safety equipments are made available to the emergency team.

- Assists Site Controller with necessary data and coordinates the emergency activities.
- Assists Site Controller in updating emergency plan.
- Maintains liaison with Civil Administration.
- Ensures availability of canteen facilities and maintenance of rehabilitation centre.
- Remains in liaison with Site Controller / Incident Controller.
- Ensures availability of necessary cash for rescue / rehabilitation and emergency expenditure.
- Controls rehabilitation of affected areas at the end of emergency.
- Makes available diesel/petrol for transport vehicles engaged in emergency operation.

7.4.3.5.5 EMERGENCY COORDINATOR – ESSENTIAL SERVICES

He would assist Site Controller and Incident Controller

- Maintains essential services like Diesel Generator, Water, Fire Water, Compressed Air / Instrument Air, Power Supply for lighting.
- Plans alternate facilities in the event of Power failure, to maintain essential services such as lighting, etc.
- Organizes separate electrical connections for all utilities and during emergency ensures that the essential services and utilities are not affected.
- Gives necessary instructions regarding emergency electrical supply, isolation of certain sections etc to shift incharges and electricians.
- Ensures availability of adequate quantities of protective equipments and other emergency materials, spares etc.

7.4.3.5.6 GENERAL RESPONSIBILITIES OF EMPLOYEES DURING AN EMERGENCY

When an emergency warning is raised, the workers, if they are incharge of any process equipment, should adopt safe and emergency shut down and attend any prescribed duty as an essential employee. If no such responsibility has been assigned, he should adopt a safe course to assembly point and await instructions. He should not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

7.4.3.6. EMERGENCY FACILITIES

7.4.3.6.1 EMERGENCY CONTROL CENTRE

During the emergency, the office block would function as Emergency Control Centre. It would have external Telephone & Fax facility. All the Incident Controllers, Officers, senior personnel would be available there.

The following information and equipments will be provided at the ECC.

- Intercom, telephone
- Fire suit / gas tight goggles / gloves / helmets
- Factory layout, emergency site plan
- Emergency lamp / torchlight
- Plan indicating locations of hazardous inventories, Plant control room, sources of safety equipment, work road plan, assembly points, rescue locations, vulnerable zones, escape routes.
- Hazard chart
- Self-contained breathing apparatus
- Hand tools, wind direction, wind velocity indications
- Public Address Megaphone, Hand bell, Telephone directories (Internal and P&T).
- Address with telephone numbers of key personnel, Emergency coordinator.
- Important addresses, telephone numbers of experts from outside, government agencies, neighboring industries etc.
- Emergency shut down procedures.
- Nominal roll of employees.

7.4.3.6.2 EMERGENCY POWER SUPPLY

Plant facilities would be connected to Diesel Generator and would be placed in auto mode.

7.4.3.6.3 FIRE FIGHTING FACILITIES

First Aid and Fire Fighting equipment suitable for emergency should be maintained as per statutory requirements/ TAC Regulations. Fire hydrant line covering major areas would be laid. It would be maintained at 6 kg / sq.cm. pressure.

7.4.3.6.4 LOCATION OF WIND SOCK

On the top of production block and on the top of administrative block wind socks would be installed to indicate direction of wind during emergency period.

7.4.3.6.5 EMERGENCY MEDICAL FACILITIES

Gas masks and general first aid materials for dealing with chemical burns, fire burns etc. would be maintained in the medical centre as well as in the emergency control room. Private medical practitioners help would be sought. Government hospital would be approached for emergency help.

Apart from Plant first aid facilities, external facilities would be augmented. Names of Medical Personnel, Medical facilities nearby town i.e. **Ranigunj** would be prepared and updated. Necessary specific medicines for emergency treatment of burnt patients and for those affected by toxicity would be maintained.

Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of nearby industrial managements in this regard would also be taken on mutual support basis.

7.4.3.7 EMERGENCY ACTIONS

7.4.3.7.1 EMERGENCY WARNING

Communication of emergency would be made familiar to the personnel inside the plant and people outside. An emergency warning system would be established.

7.4.3.7.2 EMERGENCY SHUTDOWN

There are number of facilities which can be provided to help in dealing with hazardous conditions. The suggested arrangements are

- Stop feed
- Deluge contents
- Remove heat
- Transfer contents

Methods of removing additional heat include removal by the normal cooling arrangements or by the use of an emergency cooling system. Cooling facilities which vaporizes liquid may be particularly effective, since a big increase in vaporization can be obtained by reducing pressure.

7.4.3.7.3 EVACUATION OF PERSONNEL

The area would have adequate number of exits and staircases. In the event of an emergency, unrelated personnel have to escape to assembly point. Operators have to take emergency shutdown procedure and escape. Time office maintains a copy of deployment of employees in each shift at Emergency Communication Centre. If necessary, persons can be evacuated by rescue teams.

7.4.3.7.4 ALL CLEAR SIGNAL

At the end of emergency, after discussing with Incident Controllers and Emergency Coordinators, the site controller orders an all-clear signal.

7.5 OCCUPATIONAL HEALTH AND SURVEILLANCE

Large industries where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance, the men, materials and machines are the basic inputs. Along with the booms, the industrialization generally brings several problems related with health and safety of the workmen.

7.5.1 OCCUPATIONAL HEALTH

Occupational health needs attention both during construction and operation phases. However, the problem varies both in magnitude and variety in the above phases.

7.5.2 CONSTRUCTION & ERECTION

The occupational health problems envisaged at this stage can mainly be due to constructional activities and noise.

To overcome these hazards, in addition to arrangements required to reduce it within TLV'S, personnel protective equipments should also be supplied to workers.

7.5.3 OPERATION & MAINTENANCE

The working personnel would be given the following appropriate personnel protective equipments.

- Industrial Safety helmets
- Crash helmets
- Face shield with replacement acrylic vision

- Zero power plain goggles with cut type filters on both ends
- Zero power goggles with cut type filters on both sides and blue colour glasses
- Welders equipment for eye and face protection
- Cylindrical type earplug
- Ear plugs
- Canister gas masks
- Self contained breathing apparatus
- Leather apron
- Boiler suit
- Safety belt / line man's safety belt
- Leather hand gloves
- Asbestos hand gloves
- Canvas cum leather hand gloves with leather palm
- Industrial safety shoes with steel toe
- Electrical safety shoes without steel toe and gum boots

7.5.4 OCCUPATIONAL HEALTH [Std. TOR # 8 (i)]

Anticipated Occupational & Safety Hazards

- ❖ Heat Stress & Stroke
- ❖ Dehydration
- ❖ Skin disorders
- ❖ Dust Exposure
- ❖ Metallic dust exposure
- ❖ Noise
- ❖ Illumination
- ❖ Burns and shocks due electricity

The health of workers can be protected by adopting the following measures:

- ❖ Relaxation facilities to workers in working in furnace are in separate rooms with good ventilation & air circulation. This will help in relieving of thermal stress.
- ❖ Good Housekeeping practices

- ❖ Good ventilation & exhaust system
- ❖ Enforcement of usage of Personal Protective Devices.
- ❖ Rotation of employees in specific areas to avoid continuous exposure.
- ❖ Earplugs will be provided to employees working in noise prone areas such as STG,
- ❖ Periodic monitoring of noise levels Fugitive emissions, emissions from stack, dust suppression system, etc.

Frequency of Periodical Examination:

For employees once in a year

Personal Protective Devices and Measures

- Industrial Safety helmets
- Fall arrestor
- Safety nets (for fall protection)
- Crash helmets
- Face shield with replacement acrylic vision
- Safety goggles
- Welders equipment for eye and face protection
- Ear plugs
- Canister gas masks
- Welding face shield
- Welding hand sleeve
- Self contained breathing apparatus
- Leather apron
- Safety belt / line man's safety belt
- Leather hand gloves
- Asbestos hand gloves
- Industrial safety shoes with steel toe
- Electrical safety shoes without steel toe and gum boots
- Protective clothing etc.

Plan of pre-placement and periodical health status of workers:

Pre-employment check up will be made mandatory and following test will be conducted:

- Plan of evaluation of health of workers
- Chest x rays
- Audiometry
- Spirometry
- Vision testing (Far & Near vision, color vision and any other ocular defect)
- ECG
- Haemogram (examination of the blood)
- Urine (Routine and Microscopic)
- Complete physical examination
- Musculo-skeletal disorders (MSD)
- Backache
- Pain in minor and major joints
- Fatigue, etc.
- Medical records of each employee is maintained separately and updated as per finding during monitoring. Age, sex wise, department wise data on the above parameters is maintained.
- Medical records of the employee at the end of his / her term are will be updated.

List of equipment for Occupational Health Monitoring

ECG

Analytical Pan Balance

Dust Sampling devices

Heat stress monitoring device (Personal)

Spectrophotometer

Noise Monitoring device (dosimeter)

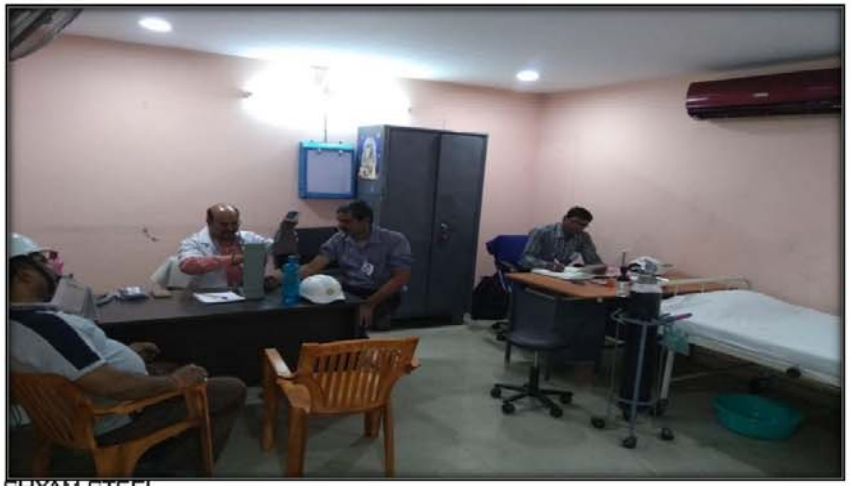
Spiro meter

Audiometric device

Vision screener


Occupational Health Centre
OCCUPATIONAL HEALTH CENTRE
DRESSING ROOM
OCCUPATIONAL HEALTH CENTRE
DOCTOR'S ROOM


AMBULANCE
WB 42M 9962



Budget for Occupational Health & Safety [Std. TOR # 8 (iv)]

- Capital cost of **Rs. 0.8 Crore** & **Recurring cost of Rs. 20 lakhs** per annum will be allocated on Occupational health & Safety in the proposed project.
- Occupational health checkup will be outsourced by third party. However, a Primary Health Centre (PHC) with ambulance facility is already been provided within the plant.
- Firefighting system will be provided all through the plant with an investment of **Rs. 2.0** Crores.

7.6 SAFETY PLAN

Safety of both men and materials during construction and operation phases is of great concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The disaster in Project is possible due to collapse of structures and fire / explosion etc. The details of fire fighting equipments to be installed are given below:

- Carbon dioxide type
- Foam type
- DCP type
- Soda acid type
- Fire buckets
- Fire hydrants

Keeping in view the safety requirement during construction, operation and maintenance phases, **Shyam Steel Manufacturing Ltd.** has formulated safety policy with the following regulations.

- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of Plants, machinery and equipment.
- To allocate sufficient resources to maintain safe and healthy conditions of work.
- To ensure that adequate safety instructions are given to all employees.
- To provide where ever necessary protective equipment, safety appliances and clothing and to ensure their proper use.
- To inform employees about materials, equipments or processes used in their work which are known to be potentially hazardous to health and safety.
- To keep all operations and methods of work under regular review for making necessary changes from the safety point of view in the light of experience and up to date knowledge.

- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work.
- To provide appropriate instructions, training and supervision to employee's health and safety, first aid and to ensure that adequate publicity is given to these matters.
- To ensure proper implementation of fire preventive methods and an appropriate fire fighting service along with training facilities for personnel involved in this service.
- To publish / notify regulations, instructions and notices in the common language of employees.
- To prepare separate safety rules for each type of process involved.
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipments, work places and operations.

7.6.1 SAFETY ORGANISATION

7.6.1.1 CONSTRUCTION AND ERECTION PHASE

A highly qualified and experienced safety officer will be appointed. The responsibilities of the safety officer include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programmes and provide professional expert advice on various issues related to occupational safety and health. In addition to employment of safety officer, every contractor, whose employees will be more than 250, would also be asked to employ one safety officer to ensure safety of the workers in accordance with the conditions of the contract.

7.6.1.2 OPERATION & MAINTENANCE PHASE

After the completion of construction, the posting of safety officer would be in accordance with the requirements of Factories Act and he will be assigned the duties and responsibilities accordingly.

7.6.1.3 SAFETY CIRCLE

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles would be constituted in each area of work. The circle would consist of 5-6 employees from that area. The circle would normally meet for about an hour every week.

7.6.2 SAFETY TRAINING

A full-fledged training centre will be established at **Shyam Steel Manufacturing Ltd.** Safety training will be provided by the safety officers with the assistance of faculty members called from professional safety institutions and universities. In addition to regular employees, limited contractor labours will also given safety training. To create safety awareness safety films will be shown to workers and leaflets etc. will be distributed.

7.6.3 HEALTH AND SAFETY MONITORING PLAN

All the potential occupational hazardous work places will be monitored regularly. The health of employees working in these areas will be monitored once in a year

7.7 SOCIAL IMPACT ASSESSMENT [Std. TOR 6(xi)]

In view of the fact that the development is an ever-growing process, its impact is also ever increasing, leading to rapid deterioration in environmental conditional and human health. Impact assessment thus ensures that the potential problems are foreseen and addressed at an early stage in the projects plant and design. Environment Impact Assessment (EIA) & Social Impact Assessment provides a rational approach to sustainable development.

Social Impact Assessment includes the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, and developmental activities) on individual, social groups and community at large and any social change processes invoked by those interventions.

7.7.1 LEGISLATIVE & REGULATORY CONSIDERATIONS

According to the Standard TOR point no. **6 (xi),** in the TOR letter issued by Ministry of Environment, Forest and Climate Change (MoEF&CC) Vide No. **J-11011/724/2007-IA.II(I) dated 1st June 2021** Towards the fulfilment of the above TOR, Functional Area Expert and his team has prepared the Social Impact Assessment report.

7.7.2 OBJECTIVE

The primary objectives of the Social Impact Assessment study are:

- Understanding the baseline socio-economic environment obtaining in the impact zone.
- Identifying the key stakeholders who are likely to be impacted by the establishment of the proposed project.

- Predicting the positive and negative impacts of the project on the socio-economic environment in the area.
- Suggesting mitigation measures to minimize the negative impacts.

7.7.3 SCOPE

In keeping with its objectives, the scope of the study extends to:

- Making a reconnaissance of the villages and human settlements within the 10 km radius from the proposed project site.
- Understanding the overall socio-economic profile of the impact area.
- Assessing the baseline socio-economic environment prevailing in the impact area focusing the core and buffer zones.
- Identifying key economic sectors and major sources of livelihood in the study area.
- Understanding social structures and lifestyles of people in the area who are likely to be affected the most by the proposed project.
- Assessing physical and social infrastructure facilities accessible to inhabitants in the project impact area.
- Predicting the likely socio-economic impacts as a consequence of establishing the project.
- Suggesting adverse impact mitigation measures in line with the felt needs, aspirations and expectations of the project affected population.
- Preparing an appropriate Socio-Economic Environment Management Plan.

7.7.4 APPROACH & METHODOLOGY

The basic approach for carrying out the SIA is focused on:

- Zeroing-in on the project impact area, covering all the villages and other habitations falling within the 10 km radius from the project site.
- Collecting basic information with respect to constituent villages in terms of census village code, name of the Tehsil in which a particular village falls, number of households, population level (as per Census 2011) and growth of village population during the last decade, distance from the proposed project site etc.
- Identifying critical knowledge/information gaps which impede an objective and reliable assessment of the socio-economic impacts of the project.

- Zeroing-in on the data/information to be collected for a fair impact assessment and deciding upon the sources and means to collecting the same.
- Identifying the key stakeholders and potential respondents for collecting the required information.
- Drawing a sampling frame and sample size specifying villages and number of households to be contacted for primary data/information collection and agencies to be contacted for eliciting information on various aspects relevant to the study.
- Assessing the views raised in the Public Hearing and developing a plan (consisting of Cost, Budget, Monitoring and Evaluation) to implement the needs of people as per Public hearing outcome.

Methodology

- The Social Impact Assessment (SIA) of the proposed project is relied on a judicious mix of Secondary (i.e. Census 2011, Govt. Dept., Maps and Literature Research) and Primary data (i.e. Field survey and Interview / Interactions) collected from different sources.

- Various socio-economic aspects considered for impact assessment include livelihoods, relocation and rehabilitation, incomes, employment, skills, education, health and overall lifestyles. The cultural aspects considered are archaeological, historical, religious and aesthetic places of importance, arts and crafts etc.
- The SIA was carried out in the three distinct stage:
  i. Desktop review / research
  ii. Field Survey
  iii. Data Analysis & its interpretation

7.7.5 STUDY AREA

The coverage of study extends to all the **54 Census villages** and towns falling within the 10 km. radius, from the proposed project site, as mandated by Standard ToR of MoEF&CC. The study area is 314 Sq. Km. The land utilisation pattern of the study area shows the dominance of single crop land accounting for 17.5 %. The land under human settlement covers an area of 13.188 Sq. Km., which is mere 4.2 % of the total area.

7.7.6 PROJECT IMPACT ZONES

The geographical area for impact assessment extends over 10 Kms. Radius from the project site and comprises of 36 census Villages and towns. To facilitate a more realistic and objective assessment, the 36 villages / towns are categorized into three zones:

- Core zone (within 0 – 2 Kms.) Radial distance from the project site)
- Buffer zone (> 2 – 5 Kms.)
- Transition zone (> 5 – 10 Kms.)

TABLE NO. 7.7.1: KEY DEMOGRAPHIC FEATURES OF THE VILLAGES IN THE THREE IMPACT ZONES

S.No.	Village Name	Distance from Project Site (In Kms.)	Direction from Project site	Total Households	Population					
					Total	Male	Female	SC	ST	Average Literacy (%)
Villages within 0 - 2 Kms distance from the project site										
1	Ardhagram	1.7	NW	254	1189	601	588	559	155	53%
2	Gopalpur	1.1	N	219	980	509	471	413	0	64%
3	Jemua	0.3	SW	618	3267	1666	1601	820	473	57%
4	Mejia	1.0	E	1086	5308	2772	2536	1220	1	68%
5	Parabatipur	0.2	N	254	1338	684	654	415	0	60%
6	Shyampur 1	1.5	NE	678	3302	1668	1634	1939	296	52%
7	Tarapur	1.9	SE	1004	4611	2395	2216	1389	11	66%
Sub Total : I				4113	19995	10295	9700	6755	936	61%
Villages within 2 - 5 Kms distance from the project site										
8	Amkula	4.2	NW	1099	5445	2928	2517	499	955	59%
9	Anandapur	2.1	SW	162	714	381	333	337	1	52%
10	Ballavpur	3.6	NE	1441	6468	3399	3069	1313	7	72%
11	Belguria	4.8	S	201	937	497	440	428	0	44%
12	Benathol	2.8	SSE	92	534	281	253	52	139	48%
13	Bhulul	2.7	W	46	249	134	115	0	0	75%
14	Damalia	3.6	NW	218	1118	581	537	703	0	65%
15	Egara	3.5	NE	1597	7623	3918	3705	4626	350	69%
16	Jorsa	3.8	W	159	852	454	398	569	0	70%
17	Jujghati	4.1	SE	119	494	250	244	329	0	61%
18	Kalikapur	3.7	W	143	666	340	326	237	0	71%
19	Kansara	4.3	SW	328	1687	866	821	468	0	57%
20	Kanshai	2.5	SW	182	965	507	458	246	0	58%
21	Lakshman bandi	2.8	SWW	256	1125	578	547	121	51	45%

22	Nabashan	4.2	SSE	49	193	94	99	193	0	48%
23	Ramlalpur	4	SW	161	710	371	339	566	0	62%
24	Ranigunj	4.6	NE	17008	83418	43825	39593	28221	6584	66%
25	Raghunathchak	3.1	NE	1305	6006	3149	2857	1432	27	63%
26	Sahebganj	3.8	NE	1068	4715	2430	2285	1058	168	73%
27	Tegharia	4.1	SWW	356	1787	930	857	744	76	63%
Sub Total : II				23288	113079	59205	53874	39993	7395	73%
Villages within 5 - 10 Kms distance from the project site										
28	Andal	8.5	E	1308	6177	3160	3017	1752	142	71%
29	Baktarnagar	7.4	NE	1106	5112	2643	2469	1305	389	63%
30	Bakulia	8.1	NW	138	671	352	319	559	0	46%
31	Banshra	8.5	NNE	1252	5703	3001	2702	1868	902	66%
32	Bhara	5.5	NW	384	1912	995	917	971	1	43%
33	Bishjhor	9.2	SW	269	1186	594	592	667	0	53%
34	Dahuka	5.4	NW	192	1174	622	552	0	0	36%
35	Damra	7.2	S	94	504	251	253	0	0	75%
36	Dhekia	8.5	SW	303	1473	765	708	476	0	65%
37	Durlabhpur	7.2	NW	373	1725	894	831	968	3	63%
38	Gopinathpur	9.3	S	320	1638	843	795	496	0	61%
39	Jamkuri	5.8	SE	126	719	368	351	313	4	56%
40	Kastara	5.4	W	307	1461	746	715	239	0	50%
41	Kotabaid	7.8	SSW	272	1292	666	626	503	0	61%
42	Madanpur	5.8	E	145	896	482	414	162	0	68%
43	Mochrakend	6.5	SE	434	1919	957	962	697	1	54%
44	Nimra	7.3	SSW	278	1445	736	709	620	0	40%
45	Pabra	6.5	SW	914	4179	2128	2051	1236	237	61%
46	Pairasol	5.5	SW	264	1277	643	634	713	0	54%
47	Palajuria	9.2	SE	252	1323	698	625	10	0	49%
48	Parulia	5.6	SE	117	563	299	264	80	0	41%
49	Purunia	6.2	EES	232	1031	553	478	344	0	52%
50	Ranipur	7.5	SE	407	1912	1004	908	568	0	66%
51	Salma	8.5	NW	749	3732	1958	1774	1757	339	46%
52	Shalroha	7.8	SW	409	1552	819	733	690	0	51%
53	Sitarampur	5.2	SE	258	1003	510	493	387	0	74%
54	Tirat	7.2	NW	851	4224	2184	2040	1553	1174	60%
Sub Total : III				11754	55803	28871	26932	18934	3192	59%
Total				**39155**	**188877**	**98371**	**90506**	**65682**	**11523**	**67%**

It is obvious from the above data that there are 7 no. of villages fall in core impact zone, accounting for just 10.6 % of the total population in the study area. 20 no. of villages accounting

for 59.9 % of the total population fall in buffer impact zone, while 27 no. of villages accounting for 29.5 % of the total population fall in transition zone.

Given the nature of the project, its socio-economic impacts will be more pronounced on the people inhabiting the core and buffer impact zones rather than on the transition zone. Hence the study focus was more on the socio-economic conditions obtaining among the households in the core and buffer zones.

7.7.7 BASELINE DATA AND ANALYSIS OF SURVEYED VILLAGES

7.7.7.1 DESKTOP REVIEW / RESEARCH

A fairly comprehensive desk research to understand the socio-economic setting of the project area was the first initiative towards carrying out SIA. Accordingly, published and unpublished information available on the subject was referred, reviewed and critical information gaps identified by the SIA team.

It was during this stage, the key stakeholders were identified and study instruments – schedules and checklists – prepared, tested and finalised. Similarly, the sampling frame and sample size were also designed and finalised. The sampling frame for the study consisted of villages, households and District and Tehsil level officials, key informants as also local opinion leaders.

A proportional random sampling technique was followed to select the sample village's and households. Accordingly, the sample villages were picked up at random from the three impact zones considered – Core, Buffer and Transition. The number of households to be contacted in each sample village was determined on the basis of the size of population of the respective village. In the absence of household level information, the respondent households were selected randomly during the course of visit to the respective village. However, while selecting the respondent households, emphasis was on contacting households, who are economically poor, susceptible to shifts in livelihood patterns and belonged to vulnerable social communities.

To ensure the accuracy of the primary data collected from the study area, all the village specific information was verified from the data of Census 2011 and secondary information collected from various Govt. Dept., Map, Literature etc.

Accordingly following 16 no. of villages have been selected:

S.No.	Village Name
1	Amkula
2	Ardhagram

3	Benathol
4	Egara
5	Gopalpur
6	Jemua
7	Jorsa
8	Lakshman bandi
9	Mejia
10	Parabatipur
11	Raghunathchak
12	Ranigunj
13	Sahebganj
14	Shyampur 1
15	Tarapur
16	Tegharia

7.7.7.2 FIELD SURVEY

Field survey helped in collecting fairly reliable primary data with respect to the major livelihood sources, education, health status, basic amenities and standard of living. It also helped in eliciting information from the natives about the negative environmental impacts of industrial units already existing in the area and the measures initiated by them (industrial units) to mitigate the impacts. Field survey was done during March 2021 to May 2021.

The potential respondents in the sample households were approached personally by members of the core study team and Field Investigators who explained the purpose of the visit and solicited their participation by sharing the intended information unbiasedly. The study team clarified the doubts and addressed the apprehensions expressed by the respondents. Once the respondents were willing and ready to participate, household level socio-economic information was collected with the help of a structured questionnaire. A number of questions were open ended to facilitate capturing perceptions of the respondents objectively.

In addition, Participatory Rapid Assessment (PRA) tools comprising Villages / Town Transect Walks, Focus Group Discussions (FGD), Key Informant Interviews and Local Opinion Leader interviews were used for collecting qualitative information with regards to key socio-economic challenges of the area.

Table No.7.3.2 : Village wise Category of Sample Households who interviewed for in depth study

S.No.	Village Name	Male	Female	Total
1	Amkula	5	6	11
2	Ardhagram	6	10	16

S.No.	Village Name	Male	Female	Total
3	Benathol	10	15	15
4	Egara	5	5	10
5	Gopalpur	6	12	18
6	Jemua	12	15	17
7	Jorsa	7	4	11
8	Lakshman bandi	6	6	12
9	Mejia	14	15	29
10	Parabatipur	12	10	22
11	Raghunathchak	5	3	8
12	Ranigunj	30	25	55
13	Sahebganj	9	8	17
14	Shyampur 1	7	9	16
15	Tarapur	6	6	12
16	Tegharia	5	6	11
	Total	145	155	280

7.7.7.3 DATA ANALYSIS & ITS INTERPRETATION

Population Distribution

As per analysis of primary data & secondary data the distribution of population varies from place to place. In the Surveyed villages, Ranigunj is densely populated area. Average Literacy rate in surveyed villages is 65 %. The avg. sex ratio of surveyed villages is 912. Total household population come out to be 27053. Average household size is 4.9. The percentage of Male population is 52.3 % and Female population is 47.7 % i.e. no major difference lies between Male and Female count.

TABLE NO. 7.7.2: DEMOGRAPHY OF THE SURVEYED VILLAGES

S.No.	Village Name	Total Households	Population						
			Total	Male	Female	SC	ST	Average Literacy (%)	Sex Ratio
1	Amkula	1099	5445	2928	2517	499	955	59%	860
2	Ardhagram	254	1189	601	588	559	155	53%	978
3	Benathol	92	534	281	253	52	139	48%	900
4	Egara	1597	7623	3918	3705	4626	350	69%	946
5	Gopalpur	219	980	509	471	413	0	64%	925
6	Jemua	618	3267	1666	1601	820	473	57%	961
7	Jorsa	159	852	454	398	569	0	70%	877
8	Lakshman bandi	256	1125	578	547	121	51	45%	946
9	Mejia	1086	5308	2772	2536	1220	1	68%	915
10	Parabatipur	254	1338	684	654	415	0	60%	956
11	Raghunathchak	1305	6006	3149	2857	1432	27	63%	907

12	Ranigunj	17008	83418	43825	39593	28221	6584	66%	903
13	Sahebganj	1068	4715	2430	2285	1058	168	73%	940
14	Shyampur 1	678	3302	1668	1634	1939	296	52%	980
15	Tarapur	1004	4611	2395	2216	1389	11	66%	925
16	Tegharia	356	1787	930	857	744	76	63%	922
	Total	**27053**	**131500**	**68788**	**62712**	**44077**	**9286**	**65%**	**912**

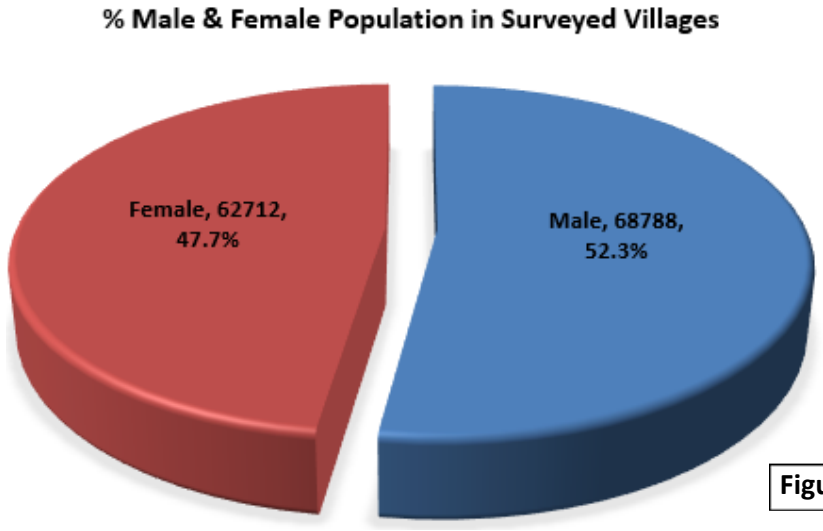


Figure 7.1

VULNERABLE GROUP:

There are particular groups who, for various reasons, are weak and vulnerable or have traditionally been victims of violations and consequently require special protection for the equal and effective enjoyment of their human rights. Such groups fall into reserve category and the Company has to take special measures to uplift the social strata in this section. The surveyed villages have very less count of Schedule caste and Schedule tribe fraction is comparatively high i.e.33.5 %. The category falling in unreserved category shows the major occupancy in the area i.e.59.4 % of the total population.

TABLE NO. 7.7.3: DEMOGRAPHY OF VULNERABLE GROUPS

S.No.	Village Name	Total	SC	ST	Others
1	Amkula	5445	499	955	3991
2	Ardhagram	1189	559	155	475
3	Benathol	534	52	139	343
4	Egara	7623	4626	350	2647
5	Gopalpur	980	413	0	567
6	Jemua	3267	820	473	1974
7	Jorsa	852	569	0	283
8	Lakshman bandi	1125	121	51	953

S.No.	Village Name	Total	SC	ST	Others
9	Mejia	5308	1220	1	4087
10	Parabatipur	1338	415	0	923
11	Raghunathchak	6006	1432	27	4547
12	Ranigunj	83418	28221	6584	48613
13	Sahebganj	4715	1058	168	3489
14	Shyampur 1	3302	1939	296	1067
15	Tarapur	4611	1389	11	3211
16	Tegharia	1787	744	76	967
	Total	**131500**	**44077**	**9286**	**78137**

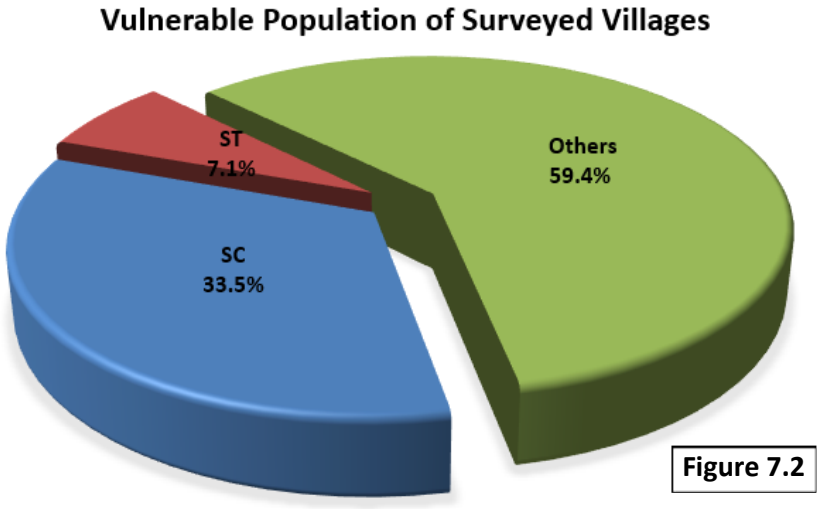


Figure 7.2

LITERACY LEVEL:

Literacy denotes progress of a nation as a whole. The "multiplier effect" of literacy empowers people, enables them to participate fully in society and contributes to improve livelihoods. Literacy is also a driver for sustainable development in that it enables greater participation in the labour market; improved child and family health and nutrition; reduces poverty and expands life opportunities. In the surveyed villages male literacy is greater than female literacy rate. The Company will make efforts in order to fill the lacunae and indirectly contribute to the progress of the nation. As per the study, the literacy rate (65 %) is average in the surveyed villages education awareness & education facilities are adequate so there is a need to create some more awareness. From the survey it is clear that the literacy rate of female (41.2 %) is lower as compared to male population (58.8 %). Male and female literacy rate of villages vary from place to place. On whole,

female literacy level has to be enhanced to provide a balance in the society and pace towards economic progress of the area.

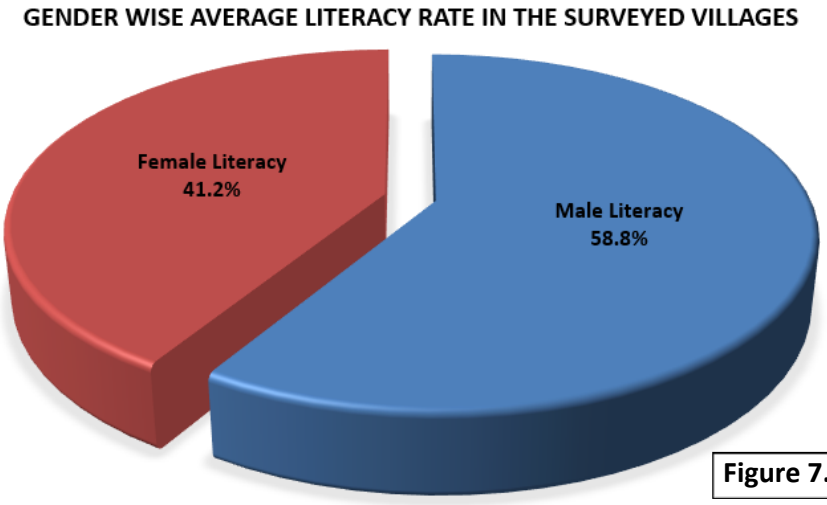


Figure 7.3

TABLE NO. 7.7.4: LITERACY RATE IN THE SURVEYED VILLAGES

S.No.	Village Name	Total Pop.	Total Literate Population	Literacy Rate	Male Literacy	Male Literacy Rate	Female Literacy	Female Literacy rate
1	Amkula	5445	3239	59%	1987	61%	1252	39%
2	Ardhagram	1189	636	53%	377	59%	259	41%
3	Benathol	534	256	48%	175	68%	81	32%
4	Egara	7623	5262	69%	3004	57%	2258	43%
5	Gopalpur	980	631	64%	372	59%	259	41%
6	Jemua	3267	1850	57%	1071	58%	779	42%
7	Jorsa	852	599	70%	360	60%	239	40%
8	Lakshman bandi	1125	510	45%	353	69%	157	31%
9	Mejia	5308	3592	68%	2103	59%	1489	41%
10	Parabatipur	1338	797	60%	483	61%	314	39%
11	Raghunathchak	6006	3768	63%	2209	59%	1559	41%
12	Ranigunj	83418	54839	66%	32232	59%	22607	41%
13	Sahebganj	4715	3424	73%	1936	57%	1488	43%
14	Shyampur 1	3302	1724	52%	1045	61%	679	39%
15	Tarapur	4611	3026	66%	1774	59%	1252	41%
16	Tegharia	1787	1130	63%	651	58%	479	42%
	Total	**131500**	**85283**	**61%**	**50132**	**60%**	**35151**	**40%**

ECONOMIC ACTIVITIES:

The economy of an area is defined by the occupational pattern and income level of the people in the area. The occupational structure of residents in the study area is studied with reference to work category. The population is divided occupation wise into three categories, viz., main workers, marginal workers and non-workers. The workers include cultivators, agricultural labourers, those engaged in household industry and other services. While the marginal workers are those workers, engaged in some work for a period of less than 180 days during the reference year. The non-workers include those engaged in unpaid household duties, students, retired persons, dependents, beggars, vagrants etc. besides institutional inmates or all other non-workers who do not fall under the above categories.

The percentage of total working population and non-working population is 32.0 % and 68.0 % respectively in the study area.

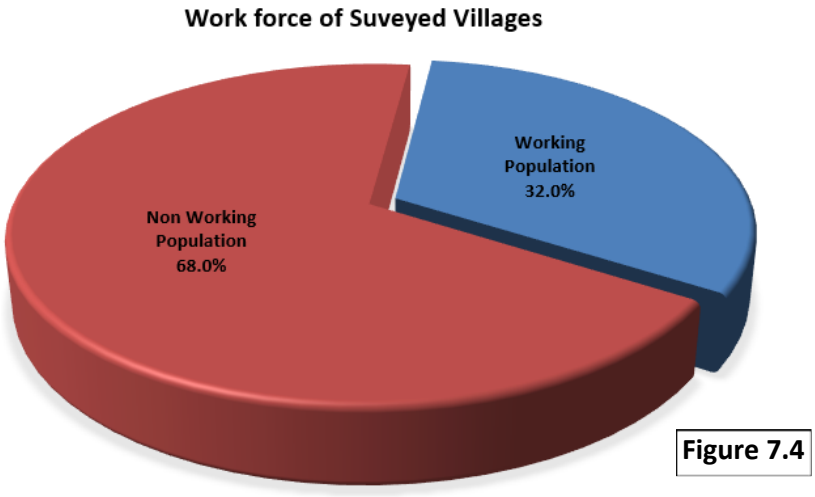


Figure 7.4

TABLE NO. 7.7.5: WORK FORCE OF THE SURVEYED VILLAGES

S.No.	Village Name	Total Population	Total Worker Population	Total Non-Working Population	Main Working Population	Main Cultivator Population	Main Agricultural Labourers Population	Main Household Industries Population	Main Other Workers Population
1	Amkula	5445	1484	3961	1395	8	25	12	1350
2	Ardhagram	1189	451	738	374	9	56	14	295
3	Benathol	534	238	296	236	45	84	4	103
4	Egara	7623	2683	4940	2120	36	21	20	2043
5	Gopalpur	980	366	614	293	54	193	0	46
6	Jemua	3267	1078	2189	861	126	202	7	526
7	Jorsa	852	299	553	184	60	55	0	69

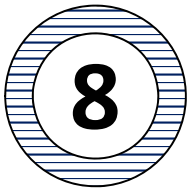
S.No.	Village Name	Total Population	Total Worker Population	Total Non-Working Population	Main Working Population	Main Cultivator Population	Main Agricultural Labourers Population	Main Household Industries Population	Main Other Workers Population
8	Lakshman bandi	1125	402	723	133	62	19	0	52
9	Mejia	5308	1738	3570	1478	186	178	27	1087
10	Parabatipur	1338	417	921	360	33	1	4	322
11	Raghunathchak	6006	2044	3962	1776	10	8	27	1731
12	Ranigunj	83418	25999	57419	19889	177	506	268	18938
13	Sahebganj	4715	1544	3171	1280	2	1	8	1269
14	Shyampur 1	3302	1254	2048	857	219	155	6	477
15	Tarapur	4611	1539	3072	1312	203	50	27	1032
16	Tegharia	1787	551	1236	451	33	87	17	314
	Total	**131500**	**42087**	**89413**	**32999**	**1263**	**1641**	**441**	**29654**

It is evident from the above on the basis of information obtained from surveyed villages that the percentage of total working population is low and dependent population is high. This indicator shows that the economic conditions are not good. They require livelihood opportunities to upgrade their economic status and fulfil basic needs. Shyam Steel Manufacturing Ltd. will provide some direct employment to the local people based on the qualification and will also provide training opportunity for self-employment generation.

7.8 R & R ACTION PLAN

There are no habitations in the additional land proposed for expansion. Hence no Rehabilitation & Resettlement Action Plan will be required.

CHAPTER – 8
PROJECT BENEFITS



8.1 PHYSICAL INFRASTRUCTURE

Once the proposed activity is commissioned, the socio-economic status of the local people will improve and there by infrastructure facilities like communication systems will improve.

8.2 SOCIAL INFRASTRUCTURE

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

8.3 EMPLOYMENT POTENTIAL

The expansion project creates direct employment to about 1800 persons (skilled, semiskilled & unskilled) once the expansion comes to the operational stage and indirect employment of about 700 persons.

8.3.1 SKILLED

Total skilled employment in the proposed plant will be 200.

8.3.2 SEMI-SKILLED

Total Semi-skilled employment in the proposed plant will be 600. Priority will be given to local people for semi-skilled jobs.

8.3.3 UNSKILLED

Total Unskilled employment in the proposed plant will be 1000. Top priority will be given to local people for unskilled jobs.

8.4 SOCIO-ECONOMIC DEVELOPMENTAL ACTIVITIES PROPOSED [Std.ToR # 11(i)]

Shyam Steel Manufacturing Ltd is being **/** will be actively contributed to improve the Socio-economic conditions of the area by providing assistance for local persons preferable from the nearby villages. The continuing commitment by business to behave ethically and contribute to economic development while improve the quality of life of workforce and their families as well as that of the local community and society at large.

BUDGET ALLOCATION FOR SOCIAL WELFARE ACTIVITIES (PROPOSED)

Earlier ESC has been changed to CER as per the O.M issued on 1st May 2018. Later on this O.M is nullified as per the O.M issued on 30th September 2020. As per this, the budgetary allocation for commitment made by Project Proponent to address the concern raised during public hearing & based on Social Impact Assessment (SIA). Hence A separate budget will be allocated for **Social and infrastructure development** after completion of Public Hearing.

CHAPTER – 9
ENVIRONMENTAL COST BENEFIT ANALYSIS

No specific TOR has been stipulated regarding Cost benefit analysis.

All the required environmental protection measures will be implemented in the proposed plant and will be operated to comply with the MOEF&CC/CPCB/SPCB norms.

CHAPTER – 10
ENVIRONMENTAL MANAGEMENT PLAN

10.1 INTRODUCTION

The major objective and benefit of utilizing Environmental Impact Assessment in project planning stage itself, is to prevent avoidable losses of environmental resources and values as a result of Environmental Management. Environmental Management includes protection / mitigation / enhancement measures as well as suggesting post project monitoring programme. Environmental management may suggest revision of project site or operation, to avoid adverse impacts or more often additional project operations may have to be incorporated in the conventional operation.

The industrial development in the study area needs to be intertwined with judicious utilization of non-renewable resources of the study area and within the limits of permissible assimilative capacity. The assimilative capacity of the study area is the maximum amount of pollution load that can be discharged in the environment without affecting the designated use and is governed by dilution, dispersion, and removal due to physico-chemical and biological processes. Environment Management Plan (EMP) is required to ensure sustainable development in the study area of the plant due to the proposed project. Hence it should be an all encompassive plan for which the proposed industry, Government, Regulating agencies like SPCB and more importantly, the affected population of the study area, need to extend their cooperation and contribution.

It has been evaluated that the study area will not be affected adversely and is likely to get new economical fillip. The affected environmental attributes in the region are air quality, water quality, soil, land use, ecology and public health.

The Management Action Plan aims at controlling pollution at the source level to the possible extent with the available and affordable technology followed by treatment measures before they are discharged.

Environmental Management aims at the preservation of ecosystem by considering the pollution abatement facilities at the plant since inception. In the upcoming modern integrated steel plants,

pollution abatement has become an integral part of planning and design along with Techno economic factors.

10.2 MANAGEMENT DURING CONSTRUCTION PHASE [Std. TOR # 10]

Environmental pollution is inevitable during the construction phase. The project proponent will take appropriate steps to control pollution during construction phase. The following are the factors requiring control during construction phase.

10.2.1 SITE PREPARATION

At the time of construction, there will be some quantity of soil and debris. The disturbed slopes shall be well stabilized before the onset of the monsoon. The leveling operation will also involve piling up of backfill materials. Use of dust suppressant spraying to minimize fugitive dust during construction activities is recommended.

10.2.2 WATER SUPPLY AND SANITATION

The employees at the plant shall be provided with water for their requirement and for the construction activities. The proposed plant shall be provided with sufficient and suitable sanitary facilities to maintain proper standards of hygiene. These facilities would preferably be connected to a septic tank and shall be maintained properly to have least environmental impact.

10.2.3 FUEL & REST ROOMS FACILITY

Fuel will be supplied to construction labour for cooking during construction period. This will prevent usage of fire wood for cooking. Rest rooms will be provided to construction labour during construction period and operational stage.

10.2.4 NOISE

Noise pollution is anticipated during the construction phase due to the usage of various construction equipment such as mechanical vibrator and mixers etc. The noise effect on the nearest inhabitations due to construction activity will be negligible.

However, as advised the onsite workers working near the noise generating equipments shall be provided with noise protection devices like earplugs. Acoustic enclosures to Generators & Compressors. Wet drilling method will be adopted.

10.2.5 MAINTENANCE OF VEHICLES

One should be very careful in selecting the site for vehicle maintenance, so as to prevent the ground water contamination due to the spillage of oil. Both diesel and petrol engine vehicles shall be maintained properly. Unauthorized dumping of waste oil will be prohibited. Wastes will be disposed off to the SPCB approved vendors.

10.2.6 WASTE

The solid waste shall be collected and disposed off as per norms.

10.2.7 STORAGE OF HAZARDOUS MATERIAL

The following hazardous materials need to be stored at the site during construction.

a. Gas for welding purpose
b. LDO
c. Painting materials

All these materials would be stored as per international safety standards.

10.2.8 LAND ENVIRONMENT

The proposed project will not create any major impact on land environment. After the completion of construction activity, the surplus earth will be utilized to fill up low lying areas, the rubbish will be cleared and all in- built surfaces will be reinstated. Appropriate vegetation will be planned and all such areas shall be landscaped. **32.79 Ha. (81 acres)** of extensive greenbelt **(inclusive of existing)** will be developed within the premises.

10.3 POST CONSTRUCTION PHASE

10.3.1 AIR EMISSION MANAGEMENT [Std.TOR # 7 (v)]

The following air emission control systems are proposed.

TABLE NO. 10.3.1: PROPOSED AIR EMISSION CONTROL SYSTEMS

S.No.	Source	Control Equipment	Emission at the outlet
1.	Pellet Plant	Electro Static Precipitators (ESP) (High performance rigid electrodes with transformer)	PM <30 mg/Nm^3
2.	DRI kilns with WHRB's	Electro Static Precipitators (ESP) (High performance rigid electrodes with transformer)	PM <30 mg/Nm^3

S.No.	Source	Control Equipment	Emission at the outlet
3.	Induction Furnaces with CCM& LRFs	Fume Extraction system with PTFE membrane bag filters	PM < 30 mg/Nm^3
4.	FBC Boiler	Electro Static Precipitators (ESP) (High performance rigid electrodes with transformer)	PM < 30 mg/Nm^3
		Automatic lime dosing control system	SOx <100 mg/Nm^3
		Combustion temperature will be around 800-850^{0}C, which is not conducive for thermal NOx formation. Low NOx burners with 3-stage combustion, flue gas recirculation and auto combustion control system will be provided.	NOx <100 mg/Nm^3
Note: Apart from the above Dry fog system with dust suppression at transfer points, crushing plant, dust extraction system with bagfilters at other dust emanating areas, covered conveyers, mechanical dust sweepers, etc. will also be provided.			

All the CREP recommendations will be implemented & followed strictly.

Good Housekeeping: Good housekeeping practices will be maintained in all sections of the plant.

10.3.1.1 DUST EXTRACTION AND DUST SUPPRESSION SYSTEM

The following are the details of dust extraction system & dust suppression system proposed in the plant.

TABLE NO. 10.3.2: DUST EXTRACTION AND DUST SUPPRESSION SYSTEM

S.No	Location	Pollution control system proposed
1.	➢ Coal screen House ➢ Crusher House ➢ Junction houses and surge hopper ➢ Iron ore screen house and bins ➢ Product discharge ➢ Junction House & SMS bins	These areas will be provided with Dust extraction systems - each comprising of pulse jet type bag filter, centrifugal fan and motor, duct work including suction hoods, duct supports, stack, dust hopper, rotary air lock valves etc.
2.	Junction houses and truck hoppers	Dust suppression system with plain water - comprising of spray nozzles, piping network, valves, pumps, instrumentation & controls, water tank etc.
3.	Stock piles in DR route	Dust suppression system with plain water - comprising piping network, valves, pumps, instrumentation & control, water tank etc.

TABLE NO. 10.3.3: SOURCES OF AIR POLLUTION (DRI Kilns)

S.No.	AREA OF AIR POLLUTION	MEASURES ADOPTED FOR CONTROL
1.	Raw Material Handling	1. All vibrating screens will be totally covered, to prevent the leakages of dust. 2. Throughout the length, the conveyor is covered with G.I. Sheets to prevent the dust pollution 3. All the material handling systems will be connected with de dusting system. All the discharge points and feed points wherever the possibility of dust generation is there, a de dusting suction point will be provided to collect the dust. 4. <u>DUST SUPPRESSION SYSTEM</u> It is the most effective and successful system to prevent the fly-off of dust. Dust suppression system will be adopted to control the fugitive dust emanated during raw material unloading operations.
2.	Raw Material Storage System	1. All conveyors will be covered with G.I. Sheets to control the dust. 2. All bins will be totally packed and covered, so that there will not be any chance of dust leakage. i. Weigh feeders will be kept below the hopper and used to feed the known quantity of raw material per hour; it also seals the discharge area. ii. All discharge and feed points wherever the possibility of dust generation is there, will be provided with dust suppression system. iii. All material transfer points will be connected with dust suppression water nozzles to avoid the fugitive dust emission.
3.	Kiln Feed System	The raw material will be fed into the kiln through a double pendulum valve, which seals the false air entry into the rotary kiln and gas leakage from the kiln. The chute will be sealed with a double pendulum flap.
4.	Main Processing System Kiln	Sealed system to avoid false air entry as well as exit. So that the desired quality can be produced. Hence, no dust escapes outside.
5.	Kiln Cooler Transfer Building	The transfer point between kiln to coolers is completely sealed to avoid the false air entry and gas leakages.
6.	Rotary Cooler	1. The water will be circulated again and again. Hence there will not be any water pollution problem 2. There will be slip seals at cooler inlet & cooler outlet. The seals are also being lubricated to avoid false air entry and gas leakages. 3. Cooler discharge and feed points wherever the possibility of dust generation is there, will be provided with de dusting system.
7.	Waste Gas Cleaning System	**<u>AFTER BURNING CHAMBER (POST COMBUSTION CHAMBER)</u>**

S.No.	AREA OF AIR POLLUTION	MEASURES ADOPTED FOR CONTROL
		The waste gas passes through the after burning chamber where the combustion of carbon monoxide and un burnt carbon takes place in presence of air supplied. The basic purpose of after burning chamber is to reduce the carbon monoxide content in waste flue gases. **ELECTRO STATIC PRECIPITATOR** The flue gas from DRI kilns, after heat recovery, will pass through an electro static precipitator where it is cleaned to contain < 30 mg/Nm^3 particulate matter. The clean gas will be emitted into the atmosphere through the chimney whose height is calculated on the basis of CPCB guidelines. The total conveying of gas from kiln to chimney is done by the induced draft fan located between ESP and chimney.
8.	Product Separation System	1. All conveyors will be covered with G.I. Sheets, to control the dust emission. 2. All bins will be totally packed and covered, so that there will not be any chance for dust leakage. 3. Telescopic chutes will be provided below the hopper to discharge the product directly into the truck for dispatch to avoid the pollution. 4. All the above material handling system will be connected with de-dusting system 5. All discharge points and feed points wherever the possibility of dust generation is there, a de-dusting suction point will be provided to collect the dust. 6. The collected dust will be taken by pneumatic conveying system and stored in a dust storage bin. 7. Bag housing system In the bag house, the dry dust will be collected in an enclosed housing containing fabric filter bags which are suspended inside the unit. The dust ladden air will pass through bag filters forming a dust cake to separate the particulate from the clean air. The collected dust will be taken by a pneumatic conveying system and stored in a dust storage bin.

10.3.1.2 TECHNICAL SPECIFICATIONS OF CONTROL SYSTEMS

10.3.1.2.1 TECHNICAL SPECIFICATIONS OF ELECTROSTATIC PRECIPITATOR (ESP)

a) For ESP attached to Pellet Plant (1 x 0.8 mtpa)

S.No.	Parameters	Value
1	No. of ESP's	1
2	Gas flow rate per kiln, m^3/hour	96,000
3	Flue gas temperature (^{0}C)	170

S.No.	Parameters	Value
4	Inlet dust concentration, gm/Nm^3	18
5	Guaranteed outlet dust Concentration, mg/Nm^3	<30
6	Design pressure, mm wc	+/- 300
7	Number of fields	Three (1 standby)
8	Pressure drop across the ESP, mm wg	25 (max)
9	Collection efficiency	99.83 %

b) For ESP attached to WHRB of 4 x 425 TPD DRI Kilns

S.No.	Parameters	Value
1	No. of ESP's	4
2	Gas flow rate per kiln, m^3/hour	3,06,000
3	Flue gas temperature (^{0}C)	170
4	Inlet dust concentration, gm/Nm^3	21
5	Guaranteed outlet dust Concentration, mg/Nm^3	<30
6	Design pressure, mm wc	+/- 300
7	Number of fields	Three (1 standby)
8	Pressure drop across the ESP, mm wg	25 (max)
9	Collection efficiency	99.85 %

c) ESP attached to For FBC Boiler (72 TPH)

S.No.	Parameter	Value
1.	Gas flow rate, m^3/hr	1,95,000
2.	Flue gas temperature (^{0}C)	170
3.	Inlet dust concentration, gm/nm^3	45
4.	Guaranteed outlet dust Concentration, mg/nm^3	< 30 (at max. flow conditions)
5.	Design pressure, mm wg	300
6.	Number of fields	Three (1 standby)
7.	Pressure drop across the ESP, mm wg	25 (max)
8.	Collection efficiency	99.93 %

TECHNICAL SPECIFICATIONS OF BAGFILTER

A) Bag filter Attached to 3x 15 T Induction Furnaces

S.No.	Parameter	Value
1.	Capacity of Bag Filter (m^3/hr)	68,500 (designed for 50% excess flow rate)
2.	Operating Temperature (^{o}C)	100^{o}C
3.	Size of Each Bag	ϕ 160 x 4880 mm long
4.	No. of Modules	1 No.
5.	Total No. of Bags	180 Nos.
6.	Total filtering Area (m^2)	360

S.No.	Parameter	Value
7.	Air To Cloth Ratio	1.4
8.	Pressure drop (mm WG.)	125 to 150
9.	Bag Material	500 gm/m^2 PTFE membrane bag filters
10.	Compressed air reqd. at 7 kg/cm^2	338 (FAD AT 6 Kg / cm2)
11.	No. of Solenoid Cum Diaphragm Pulse Valves 40 NB (1½") x 24 v D.C.	12 Nos.
12.	Type & Qty of Sequential Timer	12 Channel Electronic Sequential Controller -240 volt A.C. Supply
13.	Dust Disposal Arrangement	Through Rotary Air Lock Valves
14.	Rated Speed	20 RPM
15.	Type of Drive	Direct Drive Through Flexible Coupling
16.	Geared Motor Rating	0.37 KW / 20 rpm
17.	Material of Construction:	
a)	Raw Gas Casing	3.15 mm thk. MS sheet
b)	Clean Gas Casing	3.15 mm thk. MS sheet
c)	Hopper	3.15 mm thk. MS sheet
d)	Cage Plate	4 mm thk. MS sheet
e)	Diffuser at inlet	To be Provided
f)	Cage	MS
g)	Venturies	MS
18.	Guaranteed Emission Level	Less than 30 mg / Nm^3

10.3.2 ACTION PLAN FOR CONTROL AND MONITORING OF FUGITIVE EMISSIONS [Std. TOR # 7 (vi)]

10.3.2.1 CONTROL OF FUGITIVE EMISSIONS FROM SPONGE IRON PLANT

Control of Fugitive Emissions from Sponge Iron Plant

Fugitive dust emissions are likely in the unloading areas, material transfer point, cooler discharge area, product separation area, etc. Fugitive emission in the material unloading area can be avoided by providing dust suppression system. Fugitive emission from material unloading operations, material transfer points will be controlled fully with total enclosure and all the transfer emission will be connected with extractor inlet point and will pass through a high efficiency Bag Filter before discharging into the atmosphere. All internal roads will be asphalted.

Control of Secondary Fugitive Emissions From Induction Furnace (If)

- The secondary emissions from the Induction furnaces will be extracted and treated in a fume extraction & cleaning system.
- Fumes will be evacuated directly from induction furnaces through hoods with swiveling mechanism and ducting.

- Clean gases having less than 30 mg/Nm^3 of dust content will be exhausted through 4 nos. of combined Stacks of 30 m height.

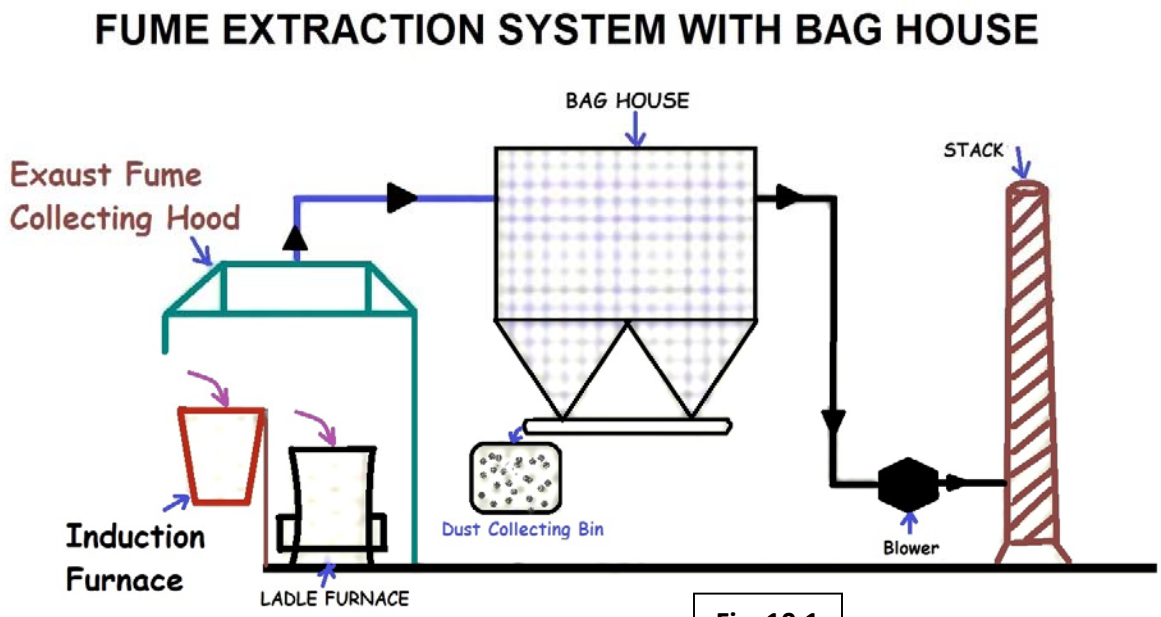


Fig. 10.1

10.3.2.2. Monitoring Of Secondary Fugitive Emissions

Sponge Iron plant

As per MoEF notification vide no. G.S.R. 414 (E) dated 30th May 2008, fugitive emissions will be monitored at a distance 10 m from their source as per following:

TABLE NO. 10.3.4: MONITORING OF SECONDARY FUGITIVE EMISSIONS

S.No	Area	Monitoring Location
1.	Raw material handling area	Screen area, Transfer Points, Stock Bin area
2.	Crusher area	Crushing plant, vibrating screen, transfer points
3.	Raw material feed area	Feeder area, Mixing area, transfer points
4.	Cooler discharge area	Over size discharge area, Transfer Points
5.	Product processing area	Intermediate stock bin area. Screening plant, Magnetic Separation unit, Transfer Points, Over size discharge area, Product separation area, Bagging area
6.	Other areas	Areas as specified by State Pollution Control Board
The fugitive emissions will be maintained below the MoEF&CC norm of 2000 µg/m^3.		

Submerged Electric Arc Furnace & Induction Furnace

Fugitive emission will be monitored at specified intervals within a distance of 10 m away from the source of emission or from suction hood connected to control system. The reports will be submitted to MoEF&CC & CECB regularly.

10.3.2.3 DUST SUPPRESSION SYSTEM

Water sprinklers will be provided at the unloading areas of the raw materials for dust suppression. Dust suppression system will be provided with plain water - comprising of piping network, valves, pumps, instrumentation & control, water tank etc.

10.3.2.4 INTERNAL ROADS

All internal roads will be asphalted to prevent the fugitive dust emission due to vehicular movement.

10.3.2.5 INTERLOCKING SYSTEM

All ESPs will have interlocking system and whenever the PM emission exceeds the stipulated standard the raw material feed to the unit will stop. Consequently, there will be no production in the unit till ESP is rectified.

10.3.3 COMPLIANCE ON CREP RECOMMENDATIONS [Addl. TOR # 7]

All the CREP recommendations will be implemented & followed strictly. The following will be the compliance of CREP recommendations.

- Continuous stack monitoring system is proposed for stack attached to WHRB & FBC Boiler.
- Online Ambient Air Quality Monitoring Stations will be established in consultation with SPCB during operation of the plant.
- Fugitive emission monitoring will be carried out as per CPCB norms.
- Energy meters will be installed for all the pollution control systems.
- Rain water harvesting pits are being constructed in consultation with CGWB.

Recommendations

a) The proposed air pollution control equipment will be installed prior to commissioning of the plant.

b) Pressure drop measuring system will be installed to measure the pressure drop across the bag filters.

c) All the internal roads shall be asphalted to reduce the fugitive dust due to truck movement.

10.3.4 WASTEWATER MANAGEMENT [Std.TOR # 7(iv)]

Existing

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

Proposed

- There will be no effluent discharge in the I/O Beneficiation, Pellet Plant, DRI Unit, Induction Furnace Unit, Electric Arc Furnace, Ferro Alloys as closed-circuit cooling system will be adopted.
- Effluent from Rolling mill will be sent to settling tank and will be recycled through closed circuit cooling system.
- Effluent from power plant will be treated in ETP and after ensuring compliance with WBPCB norms, it will be utilized for dust suppression, ash conditioning and for greenbelt development.
- Air cooled condenser will be provided in the power plant, which will reduce the water consumption significantly. Hence wastewater generation will be also be minimized.
- Sanitary waste water will be treated in STP and after treatment it will be utilized for greenbelt development.
- Zero liquid effluent discharge practice will be continued in the proposed expansion also.
- During monsoon the treated effluent will be utilized as makeup water in Rolling Mill. Accordingly, the makeup water for Rolling mill also reduces during the rainy period.

EFFLUENT TREATMENT PLANT

pH of the boiler blowdown will be between 9.5 to 10.5. Hence a neutralization tank will be constructed for neutralizing the boiler blow down. DM plant regeneration water will be neutralized in a neutralization tank. After neutralization, these two effluent streams will be mixed with Cooling Tower blowdown in a Central Monitoring Basin (CMB). The treated effluent will be utilized for dust suppression, ash conditioning and for Green belt development. No effluent will be let out of the plant premises. Hence Zero discharge concept will be implemented.

TREATED EFFLUENT DISPOSAL

Effluent quantity to be used for ash conditioning	:	91 m^3/day
Effluent to be used for dust suppression in CHP	:	300 m^3/day
Effluent to be used for Greenbelt development	:	200 m^3/day

81 Acres of greenbelt **(inclusive of existing)** will be developed by using the treated effluent. Treated effluent which is proposed to be utilized for greenbelt, will be used as make up water for Rolling Mill, during monsoon.

CHARACTERISTICS OF TREATED PROCESS EFFLUENT [Std.TOR # 7(iv)]

Parameter	:	Maximum Permissible concentration
pH	:	6.5-8.5
Free available chlorine (mg/l)	:	<1.0
Copper (mg/l)	:	<1.0
Iron (mg/l)	:	<1.0
Zinc (mg/l)	:	<0.2
Oil & Grease (mg/l)	:	<10
TSS (mg/l)	:	<100
Total Chromium (mg/l)	:	<0.2
Phosphates (mg/l)	:	<5.0

TREATED SEWAGE CHARACTERISTICS

Parameters	:	Maximum Permissible concentration
pH	:	6.5 – 8.0
BOD (mg/ L)	:	<10

COD (mg/ L)	:	<50
TSS (mg/ L)	:	<20
NH_4-N (mg/ L)	:	<5
N-Total (mg/ L)	:	<10
Fecal Coliform (MPN/100 ml)	:	<100

Effluent Treatment Plant Flow Diagram

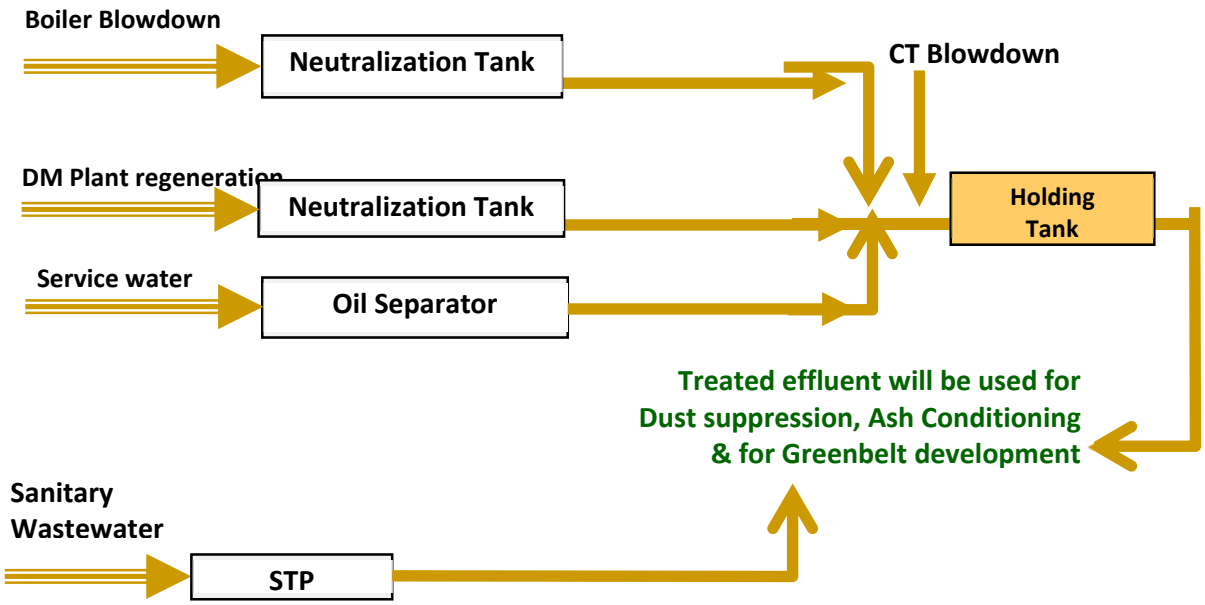


Fig: 10.2

10.3.5 SOLID WASTE GENERATION & ITS DISPOSAL [Std.TOR # 7(vii) & 7 (viii)]

The following will be the solid waste generation & proposed method of disposal.

TABLE NO. 10.3.5: SOLID WASTE GENERATION & PROPOSED METHOD OF DISPOSAL

S.No	Waste	Quantity (TPA)			Method of disposal
		Existing	Proposed	After expansion	
1.	Tailing from Beneficiation plant	--	2,40,000	2,40,000	Tailings from thickener will be taken to filter press and the dewatered tailings cake be stored in the yard with 30 days capacity. This will be given to Ceramic industries / cement plants. Kindly refer to **Annexure – 8 (a)** for letter for utilisation of Tailings

2.	Pellet Plant (ESP & Bagfilter dust from dedusting system)	--	2,200	2,200	Will be given to Brick manufacturing units. Kindly refer to **Annexure – 8 (b)** for letter for utilisation
3.	Ash from DRI	32,400	1,00,980	133,380	Is being utilized in the existing Cement Plants (Partly) & given to Brick manufacturers (partly). In expansion Ash will be utilized in brick making unit and excess if any will be supplied to other brick manufacturer / Cement Plant.
4.	Dolochar	54,000	1,40,250	194,250	Is being utilized in the existing AFBC boiler-based power plant. The same practice will be continued after expansion also.
5.	Kiln Accretion Slag	1,620	5,049	6,669	Is being given to road contractors for road construction& given to brick manufacturer and same practice will be continued after the proposed expansion also. Kindly refer to **Annexure – 8 (c)** for letter for utilization.
6.	Wet Scraper Sludge	2400	7,517	9,917	Is being given to road contractors for road construction& given to brick manufacturer and same practice will be continued after the proposed expansion also. Kindly refer to **Annexure – 8 (c)** for letter for utilization.
7.	SMS Slag	32,800	64,610	97,410	Presently it is being used in the slag crusher unit for metal recovery and the remaining after recovery process is further used as a Raw Material for owned brick manufacturing unit. After expansion same practice will be continued.
8.	End cuttings from rolling Mill	8,700	12,780	21,480	Reused in SMS
9.	Mills Scales from Rolling Mill	5,800	1,716	7,516	Will be used in existing and proposed SMS & Ferro Alloys plant captively
10.	Ash from Power Plant (With Indian Coal + Dolochar)	40,920	1,03,870	1,44,790	Is being given to M/s. BMR Enterprises, who is a supplier of ash to M/s. Ultratech Cement Ltd., Durgapur. In the proposed expansion project also ash will be given to M/s. BMR Enterprises for utilization of ash in cement manufacturing.

[Addl. TOR # 55]

NOTE: Solid wastes such as dolochar, accretion slag, wet scrapper sludge will be stored in designated storage yard. Ash generated will be stored in silos only. There will not be any open

storage of fly ash. All other storage yards will be on top of stable liner to avoid leaching of material to ground water.

[Spec. ToR # 16]

However, upon commencement of production, TCLP will be conducted and disposal of slag will be in accordance with the MoEF&CC/CPCB/CECB norms. Composition of SMS Slag is given below.

Typical slag composition (mg/kg)

Sl. No.	Element	SMS Slag
1	Al	1.6
2	Cr (III)	760
3	Mo	26
4	Pb	24
5	Cd	< 0.3
6	Ni	83
7	Co	14
8	V	634
9	Be	2.6
10	Ba	30
11	Sr	147
12	Sn	< 3.3
13	Sb	144

Hazardous waste generation, storage & disposal

1. **Waste oil: 5.0 KL / Annum**

   This will be stored in covered HDPE drums in a designated area and will be given to SPCB approved vendors.

2. **Used Batteries**

   Used batteries will be given back to the supplier under buy back agreement with supplier.

TABLE NO. 10.3.6: MUNICIPAL SOLID WASTE GENERATION & ITS DISPOSAL

Type of Municipal solid waste	Proposed method of disposal
Construction debris (generated during construction phase)	Used for landfill within the plant site to the extent possible and recyclables will be given to authorised recyclers.
Canteen waste	Used in composting / Vermiculture Used as manure for greenbelt development within the premises.
Recyclables	Given to WBPCB authorised dealers

10.3.6 NOISE LEVEL MANAGEMENT

- The major noise generating sources in the plant will be STG, boiler, feed pumps, steam blowing from boiler, D.G. Sets.
- Acoustic enclosures will be provided to STG & D.G. set.
- Quench water Silencer will be provided to prevent the noise during steam blowing.
- All machinery will be manufactured as per MoEF&CC/OSHA & other international standards on noise levels.
- The noise levels will be confined to the working zones of the plant.
- Ear plugs will be provided to all employees who will enter into the noise prone areas.
- Community noise levels are not likely to be affected due to the proposed thick green belt and attenuation due to the physical barriers.
- The ambient noise levels will be in accordance with MoEF&CC norms i.e. ambient noise levels will be < 75 dBA during daytime and < 70 dBA during night time.

Recommendations

a) Acoustic enclosures to turbines.
b) The impact can be reduced by adopting shock absorbing techniques.
c) The Noise absorption will improve by using hollow concrete blocks in the construction of the proposed Plant.
d) Ear plugs shall be provided to the workers and this shall be enforced strictly.
e) Extensive greenbelt shall be developed for further attenuating the noise levels.

10.3.7 LAND ENVIRONMENT

All the required Air Emission Control systems will be provided in the proposed activities. The treated effluent will confirm to the WBPCB's standards for onland irrigation. Hence there will not be any impact on land environment due to the proposed plant. The solid waste generated from the project will be reused / disposed as per norms. Hence there will not be any adverse impact on land environment due to the solid waste generated from the proposed activities. Extensive greenbelt development will have positive impact on land environment.

Table No. 10.3.7: Major impacts identified & proposed Mitigation measures

S.No.	Major impacts identified based on Geology & Hydrology	Mitigation measures
1.	Impact on natural drainage pattern	The Damodar River (1.5 Kms.), Galghata Jhor Nallah (0.5 Kms.) are flowing within the study area. However, natural drainage pattern shall not be disturbed as far as possible.
2.	Impact on groundwater drawl	Water required for the Existing plant & proposed expansion project will be sourced from of Damodar River. Hence there will not be much impact identified and mitigation suggested.
3.	Impact on Hydro geology of the area due to effluent from the proposed expansion project	The treated effluent will be re-circulated dust suppression in CHP, Ash conditioning and for greenbelt development. Effluent from power plant will be treated and after ensuring compliance with WBPCB norms, it will be utilized for dust suppression, ash conditioning and for greenbelt development. Sanitary wastewater will be treated in Sewage Treatment Plant (STP) of 32 KLD capacity and treated sewage will be utilized for greenbelt development. Zero Liquid effluent Discharge will be maintained in the in the proposed expansion also. Hence there will not be any significant impact on Hydro-geology of the area & contamination of Ground water due to the proposed expansion project.
3.	Impact on downstream users of nearby River.	The water required for the proposed expansion unit will be sourced from Damodar River. Water permission from Damodar Valley Corporation has already been obtained for 1.3 MGD (i.e. 5909.75 KLD). Hence there will not be any impact on the downstream users due to the proposed project.
4.	Impact on Geology due to Top soil excavation for construction activities (top soil preservation) pertaining to expansion project.	Preparation of site for expansion pits are going to be dug out for columns / pillars / posts / foundations. The earthen material generated during excavations and site grading periods, will be properly dumped and slope stabilization will be taken up. The topsoil generated during construction will be preserved and reused for plantations.

		Due to the Top soil preservation, no significant adverse impact on soil in the surrounding area is anticipated due to the construction activities.
5.	Storm water Management	Recharge pits at appropriate places will be constructed to recharge the aquifer as part of social responsibility. The water Harvesting pits will be filled in a sequential way with 100 -200 mm boulders followed by 40 mm metal and 5-10 mm chips covered with sand for easy percolation.
6.	Impact on Water quality	The groundwater & Surface water Quality to be monitored quarterly once.

10.3.8. MEASURES FOR IMPROVEMENT OF ECOLOGY

There are no National Parks, Wild life sanctuaries, Bird sanctuaries within 10 Km. radius of the plant. No significant vegetation occurs in and around the project site. No significant fauna exists in the area.

However, movement of Elephants is observed within 10 Kms. radius of the plant, as per the secondary source. Conservation plan is prepared.

Hence there will not be any adverse impact on flora & fauna due to the proposed project.

Recommendations

Plantation programme should be undertaken at several areas. They should include plantation, along the internal and external roads and along the administrative buildings and the stacking yards.

People should be educated and trained in social forestry activities by local governmental and non-governmental organizations.

10.3.8.1 GREEN BELT DEVELOPMENT [Std. TOR # 7 (ix)]

The greenbelt shall be developed simultaneously with the plant construction. This will further mitigate the pollution impacts. **10 m (minimum)** wide greenbelt is being / will be developed all around the plant.

Greenbelt plantation

Greenbelt will be developed in a set of rows of trees planted in such a way that they form an effective barrier between the plant and the surroundings. The main purpose of greenbelt development is to contribute to the following factors.

- To maintain the ecological homeostatus.
- To attenuate the air emissions from the kiln and the fugitive dust emissions.

- To prevent the soil erosion.
- To attenuate the noise levels.

Plantation of grass, flowers, bushes and trees will be taken up to reduce the generation of dust from the bare earth and to enhance the aesthetic value.

Plantation species

Plantation species will be considered based on the following.

- Suitable to the Geo-climatic conditions of the area.
- Mix of round, spreading, oblong and conical canopies.
- Evergreen trees.
- Different heights ranging from 4m to 20m.

Plantation for arresting dust

Trees particularly having compact branching closely arranged leaves of simple elliptical and hairy structure, shiny or waxy leaves and hairy twigs are efficient filters of dust. The following species are suggested to arrest the dust

- *Alstonia Scholaris*
- *Bauhinia purpurea*
- *Cassia siamea*
- *Peltoferrum ferrugineum*
- *Butea monosperma*
- *Tamarindus indica*
- *Azadirachta indica*

Plantation to absorb SO_2 emissions

The following plants are suggested for plantation to absorb SO_2 in the air.

- *Azadirachta indica*
- *Albizia lebbeck*
- *Alstonia scholaris*
- *Lagerstroemia flosregineae*
- *Melia azedarach*
- *Minusops elangi*

- Poloyalthia longifloia

Plantation to reduce noise pollution

Trees having thick and flushy leaves with petioles are suitable. Heavier branches and trunks of trees also deflect the sound waves. The following plant species are suggested to reduce noise pollution.

- *Alstonia scholaris*
- *Azadirachta indica*
- *Melia monosperma*
- *Grevillea peridifolia*
- *Tamarindus indica*

Plantation along the roads (Avenue plantation)

- *Alstonia scholaris*
- *Cassia fistula*
- *Bauhinia purpurea*
- *Mimusops elangi*
- *Pongamia pinnata*
- *Polyalthia longifolia*
- *Poluferrum ferrugineum*

GREENBELT DEVELOPMENT PLAN

- **32.79 Ha. (81 acres)** of Greenbelt (inclusive of existing) will be developed within the plant premises.
- 35,000 nos. of plants are existing till date (survival rate 85%).
- 7 m to 14 m wide greenbelt is being developed all around the plant.
- Another 46,000 nos. of saplings will be planted as part of expansion.
- Local DFO will be consulted in developing the green belt.
- The tree species to be selected for the plantation are pollutant tolerant, fast growing, wind firm, deep rooted. A three-tier plantation is proposed comprising of an outer most belt of taller trees which will act as barrier, middle core acting as air cleaner and the innermost core which may be termed as absorptive layer consisting of trees which are known to be particularly tolerant to pollutants.
- 1000 plants will be planted per acre as per CPCB norms.

Table No. 10.3.8: Details of Green belt developed in the Plant Premises

S.No.	Scientific Name	Common Name / Local Name	No. of Trees
1	Acacia auriculiformis	Sonajhuri	2867
2	Aegle marmelos	Bael Tree	183
3	Alstonia scholaris	Chhatim	1682
4	Arecaceae	Ch Palm	148
5	Azadirachta indica	Neem	5703
6	Cinnamomum tamala	Tejpatta	88
7	Citrus limon	Lemon Tree	112
8	Cocos nucifera	Simpain Palm	136
9	Dalbergia sissoo	Sissoo	1860
10	Delonix regia	Krishnachura Tree	769
11	Dianthus caryophyllus	Carnation	4334
12	Eucalyptus globulus	Eucalyptus	263
13	Hyophorbe lagenicaulis	Batal Palm Tree	88
14	Linospadix monostachyos	Arick Palm Tree	136
15	Mangifera indica	Mango	395
16	Millettia pinnata	Karanja	378
17	Murraya paniculata	Kameni Tree	3482
18	Neolamarckia cadamba	Kadam	114
19	Peltophorum pterocarpum	Radhachura Tree	794
20	Polyalthia longifolia	Debdaru Pandula	989
21	Psidium guajava	Guava	378
22	Roystonea regia	Royal Palm	128
23	Senna siamea	Minijiri Tree	156
24	Swietenia macrophylla	Mahogany Tree	2957
25	Syzygium cumini	Jamun	513
26	Tamarix dioica	Jhau	144
27	Tectona grandis	Sagwan	5647
28	Terminalia arjuna	Arjun	428
29	Wodyetia bifurcata	Foxtail Palm	128
	Total		**35000**

10.3.9 RAINWATER HARVESTING [Std. ToR # 7 (x)]

In the existing plant, 2 no.s of Rain Water Harvesting Pits have already been provided. As part of expansion, 2 nos. of Rainwater Harvesting Ponds will be constructed. Rainwater harvesting structures will be constructed to harvest the run-off water from rooftops by laying a separate storm water drainage system for recharging of ground water. Rainwater harvesting structures will be provided in the plant to recharge the precious ground water. Rain harvesting pits will be constructed in consultation with Central Ground Water Board.

The following is the Plan for rain water harvesting measure at plant site.

Average annual rainfall = 1236 mm

Quantum of Rain water that can be harvested from the premises

a) Average annual rainfall = 1.236 m

b) Runoff co-efficient

Runoff co-efficient for Water Reservoir	= 100%
Runoff co-efficient for Roof area	= 90%
Runoff co-efficient for Roads and Paved area	= 80%
Runoff co-efficient for Open area	= 40%
Runoff co-efficient for Green belt area	= 20%

TABLE NO. 10.3.9: DETAILS OF RAIN WATER HARVESTING POTENTIAL

S.No.	Area	Total Area (m^2)	Runoff Co-efficient	Rainfall in m	Rainwater Collection Potential (m^3)
1	Roof top area (plant facilities & Storage sheds)	209640	0.9	1.236	233203.5
2	Internal roads	85000	0.8	1.236	84048.0
3	Greenbelt	327900	0.2	1.236	81056.9
4	Open areas	28300	0.4	1.236	13991.5
5	Water reservoir	21900	1.0	1.236	27068.4
	TOTAL	**650840**			**412299.9**

The potential rain water that can be recharged / utilized to meet the plant water requirement is 4,12,300 m^3 / year. Accordingly, the net water requirement will reduce by 1250 m^3/day.

10.4 POST PROJECT MONITORING STRATEGY

The monitoring of various environmental parameters is necessary which is part of the environmental protection measures. Monitoring is an important feature because the efficiency of control measures can only be determined by monitoring. A comprehensive monitoring programme is given here under. $PM_{2.5}$, PM_{10}, SO_2 and NO_X are monitored as per Ministry notification vide G.S.R. No. 826(E) dated 16th November, 2009.

Locations and frequency of monitoring as per the guidelines of WBPCB and MOEF&CC are tabulated below.

TABLE NO. 10.4.1: MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS

S.No.	Particulars	Frequency of Monitoring	Duration of sampling	Parameters required to be monitored
1. Water & Waste water quality				
A.	Water quality in the area	Quarterly Once	Grab sampling	As per IS: 10500
B.	Effluent at the inlet & outlet of the ETP	Once in a month	composite sampling	As per EPA Rules, 1996
C.	Sanitary Wastewater (inlet & outlet of STP)	Once in a month	composite sampling	As per EPA Rules, 1996
2. Air Quality				
A.	Stack Monitoring	CEMS (all Stacks) Once in a month	-- --	PM, SO_2 & NOx PM, SO_2 & NOx
B.	Ambient Air quality	CAAQMS Quarterly Once	continuously 24 Hourly	$PM_{2.5}$, PM_{10}, SO_2, NOx $PM_{2.5}$, PM_{10}, SO_2, NOx & CO
C.	Fugitive emissions	Once in a Month	8 hours	PM
3. Meteorological Data				
A.	Meteorological data to be monitored at the plant.	Daily	Continuous monitoring	Temperature, Relative Humidity, rainfall, wind direction & wind speed.
4. Noise level monitoring				
A.	Ambient Noise levels	Once in a month (Hourly)	Continuous for 24 hours with 1-hour interval	Noise levels

Infrastructure for Environmental Protection

Man Power

The project proponent shall provide a fully equipped laboratory to carry out the analysis. The following manpower shall be provided on regular basis.

Environmental Engineer / Safety Officer

He will be a graduate engineer with adequate experience, responsible for implementing and monitoring the environmental impacts and all the safety aspects. He will act as a liaison officer between the proposed plant and regulatory agencies like WBPCB, CPCB etc.

Chemist

He will be a qualified chemist to carry out the analysis of various samples.

Monitoring equipment and Consumables

Environmental monitoring during the operation phase of the plant will be entrusted to a third party. Monitoring will be carried out as per CPCB/SPCB norms. A budgetary allocation of **Rs. 20 Lakhs** has been earmarked for Environmental monitoring.

Noise levels

A sound level meter shall be purchased to record noise levels in different scales like A, B and C with slow and fast response options at various generating source from D.G set which will be used only when there is an interruption in the power supply of State Electricity Board.

10.5 COSTS FOR ENVIRONMENTAL PROTECTION [Std. TOR # 7 (xi) & 8 (iv)]

Capital Cost for Environment Protection for proposed expansion : Rs. 87.55 Crores

Recurring Cost per annum for Environmental protection : Rs. 16.0 Crores

TABLE NO. 10.5.1: BREAK-UP OF BUDGET FOR ENVIRONMENTAL PROTECTION MEASURES

S.No.	Particulars	Capital Cost (Rs.in Crores)	Recurring Cost / Annum (Rs.in Crores)
1	**Air Emission Management**		
	· Electro Static Precipitators (ESP) - PELLET PLANT	12.0	2.4
	· Electro Static Precipitators (ESP) - DRI 4 x 425 TPD	48.0	9.6
	· Bag filters for I/O beneficiation	1.0	0.1
	· Fume Extraction system with bag filters	11.0	1.1
	· other APCS & Conveyor systems	3.0	0.45
	· Stacks	4.50	0.225
	· Mechanical Dust sweepers	0.26	0.026
	· Water Sprinklers	0.1	0.005
2	**Wastewater Management**		
	· for upgradation of ETP	0.5	0.1
	· for STP	0.6	0.12
	· for Garland drains	0.3	0.03
	· for Settling ponds	0.02	0.002
3	**Solid waste Management**		
	· Fly Ash Handling & disposal	1.5	0.6
	· Slag Handling & Disposal	0.2	0.05
	· Hazardous waste storage & disposal	0.1	0.05
	· Municipal solid waste storage & disposal	0.05	0.025
4	Greenbelt development, Land scaping, Noise Management,	0.8	0.31
5	Noise Management	0.2	0.1

S.No.	Particulars	Capital Cost (Rs.in Crores)	Recurring Cost / Annum (Rs.in Crores)
6	RWH in Plant	0.02	0.002
7	Fire Safety Systems	2.5	0.25
8	**Environmental Monitoring**		
	· CEMS	0.45	0.01
	· CAAQMS	0	0
	· Environment Monitoring	0	0.2
	· Performance monitoring of APCS	0	0.01
9	**Occupational Health & Safety**		
	· Rennovation of existing Occupational Health centre	0.3	0.075
	· Personal Protective Equipment's (PPEs)	0.15	0.15
	TOTAL	**87.55**	**15.99**

10.6 CORPORATE ENVIRONMENT POLICY [Std. ToR # 9 (i), (ii), (iii) & (iv)]

Following is the compliance to TOR point pertaining to Corporate Environment Policy in the TOR letter issued by MoEF&CC, New Delhi

Corporate Environment Policy	
i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	The company has well laid down Environment Policy, approved by Managing Director. Plant Head is authorised by the Board to sign, issue & modify the Environment Policy.
ii. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.	The organization has developed procedure detailing compliance with all aspects of Environmental norms including the process of corrective actions for its improvement. The policy provides a framework for setting and reviewing environmental objectives, which includes a commitment to fulfil its compliance obligations, to the protection of the environment, including prevention of pollution and other specific commitment(s) relevant to the context of the organization.
iii. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	An Environmental Officer will look all the environmental issues and ensure the compliance with Environmental Clearance conditions and will report to the Head of Department, who will report to the Plant Head and ultimate reporting would be to the Managing Director. Subsequently it will be discussed in the Board meeting.

iv. Does the company have system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report	An Environmental Officer will look all the environmental issues and ensure the compliance with Environmental Clearance conditions and will report to the Head of Department, who will report to the Plant Head and ultimate reporting would be to the Managing Director. Subsequently it will be discussed in the Board meeting.

Shyam Steel Manufacturing Ltd

Jemua Mouza, Mejia, Bankura – 722143

Corporate Environment Policy

Ref. No.: SSML/POLICY/CEP/18-19/01 **Date: 01/07/2018**

Shyam Steel is committed to offer unique product advantages that contribute to more productive and profitable steel usage for the end user. It has always looked forward to offer consistency in quality, uniformity in grades, dimensions and tolerances. A superior product comes with a series of inherent advantages. With four fully operational steel manufacturing units in West Bengal, Shyam Steel runs a pan India Sales and Marketing network with a highly efficient and dynamic logistics support system.

Objective:

The company recognises its joint responsibility with the Government and the Public to protect environment and is committed to regulate all its activities so as to follow best practicable means for minimising adverse environmental impact arising out of its operations.

The company is committed to making its products environmentally acceptable, on a scientifically established basis, while fulfilling consumers' requirements for excellent quality, performance and safety.

The aim of the Policy is to do all that is reasonably practicable to prevent or minimise, encompassing all available knowledge and information, the risk of an adverse environmental impact arising from processing of the product, its use or foreseeable misuse.

This Policy document reflects the continuing commitment of the Board for sound Environment Management of its operations. The Policy applies to development of a process, product and services, from research to full-scale operation. It is applicable to all company operations covering its plantations, manufacturing, sales and distribution, research & innovation centres and offices. This document defines the aims and scope of the Policy as well as responsibilities for the achievement of the objectives laid down.

The Vision:

Our vision is to continue to be an environmentally responsible organisation making continuous improvements in the management of the environmental impact of our operations.

We will achieve this through an Integrated Environment Management approach, which focuses on People, Technology and Facilities, supported by Management Commitment as the prime driver.

Corporate Social Responsibility:

Shyam Steel Manufacturing Ltd (SSML) is committed to meeting the needs of customers and consumers in an environmentally sound manner, through continuous improvement in environmental performance in all our activities. Management at all levels, jointly with employees, is responsible and will be held accountable for company's environmental performance.

Occupational Health and Safety:

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Shyam Steel Manufacturing Ltd

Jemua Mouza, Mejia, Bankura – 722143

Corporate Environment Policy

Ref. No.: SSML/POLICY/CEP/18-19/01 **Date: 01/07/2018**

- Ensure safety of its products and operations for the environment by using standards of environmental safety, which are scientifically sustainable and commonly acceptable.
- Develop, introduce and maintain environmental management systems across the company to meet the company standards as well as statutory requirements for environment.
- Verify compliance with these standards through regular auditing.
- Assess environmental impact of all its activities and set continual improvement objectives and targets and review these periodically to ensure that these are being met at the individual unit and corporate level.
- Reduce waste, conserve energy and explore opportunities for reuse and recycle.
- Involve all employees in the implementation of this Policy and provide appropriate training.
- Provide for dissemination of information to employees on environmental objectives and performance through suitable communication networks.
- Encourage suppliers and co-packers to develop and employ environmentally superior processes and ingredients and co-operate with other members of the supply chain to improve overall environmental performance.
- Work in partnership with external bodies and Government agencies to promote environmental care, increase understanding of environmental issues and disseminate good practices.

Management Committee & Responsibilities:

The Board and the Management Committee of SSML is committed to conduct the company operations in an environmentally sound manner. The Management Committee will:

- Set mandatory standards and establish environmental improvement objectives and targets for SSML as a whole and for individual units, and ensure these are included in the annual operating plans.
- Formally review environment performance of the company once every quarter.
- Review environment performance when visiting units and recognise exemplary performance.
- Nominate:
  - A senior line manager responsible for environmental performance at the individual SSML site.
  - SSML environmental coordinator.

- The Management Committee, through the nominated environmental coordinator will:
  - Ensure implementation of SSML Policy on environment and compliance with SSML environmental standards and the standards stipulated under relevant national / local legislation. When believed to be appropriate, apply more stringent criteria than those required by law.
  - Assess environmental impact of SSML operations and establish strategies for sound environment management and key implementation steps.
  - Encourage development of inherently safer and cleaner manufacturing processes to further raise the standards of environment performance.

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Shyam Steel Manufacturing Ltd
Jemua Mouza, Mejia, Bankura – 722143

Corporate Environment Policy

Ref. No.: SSML/POLICY/CEP/18-19/01 **Date: 01/07/2018**

- Establish appropriate management systems for environment management and ensure regular auditing to verify compliance.
- Establish systems for appropriate training in implementation of Environment Management Systems at work.
- Ensure that all employees are made aware of individual and collective responsibilities towards environment.
- Arrange for expert advice on all aspects of environment management.
- Participate, wherever possible, with appropriate industry and Government bodies advising on environmental legislation and interact with national and local authorities concerned with protection of environment.

Responsibilities - Individual Units

The overall responsibility for environment management at each unit will rest with the Unit Head, who will ensure implementation of SSML Policy on environment at unit level. Concerned line managers / heads of departments are responsible for environmental performance at department levels.

In order to fulfil the requirements of the Environment Policy at each site, the Unit Head will:

- Designate a unit environment coordinator who will be responsible for co-ordinating environmental activities at unit, collating environmental statistics and providing / arranging for expert advice.
- Agree with the Management Committee Member responsible for the unit, specific environmental improvement objectives and targets for the unit and ensure that these are incorporated in the annual objectives of the concerned
- Managers and officers and are reviewed periodically.
- Ensure formal environmental risk assessment to identify associated environmental aspects and take appropriate steps to control risks at acceptable levels.
- Manage change in People, Technology and Facilities through a planned approach based on training, risk assessment, pre-commissioning audits and adherence to design codes.
- Regularly review environment performance of the unit against set objectives and targets and strive for continual improvement.
- Sustain a high degree of environmental awareness through regular promotional campaigns and employee participation through training, safety committees, emergency drills etc.
- Maintain appropriate emergency procedures consistent with available technologies to prevent / control environmental incidents.
- Ensure periodic audits to verify compliance with environment management systems and personally carry out sample environment audits to check efficacy of the systems.

Research and Innovation Centres

Since most new products and processes are developed in these Units, certain additional responsibilities devolve on them to ensure implementation of the Environment Policy of the company. In addition to the Unit Head's responsibilities outlined above, the heads of these units will:

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Shyam Steel Manufacturing Ltd

Jemua Mouza, Mejia, Bankura – 722143

Corporate Environment Policy

Ref. No.: SSML/POLICY/CEP/18-19/01 **Date: 01/07/2018**

- Ensure that a formal and systematic risk assessment exercise is undertaken during the process/product development stage with specific reference to environmental impact.
- Transfer technology to the pilot plant and main production through a properly documented process specification which will clearly define environmental impact and risks associated with processes, products, raw material and finished product handling, transport and storage.
- Ensure that treatment techniques are developed for any wastes generated as a result of the new product/process and is incorporated into the process specifications.

HEIRARCHY TO IMPLEMENT ENVIRONENT POLICY

An Safety & Environment Officer is looking after all the environment issues and ensure compliance with Environment Clearance conditions / SPCB norms and will report to Unit Head who ultimately will report to Managing Director and Board of Directors. Subsequently it will be discussed in the Board meeting and it will be made aware of the Environment Policy and compliance on Environmental Clearance / SPCB norms to all. Any non-compliance / deviations will be brought to the notice of Managing Director & Board of Directors and necessary fund allocation for closure of NCs will be approved in the Board Meetings and accordingly corrective measures will be taken upon in priority basis.

Review of compliance on Environmental Clearance / SPCB norms every 3 months.

The following will be the organisation chart pertaining to Environment Policy.

Board of Directors
↑
Managing Director
↑
Unit Head
↑
Safety & Environment Officer

Proposed By HR Head **Approved By Plant Head**

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CHAPTER – 11
SUMMARY & CONCLUSION

(As per Appendix - III A of EIA notification) [Std. ToR # 1]

11.1 PROJECT DESCRIPTION

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

Chronology of permission obtained:

- Existing plant has obtained Environment Clearance from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 4th August 2008. Accordingly obtained Consent to Establishment and Consent to Operate from the WBPCB for few units and same are under operation.
- Subsequently another EC has been obtained from MoEF&CC vide F.No.J-11011/724/2007 – IA II (I) dated 24th May 2019 for expansion of steel plant.
- Later obtained NIPL Certificate (for capacities of EC dt. 4th August 2008) vide dt. vide letter no. 406-2N-29/2019 (E)-PT-II dt. 26th April 2021 from West Bengal Pollution Control Board (WBPCB) for increase in production capacity of Sponge Iron, Induction Furnaces & Rolling Mill.

Proposed Project

Now as part of expansion, company proposed to the expand the existing capacity of steel plant i.e. DRI Kilns (Sponge Iron from 2,25,000 TPA to 7,86,000 TPA), Induction Furnaces along with CCM & LRF (MS Ingots / Billets/ Hot Charging from 2,34,300 TPA to 6,95,800 TPA), Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod - 2,90,000 TPA to 7,19,000 TPA), 2 x 9 MVA Ferro Alloys, 1 x 30 T Electric Arc Furnace, WHRB based Power Plant from 10 MW to 46 MW, FBC based Power Plant from 7 MW to 25 MW, New 1.2 MTPA of I/O Beneficiation plant, New 0.8 MTPA of I/O Pellet Plant.

Proposed expansion which will be taken up partly in existing plant and the partly in the land adjacent to the existing plant premises.

As per the Ministry of Environment, Forests & Climate Change, New Delhi, EIA notification dated 14th September, 2006 & its subsequent amendments, all Primary Metallurgical processing industries are listed under S.No. 3(a), under Category 'A'.

In order to obtain Environmental Clearance for the proposed expansion of Steel plant, Form-I, proposed TOR along with Pre-Feasibility Report were submitted to the Honourable Ministry of Environment, Forests & Climate Change (MoEF&CC), New Delhi on **30th May 2021**. Accordingly, Standard TOR has been issued for the proposed expansion of steel plant vide No. **J-11011/724/2007-IA.II(I)** dated **1st June 2021**. Subsequently, Draft EIA report has been prepared incorporating the Terms of Reference & is being submitted to WBPCB for conducting Public Hearing / Consultation.

***Pioneer Enviro Laboratories & Consultants Private Limited**, Hyderabad,* which is accredited by NABET, Quality Council of India, vide certificate No. NABET/EIA/1922/RA0149, for preparing Environmental Impact Assessment (EIA) report for Metallurgical Unit, has prepared EIA report for the proposed project.

This report furnishes the details of location of Site, Description of the project, prevailing baseline status w.r.t Air Environment, Water Environment, Noise Environment, Land Environment, Flora & Fauna and Socio-economic environment. This report also helps in identification of environmental impacts and suggesting mitigation measures to be followed during Construction and Operation of the proposed project as a part of Environmental Management Plan. This report also acts as guidance manual for the proponent for following the Environmental Management Plan (EMP) and for adopting post project Environmental Monitoring Program as per statutory norms.

11.1.1 ENVIRONMENTAL SETTING WITHIN 10 Km. RADIUS OF THE PLANT SITE

The following is the environmental setting within the 10 Km. radius of the Plant site:

Table No.11.1.1: Environment Setting Within 10 Kms. Radius of the Plant Site

S.No.	Salient Features / Environmental features	Distance w.r.t. site / Remarks
1.	Type of Land	Existing Plant (Industrial land) Additional land will be converted to Industrial purpose.

S.No.	Salient Features / Environmental features	Distance w.r.t. site / Remarks
2.	Type of Land (Study Area)	As per LULC the land use within 10 Km. is as follows: Settlements – 6.1 %; Industrial Area- 3.8 %; , Tanks / River/ Major canal/ Reservoir etc – 10.5%; Scrub Forest & Dense Forest area – 1.5 %; Single crop land –56.4 %; Double Crop Land – 3.7 %; Land with scrub – 7.1 %; Land without scrub – 5.7 % ; Mining area – 3.9% & Sheet rock area –1.3%.
3.	National Park/ Wild life sanctuary / Biosphere reserve / Tiger Reserve / Elephant Corridor / migratory routes for Birds	There are no notified National Park/ Wild life sanctuary / Biosphere reserve / Tiger Reserve/ migratory routes for Birds with in 10 Km. radius of the plant. However, movement of Elephants is observed within 10 Kms. radius of the plant, as per the secondary source. Conservation plan is prepared.
4.	Historical places / Places of Tourist importance / Archeological sites	Nil
5.	Critically polluted area as per MoEF&CC Office Memorandum dated 13th January 2010	Nil And also the Plant area does not fall in the areas given in Hon'ble NGT order issued vide dated 10thJuly 2019.
6.	Defence Installations	Nil
7.	Nearest village	Jemua Village at 0.1 Kms.
8.	No. of Villages in the Study Area	78 nos.
9.	Nearest Hospital	Mejia at 1.2 Kms
10.	Nearest School	Nearest School is at Mejia at 0.4 Kms.
11.	Forests	No PF is present within study area.
12.	Water body	Damodar River (NE Direction) – 1.5 Kms., GalghataJhor Nallah (South Direction) – 0.5 Kms., Chouphari Nallah (SE Direction) – 3.7 Kms., Mejia Bil Reservoir (East Direction) – 1.3 Kms. 4 no.s of rain fed pond are present in the additional land proposed for expansion proposal and same will not be disturbed & will be utilized as water reservoirs
13.	Nearest Highway	National Highway # 60 (NE direction - 0.8 Kms.)
14.	Nearest Railway Station	Raniganj Railway Station – 4.4 Kms. (Aerial)
15.	Nearest Port facility	Nil
16.	Nearest Airport	Panagarh Airport – 34.0 Kms. (Aerial)
17.	Nearest Interstate Boundary	Nil within 10 Km. radius
18.	Seismic zoneas per IS-1893	Seismic zone – II
19.	R & R	Not applicable as there are no habitations in the additional land proposed for expansion.

S.No.	Salient Features / Environmental features	Distance w.r.t. site / Remarks
20.	Litigation / court case is pending against the proposed project / proposed site and or any direction passed by the court of law against the project	Nil

11.1.2 PLANT CONFIGURATION AND PRODUCTION CAPACITY

Following is plant configuration and production capacity proposed now

TABLE NO. 11.1.2: Plant Configuration and Production Capacity (Existing & Proposed)

S.No.	Unit (Product)	Existing Operating plant	Capacity for which EC obtained in 24th May, 2019	Present Proposal	Final Configuration after Present Proposal
		[1]	[2]	[3]	[4] = [1] + [3]
1.	Iron Ore Beneficiation plant (concentrated Iron ore)	---	---	1.2 MTPA	1.2 MTPA
2.	Iron Ore Pellet Plant (I/o Pellets)	---	---	0.8 MTPA	0.8 MTPA
3.	DRI Kilns (Sponge Iron)	2,25,000 TPA	3,46,500 TPA (3 x 350 TPD)	5,61,000 TPA (**4 x 425 TPD will be installed instead of 3 x 350 TPD**)	7,86,000 TPA
4.	Induction Furnace with CCM & LRF (MS Ingots / Billets /Hot Billets)	2,34,300 TPA	3,96,000 TPA (8 x 15T)	4,61,500 TPA (**3x15T& 5x17Twith 5 x 15T LRF will be installed instead of 8 x 15 T)**	6,95,800TPA
5.	Electric Arc Furnace	Nil	1,98,000 TPA (1 x 30 T)	1,98,000 TPA (1 x 30 T) **[Retained EC permitted capacity]**	1,98,000 TPA (1 x 30 T)
6.	Rolling Mill (Hot Rolled TMT / Structural / Cold Rolled Bars / Wire Rod)	2,90,000 TPA	4,29,000 TPA (2 x 650 TPD)	4,29,000 TPA (**Change in configuration of EC**	7,19,000 TPA

S.No.	Unit (Product)	Existing Operating plant	Capacity for which EC obtained in 24th May, 2019	Present Proposal	Final Configuration after Present Proposal
		[1]	[2]	[3]	[4] = [1] + [3]
	(80 % Hot charging with Hot Billets and remaining 20% through 2X20TPH RHF)			**permitted capacity to 1 x 1000 TPD + 1 x 300 TPD**)	
7.	Ferro Alloy Plant (FeSi/FeMn/SiMn/FeCr)	2 x 9 MVA (FeMn 32,400 TPA / SiMn 32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA)	2 x 9 MVA (FeMn 32,400 TPA / SiMn 32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA)	2 x 9 MVA (FeMn 32,400 TPA / SiMn 32,400 TPA / FeCr – 27,000 TPA / FeSi – 15,600 TPA) **[Retained EC permitted capacity]**	4 x 9 MVA (FeMn64,800 TPA / SiMn64,800 TPA / FeCr – 54,000 TPA / FeSi – 31,200 TPA)
8.	Power Plant (WHRB)	10 MW	24 MW	Increase in WHRB Power from 24 MW **to 36 MW (4 x 9 MW)**	46 MW
9.	Power Plant (FBC)	7 MW	25 MW (1 x 25 MW)	**Reduction in Power Plant from 25 MW to 18 MW**	25 MW
10.	Oxygen Plant	Nil	4,000 TPA	4,000 TPA **[Retained EC permitted capacity]**	4,000 TPA
11.	Cement Plant	75,000 TPA	Nil	---	75,000 TPA
12.	Coal / Coke / Chrome fines Briquette	Nil	1,00,000 TPA	1,00,000 TPA **[Retained EC permitted capacity]**	1,00,000 TPA

11.1.3 RAW MATERIALS (FOR EXPANSION PROJECT)

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

TABLE NO. 11.1.3: RAW MATERIAL REQUIREMENT, SOURCE & MODE OF TRANSPORT

S.No.	Raw Material		Quantity (TPA)	Sources	Distance from site (in Kms.)	Mode of Transport
1.	**For Iron Ore Beneficiation Plant (12,00,000 TPA – throughput capacity)**					
a)	Iron ore fines		12,00,000	Rungta Mines, Essel Mines & Other mines in Barbil & Jharkhand	~ 500 Kms.	By rail & road (Covered trucks)
2.	**For Pellet Plant (Pellets) - 8,00,000 TPA**					
a)	Iron Ore Concentrate		8,80,000	Own generation	---	Through covered conveyers
b)	Bentonite		6,400	West Bengal	~ 200 Kms.	By road (Covered trucks)
c)	Limestone		12,000	Madhya Pradesh	~ 500 Kms.	By road (Covered trucks)
d)	Anthracite Coal		28,000	Jharkhand	~ 200 Kms.	By road (Covered trucks)
3.	**For DRI Kilns (Sponge Iron) – 5,61,000 TPA (4 x 425 TPD)**					
a)	Pellets (100%)		8,00,000	Inhouse generation	---	---
	Or					
b)	Iron ore (100%)		9,53,700	Barbil, Orissa NMDC, Chhattisgarh	~ 500 Kms.	By Rail & Road (covered trucks)
c)	Coal	Indian (100%)	7,30,000	ECL, West Bengal / MCL Odisha	~ 600 Kms.	By rail & road (covered trucks)
		Imported (100%)	5,00,000	Indonesia / South Africa / Australia	~ 270 Kms. (from Haldia Port)	Through sea route,& by road (covered trucks)
d)	Dolomite		28,050	Chhattisgarh	~ 600 Kms.	By rail &road (covered trucks)
4.	**For Steel Melting Shop (MS Ingots / Billets/Hot Billets) –4,61,500 TPA (3x15T & 5x17T induction furnaces)**					
a)	Sponge Iron		4,43,040	Own generation	---	Through covered conveyers
b)	Pig Iron		55,380	West Bengal	~ 100 Kms.	By road (covered trucks)
c)	MS Scrap		41,535	West Bengal	~ 100 Kms.	By road (covered trucks)
d)	Ferro alloys		5,538	Own generation	---	By road (covered trucks)
5.	**For Rolling Mill through Hot charging & RHF (Hot Rolled TMT / Structural / Cold Rolled Bars/Wire Rod) – 4,29,000 TPA**					
a)	Hot Billets / Billets / Ingots		4,51,650	Own generation	---	----
b)	LDO / LSHS		2,800 Kl/annum	Nearby IOCL Depot	~ 100 Kms.	By road (in Tankers)
6.	**For FBC Boiler [Power Generation 1 x 18 MW]**					
a)	Indian Coal (100%)		1,20,960	ECL, West Bengal / MCL Odisha	~ 600 Kms.	By rail & road (covered trucks)
	OR					

S.No.	Raw Material		Quantity (TPA)	Sources	Distance from site (in Kms.)	Mode of Transport
b)	Imported Coal (100%)		87,971	Indonesia / South Africa / Australia	~ 270 Kms. (from Haldi Port)	Through sea route, rail route & by road (covered trucks)
	OR					
c)	Dolochar + Indian Coal	Dolochar	1,40,250	Inhouse generation	---	Through covered conveyors
		Indian Coal	43,823	ECL, West Bengal / MCL Odisha	~ 600 Kms.	By rail & road (covered trucks)
	OR					
d)	Dolochar + Imported Coal	Dolochar	1,40,250	Inhouse generation	---	Through covered conveyors
		Imported Coal	31,871	Indonesia / South Africa / Australia	~ 270 Kms. (from Haldi Port)	Through sea route, rail route & by road (covered trucks)

11.1.4 MANUFACTURING PROCESS

11.1.4.1 Iron Ore Beneficiation

Beneficiation is a process which removes the gang particle like Alumina, Silica from the Iron Ore. Basically, it separates Fe_2O_3 or Fe_3O_4 from other impurities in the iron ore. In this process the Fe content is improve to maximum possible extent. The highest can be 70% i.e. purest form.

11.1.4.2 Process of Pelletization

Iron ore fines will be grinded in Ball mills. The concentrate will be fed to thickener and subsequently to filtering unit. The filter cake will be sent to pellet plant comprising of Travelling grate kiln. Green pellets will be produced from this process. The flue gases from grate kiln will be treated in ESP and discharged through a stack.

11.1.4.3 Manufacturing of Sponge Iron (DRI)

4x425 TPD to be established instead of 3x 350 TPD as per EC permission dt. May 2019

(SPONGE IRON – 5,61,000 TPA WITH WHRB FACILITY)

The proposal consists of establishment of 4 x 425 TPD of DRI kilns to produce 5,61,000 TPA of Sponge iron with 4 x 9 MW WHRB facility. Refractory lined rotary kilns will be used for reduction of iron ore in solid state.

Refractory lined rotary kilns will be used for reduction of iron ore in solid state. A central Burner located at the discharge end will be used for initial heating of the kiln.

Iron ore will be continuously fed into the kiln along with coal which has dual role of fuel as well as reductant. Dolomite will be added to scavenge the sulphur from the coal. A number of air tubes will be provided along the length of the kiln. The desired temperature profile will be maintained by controlling the volume of the combustion air through these tubes. The Carbon monoxide generated due to the combustion of coal, reduces the iron ore and converts it into sponge iron. The rotary kiln is primarily divided into two zones viz. the pre heating zone and the reduction zone. The preheating zone extends over 30 to 50 % of the length of the kiln and in this the moisture in the charge will be driven off and the volatile matter in the coal will be burnt with the combustion air supplied through the air tubes. Heat from the combustion raises the temperature of the lining and the bed surface. As the kiln rotates, the lining transfers the heat to the charge. Charge material, pre-heated to about 1000^0C enters the reduction zone. Temperature of the order of 1050^0C will be maintained in the reduction zone, which is the appropriate temperature for solid state reduction of iron oxide to metallic iron.

This hot material will be transferred to Heat exchanger. In Heat exchanger the material will be cooled to 160^0C. The cooler discharge material consists of sponge iron lumps, sponge iron fines and char. Magnetic and non-magnetic material will be separated through magnetic separators and stored in separate bins. The hot flue gases will be taken to a Waste Heat Recovery Boilers and after heat recovery they will be treated in high efficiency ESP and discharged into the atmosphere through stack whose height will be in accordance with CPCB norms.

11.1.4.4 Steel Melting Shop

(3 x 15T & 5 x 17T INDUCTION FURNACES instead of permitted 8 x 15 T Induction Furnaces, along with CCM &5x 15T LRFs) (Hot Billets / MS Billets / MS Ingots – 4,61,500 TPA)

In Steel Melting Shop (SMS), Sponge Iron will be melted along with melting scrap and fluxes to make pure liquid steel and then to mould it in required size billets. The SMS will consist of Induction furnace, Ladles, Cranes & Continuous Casting Machine (CCM). There will be 8 x 15 T Induction furnaces to manufacture Hot Billets/ M.S. Billets of 4,61,500 TPA. Either the Hot Billets produced from LRF will be directly sent to Rolling Mill without using Re-heating Furnace through Hot charging method (or) M.S. Billets / M.s. Ingots will be sent to Re-heating Furnace to reheat the Billets and then sent to Rolling Mill to manufacture Rolled Products.

11.1.4.5 Manufacturing of Rolled products through Rolling Mill

Permitted Rolling Mills as per EC are 2 x 650 TPD. Now it has been proposed to change configuration of Rolling Mill to 1x1000 TPD & 1x300 TPD and the production will remain same i.e. 4,29,000 TPA along with 2 x 20 T RHF.

The Hot Billets produced from Induction Furnaces will be directly sent to Rolling Mill to produce Rolled Products (OR) Hot Billets will be cooled and stored will be sent to reheating furnaces for the heating and will be sent to Rolling Mill. Furnace will be heated with LDO / LSHS. A Rolling mill will be installed in the plant to produce 4,29,000 TPA of Rolled Products /TMT Bars / Structural Steels.

11.1.4.6 Power Generation

54MW (36 MW from WHRB from flue gases of DRI Kilns + 18 MW from FBC Based Boiler)

Through WHRB Boiler

The hot flue gases from proposed 4 x 425 TPD of DRI kilns will pass through waste heat recovery Boiler to recover the heat and to generate 36 MW (4 x 9 MW) electricity. The gases after heat recovery will pass through ESP and then discharged through chimneys into the atmosphere for effective dispersion of emissions into the atmosphere through stacks of adequate height.

Through CFBC Boiler

Coal (Imported / Indian) along with dolochar will be used as fuel in FBC Boiler to generate 18 MW of electricity. The flue-gases will be treated in high efficiency ESP and then discharged through a stack of adequate height into the atmosphere.

11.1.5 Water Requirement

- Water required in the existing plant is 1050 KLD and same being sourced from Damodar river
- Water required for the proposed expansion project will be 3420 KLD and same will be sourced from Damodar river.
- Air cooled condensers have been provided in existing power plant. In expansion also air-cooled condensers will be provided.

- Total water requirement after the proposed expansion will be 4470 KLD.
- Water permission from Damodar Valley Corporation has already been obtained for 1.3 MGD (i.e. 5909.75 KLD).
- Hence separate water drawl permission will not be required even after the present expansion also.

TABLE NO. 11.1.4: Break Up of Water Consumption (Existing & Proposed)

S.No.	Unit	Quantity in KLD		
		Existing Plant	Proposed Expansion	Total after Expansion
1.	Iron Ore Beneficiation Plant (Beneficiated Iron Ore)	---	500	500
2.	Pellet Plant (Pellet)	---	300	300
3.	DRI Kilns (Sponge Iron)	100	560	660
4.	Induction Furnace (MS Ingot/Billet/Hot Billets)	200	320	520
5.	Electric Arc Furnace	---	200	200
6.	Rolling Millwith RHF	200	390	590
7.	Ferro Alloy Plant	30	30	60
8.	Cement Plant	150	---	150
9.	Power Plant (WHRB & FBC)	350	1080	1430
10.	Domestic	20	40	60
	Total water requirement	**1050**	**3420**	**4470**

11.1.6 Waste Water Generation

Existing

- There is no wastewater discharge from the existing plant as Closed circuit cooling system is being adopted.
- Boiler blow down & DM plant regeneration wastewater is being treated in Neutralization tanks and is being mixed in a Central Monitoring Basin (CMB). The treated effluent from CMB is being utilized for dust suppression, ash conditioning and for greenbelt development.
- Effluent from Rolling mill is being treated in an oil separator followed by settling tank. The treated effluent is recycled back.
- Sanitary wastewater, which is being treated in Septic tank followed by Soak pit.
- Zero liquid effluent discharge is being maintained in the existing plant.

Proposed

- There will be no effluent discharge in the I/O Beneficiation, Pellet Plant, DRI Unit, Induction Furnace Unit, Electric Arc Furnace, Ferro Alloys as closed circuit cooling system will be adopted.
- Effluent from Rolling mill will be sent to settling tank and will be recycled through closed circuit cooling system.
- Effluent from power plant will be treated in ETP and after ensuring compliance with WBPCB norms, it will be utilized for dust suppression, ash conditioning and for greenbelt development.
- Air cooled condenser will be provided in the power plant, which will reduce the water consumption significantly. Hence wastewater generation will be also be minimized.
- Sanitary waste water will be treated in STP and after treatment it will be utilized for greenbelt development.
- Zero liquid effluent discharge practice will be continued in the proposed expansion also.
- During monsoon the treated effluent will be utilized as makeup water in Rolling Mill. Accordingly, the makeup water for Rolling mill also reduces during the rainy period.

TABLE NO. 11.1.5: BREAKUP OF WASTE WATER GENERATION

S.No.	Source	Generation (KLD)		
		Existing Operating plant	Proposed Expansion	After Proposed Expansion
1.	DRI Kilns	---	---	---
2.	Induction Furnaces	---	---	---
3.	Electric Arc Furnace	---	---	---
4.	Submerged Electric Arc Furnaces	---	---	---
5.	Power Plant	133	410	543
	a) Cooling Tower blowdown	42	130	172
	b) Boilers blowdown	36	110	146
	c) D.M. plant regeneration water	55	170	225
6.	Sanitary Wastewater	16	32	48
	Total	**149**	**442**	**591**

11.1.7 Wastewater Characteristics

The following are the Characteristics of waste water

TABLE NO. 11.1.6: CHARACTERISTICS OF WASTEWATER

PARAMETER	CONCENTRATION			
	DM plant regeneration	Boiler blowdown	Cooling Tower blowdown	Sanitary waste water
pH	4 – 10	9.5 – 10.5	7.0 – 8.0	7.0 – 8.5
BOD (mg/l)	--	--	--	200 – 250
COD (mg/l)	--	--	--	300 – 400
TDS (mg/l)	5000 -6000	1000	1000	800 – 900
Oil & Grease (mg/l)	--	10	--	--

11.2. DESCRIPTION OF ENVIRONMENT

Base line data has been collected on ambient air quality, water quality, noise levels, flora and fauna and socio-economic details of people within 10 km radius of the plant.

11.2.1 Ambient air quality

Ambient air quality was monitored for $PM_{2.5}$, PM_{10}, SO_2, NOx & CO at 8 stations including project site during 1st March 2021 to 31st May 2021. The following are the concentrations of various parameters at the monitoring stations:

TABLE NO. 11.2.1: AAQ DATA SUMMARY

S.No.	Parameter		Concentration
1.	$PM_{2.5}$	:	22.2 to 44.9 $\mu g/m^3$
2.	PM_{10}	:	37.5 to 77.8 $\mu g/m^3$
3.	SO_2	:	6.7 to 14.2 $\mu g/m^3$
4.	NO_X	:	7.3 to 28.9 $\mu g/m^3$
5.	CO	:	312 to 1445 $\mu g/m^3$

11.2.2 Water Quality

11.2.2.1 Surface Water Quality

Damodar River (1.5 Kms.), Gaighata Jhor Nallah (0.5 KMs.), Chouphari Nallah (3.7 Kms.) & Mejia Bil Reservoir (1.3 Kms.) are flowing within 10 km. radius of the plant. 2 no. of Samples are collected from Damodar River, 1 no. of sample collected from Gaighata Jhor Nallah, Chouphari Nallah & Mejia Bil Reservoir. No other water sample is collected as water is not available during the study period and analyzed for various parameters. The analysis of samples shows that all the parameters are in accordance with BIS-2296 specifications.

11.2.2.2 Ground Water Quality

8 No. of ground water samples from open wells / bore wells were collected from the nearby villages to assess ground water quality impacts and analyzed for various Physico-Chemical parameters. The analysis of samples shows that all the parameters are in accordance with BIS: 10500 specifications.

11.2.3 Noise Levels

Noise levels were measured at 8 locations during Day time & Night time. The noise levels at the monitoring stations are ranging from **47.18 dBA to 70.06 dBA**.

11.3 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

11.3.1 Prediction of impacts on air quality

The predicted max. incremental PM_{10} concentrations (24 hourly) due to the emissions from operation of proposed expansion project will be **1.3 μg/m³** at a distance of 1100 m from the stack in the down wind direction over the baseline concentrations.

The predicted incremental rise in PM concentration due to the Vehicular emission will be **1.2 μg/m³**.

Hence the total predicted incremental rise in Particulate Matter concentration due to the emission from proposed expansion project and due the vehicular emissions will be 1.3 μg/m³ + 1.2 μg/m³ = **2.5 μg/m³.**

The predicted max incremental SO_2 concentrations (24 hourly) due to the emissions from operation of proposed expansion project will be **18.1 μg/m³** at a distance of 1100 m from the stack in the down wind direction over the baseline concentrations.

The predicted max incremental NOx concentrations (24 hourly) due to the emissions from operation of proposed project will be **6.0 μg/m³** at a distance of 1100 m from the stack in the down wind direction over the baseline concentrations.

The predicted incremental rise in NOx concentration due to the Vehicular emission will be **9.1 μg/m³**.

Hence the total predicted incremental rise in NOx concentration due to the emission from project and due the vehicular emission will be 6.0 μg/m³ + 9.1 μg/m³ = **15.1 μg/m³**

The predicted incremental rise in CO concentration due to the Vehicular emission will be **6.4 µg/m³**.

TABLE NO. 11.3.1

NET RESULTANT MAXIMUM CONCENTRATIONS DURING THE OPERATION OF THE PROPOSED EXPANSION PROJECT

Item	PM_{10} (µg/m³)	SO_2 (µg/m³)	NO_X (µg/m³)	CO (µg/m³)
Maximum baseline conc. in the study area	77.8	14.2	28.9	1445
Maximum predicted incremental rise in concentration due to proposed expansion of **SSML**	1.3	18.1	6.0	6.4
Maximum predicted incremental rise in concentration due to **Vehicular Emissions from the proposed expansion project**	1.2	---	9.1	---
Net resultant concentrations during operation of the plant	80.3	32.3	44.0	1451.4
National Ambient Air Quality Standards	**100**	**80**	**80**	**2000**

The net resultant Ground level concentrations during operation of the expansion project are within the NAAQS. Hence there will not be any adverse impact on air environment due to the proposed expansion project.

11.3.2 Prediction of impacts on Noise quality

The major sources of noise generation in the proposed project will be STG, boilers, compressors, DG set, etc. Acoustic enclosures will be provided to the STG. The ambient noise levels will be within the standards prescribed by MoEF vide notification dated 14-02-2000 under the Noise Pollution (Regulation & Control), Rules 2000 i.e. the noise levels will be less than 75 dBA during day time and less than 70 dBA during night time. **32.79 Ha. (81.0 acres)** of extensive greenbelt will be developed (inclusive of existing) to further attenuate the noise levels. Hence there will not be any adverse impact due to noise on population in surrounding areas due to the proposed expansion project.

11.3.3 Prediction of impacts on Water Environment

There will be no effluent discharge in the I/O Beneficiation, Pellet Plant, Sponge Iron, Induction Furnace as closed-circuit cooling system will be adopted. Effluent from Rolling Mill will be sent to settling tank & will be recycled through closed circuit cooling system. Effluent from power plant will be treated in ETP and after ensuring compliance with SPCB norms, it

will be utilized for dust suppression, ash conditioning and for greenbelt development. Sanitary waste water will be treated in STP. There will not be any effluent discharge outside the premises. ZLD will be followed. Hence there will not be any adverse impact on environment due to the proposed expansion project.

11.3.4 Prediction of Impacts on Land Environment

The effluent will be treated to achieve SPCB standards. Zero effluent discharge will be adopted. All the required air pollution control systems will be provided to comply with CPCB / SPCB norms. All solid wastes will be disposed / utilized as per CPCB / SPCB norms. **32.79 Ha. (81.0 acres)** of extensive greenbelt will be developed (inclusive of existing) as per guidelines. Hence, there will not be any adverse impact on land environment due to the proposed expansion project.

11.3.5 Socio - Economic Environment

There will be further upliftment in Socio Economic status of the people in the area. Hence, there will be further development of the area due to the proposed expansion project.

Due to this the economic conditions, the educational and medical standards of the people living in the study area will certainly move upwards which will result in overall economic development, improvement in general aesthetic environment and increase in business opportunities.

11.4 ENVIRONMENTAL MONITORING PROGRAMME

Post project monitoring will be conducted as per the guidelines of SPCB and MoEF&CC are tabulated below:

Table no. 11.4.1: MONITORING SCHEDULE FOR ENVIRONMENTAL PARAMETERS

S.No.	Particulars	Frequency of Monitoring	Duration of sampling	Parameters required to be monitored
1. Water & Waste water quality				
A.	Water quality in the area	Quarterly Once	Grab sampling	As per IS: 10500
B.	Effluent at the inlet & outlet of the ETP	Once in a month	composite sampling	As per EPA Rules, 1996
C.	Sanitary Wastewater (inlet & outlet of STP)	Once in a month	composite sampling	As per EPA Rules, 1996
2. Air Quality				
A.	Stack Monitoring	CEMS (all Stacks)	--	PM, SO_2 & NOx

		Once in a month	--	PM, SO_2 & NOx
B.	Ambient Air quality	CAAQMS Quarterly Once	continuously 24 Hourly	$PM_{2.5}$, PM_{10}, SO_2, NOx $PM_{2.5}$, PM_{10}, SO_2, NOx & CO
C.	Fugitive emissions	Once in a Month	8 hours	PM
3. Meteorological Data				
A.	Meteorological data to be monitored at the plant.	Daily	Continuous monitoring	Temperature, Relative Humidity, rainfall, wind direction & wind speed.
4. Noise level monitoring				
A.	Ambient Noise levels	Once in a month (Hourly)	Continuous for 24 hours with 1-hour interval	Noise levels

11.5 ADDITIONAL STUDIES

No Rehabilitation and Resettlement is involved in the proposed project as there are no habitations in the additional land proposed for expansion. Hence no R & R study has been carried out.

11.6 PROJECT BENEFITS

With the establishment of the proposed project employment potential will increase. Land prices in the area will increase. The economic status of the people in the area will improve due to the proposed project. Periodic medical checkups will be carried out. Top priority will be given to locals in employment. Separate budget will be allocated for social welfare & developmental activities to develop the surrounding villages.

11.7 ENVIRONMENT MANAGEMENT PLAN

11.7.1 Air Environment

The following are air emission control systems proposed in the proposed project:

TABLE NO. 11.7.1: AIR EMISSION CONTROL SYSTEM PROPOSED

S.No.	Source	Control Equipment	Emission at the outlet
1.	Pellet Plant	Electro Static Precipitators (ESP) (High performance rigid electrodes with transformer)	PM <30 mg/Nm^3
2.	DRI kilns with WHRB's	Electro Static Precipitators (ESP) (High performance rigid electrodes with transformer)	PM <30 mg/Nm^3

S.No.	Source	Control Equipment	Emission at the outlet
3.	Induction Furnaces with CCM& LRFs	Fume Extraction system with PTFE membrane bag filters	PM < 30 mg/Nm^3
4.	FBC Boiler	Electro Static Precipitators (ESP) (High performance rigid electrodes with transformer)	PM < 30 mg/Nm^3
		Automatic lime dosing control system	SOx <100 mg/Nm^3
		Combustion temperature will be around 800-850^{0}C, which is not conducive for thermal NOx formation. Low NOx burners with 3-stage combustion, flue gas recirculation and auto combustion control system will be provided.	NOx <100 mg/Nm^3
Note: Apart from the above Dry fog system with dust suppression at transfer points, crushing plant, dust extraction system with bagfilters at other dust emanating areas, covered conveyers, mechanical dust sweepers, etc. will also be provided.			

Apart from the above the following air emission control systems/ measures are proposed in the Plant:

- All conveyors will be completely covered with G.I. sheets to control fugitive dust.
- All bins will be totally packed and covered so that there will not be any chance for dust leakage.
- All the dust prone points material handling systems will be connected with de-dusting system with bag filters.
- All discharge points and feed points, wherever the possibility of dust generation is there a de-dusting suction point will be provided to collect the dust.

11.7.2 Water Environment

- There will be no effluent discharge in the I/O Beneficiation, Pellet Plant, DRI Unit, Induction Furnace Unit, Electric Arc Furnace, Ferro Alloys as closed-circuit cooling system will be adopted.
- Effluent from Rolling mill will be sent to settling tank and will be recycled through closed circuit cooling system.

- Effluent from power plant will be treated in ETP and after ensuring compliance with WBPCB norms, it will be utilized for dust suppression, ash conditioning and for greenbelt development.
- Air cooled condenser will be provided in the power plant, which will reduce the water consumption significantly. Hence wastewater generation will be also be minimized.
- Sanitary waste water will be treated in STP and after treatment it will be utilized for greenbelt development.
- Zero liquid effluent discharge practice will be continued in the proposed expansion also.
- During monsoon the treated effluent will be utilized as makeup water in Rolling Mill. Accordingly, the makeup water for Rolling mill also reduces during the rainy period.

EFFLUENT TREATMENT PLANT

pH of the boiler blow down will be between 9.5 to 10.5. Hence a neutralization tank will be constructed for neutralizing the boiler blow down. DM plant regeneration water will be neutralized in a neutralization tank. After neutralization, these two effluent streams will be mixed in Holding Tank. Service water will be treated in an oil separator and after treatment it will also be taken to Holding Tank. The treated effluent will be utilized for dust suppression, ash conditioning and for Green belt development. Sanitary waste water will be treated in proposed STP.

TREATED EFFLUENT DISPOSAL

Effluent quantity to be used for ash conditioning	:	91 m^3/day
Effluent to be used for dust suppression in CHP	:	300 m^3/day
Effluent to be used for Greenbelt development	:	200 m^3/day

32.79 Ha. (81.0 acres) of greenbelt (inclusive of existing) will be developed by using the treated effluent. Treated effluent which is proposed to be utilized for greenbelt during non-monsoon period, will be used as make up water for Rolling Mill, during monsoon.

11.7.3 Noise Environment

The major sources of noise generation in the proposed project will be STG, boilers, compressors, DG set, etc. Acoustic enclosure will be provided. All the machinery will be

manufactured in accordance with MoEF&CC norms on Noise levels. The employees working near the noise generating sources will be provided with earplugs. The extensive greenbelt development proposed within the plant premises will help in attenuating the noise levels further. Noise barriers in the form of trees are recommended to be grown around administrative block and other utility units.

11.7.4 Land Environment

The waste water generated from the proposed project will be treated in the Effluent Treatment Plant to comply with the SPCB standards and will be used for dust suppression, ash conditioning and for greenbelt development. All the required Air emission control systems will be installed and operated to comply with SPCB norms. Solid wastes will be disposed off as per norms. Extensive greenbelt will be developed in the plant premises. Desirable beautification and landscaping practices will be followed. Hence there will not be any impact due to the proposed expansion project.

Solid waste generation and disposal

TABLE NO. 11.7.2: SOLID WASTE GENERATION & ITS DISPOSAL

S.No.	Waste	Quantity (TPA)			Method of disposal
		Existing	Proposed	After expansion	
1.	Tailing from Beneficiation plant	--	2,40,000	2,40,000	Tailings from thickener will be taken to filter press and the dewatered tailings cake be stored in the yard with 30 days capacity. This will be given to Ceramic industries / cement plants.
2.	Pellet Plant (ESP & Bagfilter dust from dedusting system)	--	2,200	2,200	Will be given to Brick manufacturing units.
3.	Ash from DRI	32,400	1,00,980	133,380	Is being utilized in the existing Brick Plant (Partly) & given to other Brick/ Cement manufacturers. In expansion Ash will be utilized in brick making unit and excess if any will be supplied to other brick manufacturer / Cement Plant.
4.	Dolochar	54,000	1,40,250	194,250	Is being utilized in the exising AFBC boiler-based power plant. The same practice will be continued after expansion also.

5.	Kiln Accretion Slag	1,620	5,049	6,669	Is being given to road contractors for road construction& given to brick manufacturer and same practice will be continued after the proposed expansion also.
6.	Wet Scraper Sludge	2400	7,517	9,917	Is being given to road contractors for road construction& given to brick manufacturer and same practice will be continued after the proposed expansion also.
7.	SMS Slag	32,800	64,610	97,410	Presently it is utilized in the slag crusher unit of M/s. Shyam Steel Industries Ltd. (Sister Concern unit) at Bamunara Industrial Estate, where it is processed for metal recovery. The remaining material after the recovery process is further used as Raw material for Brick manufacturing unit at M/s. Shyam Steel Industries Ltd.
8.	End cuttings from rolling Mill	8,700	12,780	21,480	Reused in SMS
9.	Mills Scales from Rolling Mill	5,800	1,716	7,516	Will be used in existing and proposed SMS &Ferro Alloys plant captively
10.	Ash from Power Plant (With Indian Coal + Dolochar)	40,920	1,03,870	1,44,790	Is being given to M/s. BMR Enterprises, who is a supplier of ash to M/s. Ultratech Cement Ltd., Durgapur. In the proposed expansion project also ash will be given to M/s. BMR Enterprises for utilization of ash in cement manufacturing.

11.7.5 Greenbelt Development

- **32.79 Ha. (81 acres)** of Greenbelt (inclusive of existing) will be developed within the plant premises.
- 35,000 nos. of plants are existing till date (survival rate 85%).
- 7 m to 140 m wide greenbelt is being developed all around the plant.
- Another 46,000 nos. of saplings will be planted as part of expansion.
- Local DFO will be consulted in developing the green belt.
- The tree species to be selected for the plantation are pollutant tolerant, fast growing, wind firm, deep rooted. A three-tier plantation is proposed comprising of an outer most belt of taller trees which will act as barrier, middle core acting as air cleaner and the innermost core which may be termed as absorptive layer consisting of trees which are known to be particularly tolerant to pollutants.
- 1000 plants will be planted per acre as per CPCB norms.

11.7.6 Cost for Environment Protection

Capital Cost for Environment Protection for proposed expansion : Rs. 87.55 Crores

Recurring Cost per annum for Environmental protection : Rs. 16.0 Crores

11.7.7 Implementation of CREP Recommendations

All the CREP recommendations will be implemented & followed strictly.

- Continuous stack monitoring system is proposed for stack attached to WHRB & FBC Boiler.
- Online Ambient Air Quality Monitoring Stations will be established in consultation with SPCB during operation of the plant.
- Fugitive emission monitoring will be carried out as per CPCB norms.
- Energy meters will be installed for all the pollution control systems.
- Additional Rain water harvesting pits will be constructed outside the plant premises in consultation with CGWB.

CHAPTER – 12
DISCLOSURE OF CONSULTANT ENGAGED

12.1 DISCLOSURE OF CONSULTANT ENGAGED [Std. TOR # 2 (i)]

Pioneer Enviro Laboratories & Consultants Pvt. Ltd. is QCI-NABET accredited EIA Consultant, vide certificate No. NABET/ EIA/ 1922/ RA 0149. It is one of the leading Environmental Consultancy organizations in South India and Chhattisgarh. Established in 1996 PIONEER ENVIRO has an excellent track record of serving several well-established Group companies across the Country.

PIONEER ENVIRO is a team of professionals in various disciplines such as Environmental Engineering & Environmental Management. The team is slated to double in next two years.

Our goals are to provide all of our clients with quality services at a fair, competitive price. By offering a turnkey service (excepting some specific areas), we can maximize the efficiency of data collection so that our clients pay one time for similar services. The technologies deployed at PIONEER ENVIRO are current and leading edge, duly validated.

PIONEER ENVIRO has an exceptional team of Environment professionals. PIONEER ENVIRO has the expertise to assess the impact of various industrial activities such Coal Washery, Power Plants, Steel Plants, Distilleries, Cement Plants etc., on the environment. These assessments will help the industry to install the best Environmental Management Systems and to maintain the plant in accordance with the norms stipulated for ISO-14001 & ISO-18000. PIONEER ENVIRO services range from site assessments, environmental audits, environmental impact statements and risk assessments to waste management.

Following are some of the services which are PIONEER ENVIRO core competency:

- Helping the client to select the suitable site as per the norms of Ministry of Environment and Forest, Govt. of India and State Pollution Control Boards in India.
- Environmental Impact assessment studies carried out as per the guidelines issued by Ministry of Environment and Forest, Govt. of India and State Pollution Control Boards in India.
- Environment Audits.
- Risk Assessment and Disaster Management Studies.
- Occupational health & industrial hygiene.

- Solid waste management.
- Environmental baseline studies covering the fields of ambient Air, Surface water, Ground water, Soil, Noise and Biological Environment (Flora & Fauna).
- Stack Emission Monitoring, Effluent Analysis, Ground water analysis.
- Design of Effluent Treatment Plant
- Design of Sewage Treatment Plant

Quality Council of India

National Accreditation Board for Education & Training

CERTIFICATE OF ACCREDITATION

Pioneer Enviro Laboratories and Consultants Private Limited, Hyderabad

2nd Floor, A-Z Elite, Plot No. 197, Kavuri Hills, Guttala Begumpet Village, Madhapur, Hyderabad

Accredited as Category - A organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations: Version 3 for preparing EIA-EMP reports in the following Sectors:

Sl. No.	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals - Opencast mining only	1	1 (a) (i)	A
2	River Valley projects	3	1 (c)	A
3	Thermal power plants	4	1 (d)	A
4	Coal Washeries	6	2 (a)	A
5	Mineral beneficiation	7	2 (b)	B
6	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	A
7	Cement plants	9	3 (b)	A
8	Asbestos milling and asbestos based products	12	4 (c)	A
9	Distilleries	22	5 (g)	A
10	Sugar Industry	25	5 (j)	B
11	Building and construction project	38	8 (a)	B
12	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RA AC minutes dated Nov 29, 2019 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/20/1190 dated Jan 22, 2020. The accreditation needs to be renewed before the expiry date by Pioneer Enviro Laboratories and Consultants Private Limited, Hyderabad following due process of assessment.

Sr. Director, NABET
Dated: Jan 22, 2020

Certificate No.
NABET/ EIA/1922/ RA 0149

Valid till
March 22, 2022

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

No. Q-15018/33/2019-CPW
Government of India
Ministry of Environment, Forest and Climate Change
CP Division

Room No. A-129, Agni Block, 1st Floor,
Indira Paryavaran Bhawan,
Jor Bagh Road, New Delhi- 110003

Dated: 12th October, 2020

To

M/s Global Enviro Labs
#2-2-1075/14/A/1, 1st Floor
Tilak Nagar 'X' Road, Bagh Amberpet
Hyderabad-500013, Telangana

Ref: (i) MoEF&CC's letter No. Q-15018/33/2019-CPW dated 05.06.2020
(ii) M/s Global Enviro Labs, Hyderabad, Telangana Letter dated 01.10.2020.

Subject: - Extension of validity of recognition of M/s Global Enviro Labs, #2-2-1075/14/A/1, 1st Floor, Tilak Nagar 'X' Road, Bagh Amberpet, Hyderabad-500013, Telangana as Environmental Laboratory under the Environment (Protection) Act, 1986.

Sir,

With reference to the above, and in view of the current validity of mandatory certificates submitted, this Ministry hereby extends the validity of recognition of M/s Global Enviro Labs, Hyderabad, Telangana under the Environment (Protection) Act, 1986 to 28.09.2023, as shall be notified in the Gazette of India.

2. This recognition is subject to all the terms and conditions detailed in this Ministry's letter under reference and these shall be strictly adhered to by the laboratory.

Yours faithfully,

(Dr. Ritesh Joshi)
Scientist 'E'
Email; ritesh.joshi@nic.in

Copy to:

1. Member Secretary, Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, New Delhi – 110032.
2. Member Secretary, Telangana State Pollution Control Board, A-3, Industrial Estate, Sanath Nagar, Hyderabad
3. Additional Principal Conservator of Forests (C), 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. Director, IT Division, MoEF&CC, New Delhi-110003: for uploading on MoEF&CC website